CURRICULUM

SUPERSPECIALITY – D.M. / M.Ch. Courses

2008-09

JAWAHARLAL INSTITUTE OF POSTGRADUATE MEDICAL EDUCATION & RESEARCH (JIPMER),

PUDUCHERRY-605 006

Academic Affairs
Concerned Officials

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Dr. K.S. Reddy	**…**	**Dean**
Dr. S. Mahadevan	**…**	**Professor (Academics)**
Dr. M.G. Sridhar	**…**	**Professor (Examinations)**

Jawaharlal Institute of Postgraduate Medical Education & Research (JIPMER), Puducherry-605 006.

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SUPERSPECIALITY – D.M. / M.Ch.

MEDICAL EDUCATION

CONTENTS

D.M. (DOCTOR OF MEDICINE)

CARDIOLOGY

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1. COURSE OBJECTIVES

The Higher Specialty Post-Doctoral Course D.M Cardiology is conducted at JIPMER, Pondicherry.

The Course has been Commenced after due permission from the Medical Council of India and the Ministry of Health Government of India vide Letter No. U. 12012/30/2001- ME (P) Dated 30th August 2001.

The Course Duration is for 3 Years as per the norms of the Medical Council of India Recommendations on Post Graduate Medical Education Adopted by the Medical Council of India in January 1992 Revised up to April 1993, and opening of Higher Course of study regulation 1993 as amended by Gazette notification part III-section 4 dated 24th June 1997, amended again and called as The Post graduate Medical Education Regulations and published in Part III, Section 4 of Gazette Of India Dated the 7th October, 2000.

The Pondicherry University has granted Provisional Affiliation to this course vide Letter PU/AS-1/Aca-8/1/99/JIPMER/160 Dated 02/03/04.

GENERAL CONDITIONS TO BE OBSERVED AS PER MCI GUIDELINES

1. Post Graduate Medical Education in the case of Super-specialties shall be of three years duration after MD as prescribed.
2. Post Graduate Curriculum shall be competency based.
3. Learning in post graduate programme shall be essentially autonomous and self directed.

4. A combination of both formative and summative assessment is vital for the successful completion of the PG programme.
5. A modular approach to the core curriculum is essential for achieving a systematic exposure to the various sub-specialties concerned with the discipline of Cardiology.
6. The training of PG students shall involve learning experience derived from and targeted to the needs of the community. It shall, therefore, be necessary to expose the students to community base activities.

1.1: TRAINING OBJECTIVES

GENERAL OBJECTIVES OF POST-GRADUATE TRAINING EXPECTED FROM STUDENTS AT THE END OF POST GRADUATE TRAINING AS RECOMMENDED BY THE MCI

At the end of the Postgraduate training in the discipline concerned the student shall be able to

1. Recognise the importance of Cardiology in the context of the health needs of the community and national priorities in the health sector.
2. Practice Cardiology ethically and in step with the principles of primary health care.
3. Demonstrate sufficient understanding of the basic sciences relevant to Cardiology.
4. Identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning therapeutic, rehabilitative, preventive, and promotive measures/strategies.
5. Diagnose and manage majority of conditions in the specialty of Cardiology on the basis of clinical assessment, and appropriately selected and conducted investigations.
6. Plan and advice measures for the prevention and rehabilitation of patients suffering from disease and disability related to the specialty of Cardiology.
7. Demonstrate skills in documentation of individual case details as well as morbidity and mortality data relevant to the assigned situation.
8. Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behaviour in accordance with the societal norms and expectation.
9. Play the assigned role in the implementation of National Health Programmes, effectively and responsibly.
10. Organise and supervise the Cardiological Health Care services demonstrating adequate managerial skills in the clinic/hospital in the field situation.
11. Develop skills as a self-directed learner, recognise continuing educational needs: select and use appropriate learning resources.
12. Demonstrate competence in basic concepts of research methodology and epidemiology and be able to critically analyse relevant published research literature.
13. Develop skills in using educational methods and techniques as applicable to the teaching of medical/nursing students, general physicians and paramedical health workers.
14. Function as an effective leader of a health team engaged in health care, research or training.

COMPONENTS OF THE POST GRADUATE CURRICULUM

The major components of the Post-Graduate Curriculum are according to the guidelines issued by the MCI are

1. Theoretical Knowledge
2. Practical and Clinical skills
3. Attitudes including Communication skills
4. Knowledge about research methodology.

TRAINING OBJECTIVES IN THE HIGHER SPECIALTY OF CARDIOLOGY

KNOWLEDGE:

At the end of the course, upon successful completion of training and passing the examination the candidate is expected to

1.1.1: Acquire comprehensive knowledge of the basics of Cardiology including all allied specialities related to Cardiology like Cardiac Anatomy, Physiology, Biochemistry, Pharmacology, Pathology, Microbiology, Preventive Cardiology, Cardiac Epidemiology, Paediatric Cardiology and Cardiac Surgery.

SKILLS

1.1.2: Possess complete Clinical Diagnostic Skills for the recognition of common heart diseases.

1.1.3: Possess a complete knowledge of all the commonly used Non-Invasive Cardiac Diagnostic Tests like Electrocardiography, Cardiac Roentgenology, Exercise Stress Testing, Dynamic Cardiography, Echocardiography etc.

1.1.4: Acquire skills in the performance and interpretation of commonly used Invasive Cardiac procedures like Diagnostic Cardiac Catheterization and Angiography and Cardiac Interventions

1.1.5: Able to apply sound clinical judgement and rational cost effective investigations for the diagnosis and management of Cardiac Cases in the OPD, Wards, Emergency Room and Intensive Care unit.

1.1.6: Possess some understanding of the recent advances in the subject of Cardiology and all its allied specialities and working knowledge of the sophisticated and routine equipments, consumables used in Cardiology.

1.1.7: Possess knowledge of research work in the field of Cardiology in both the Clinical and experimental field with the ability to usefully analyse data.

1.1.8: Be able to teach undergraduate students MBBS as well as Post Graduate Students MD Med or Pediatrics Clinical as well as investigative Cardiology.

1.1.9: Be able to perform Clinical and Investigative studies and to present in Seminars etc.

1.1.10: Have the ability to organise specific teaching and training programmes for para medical staff, associated professionals and patient education programmes. Should be able to develop good communication skills and give consultations to all other departments of the hospital.

ATTITUDE AND VALUES

Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal **behaviour in accordance with the societal norms and expectation.**

1.2: NATIONAL OBJECTIVES

1.2.1: Should be able to work in any hospital in India with minimum of facilities and should be able to diagnose and treat cardiac disease swiftly and efficiently both on an elective and emergency basis.

1.2.2: Should be able to start a Cardiac Unit with effective functioning with minimum inputs.

1.2.3: Should be able to work effectively in National Programmes for the Prevention or Eradication of Heart Diseases.

2. COURSE CONTENT

A) AIM: To produce specialists with necessary skills, judgement and sense of dedication to tackle all major and minor cardiac problems. The candidates will be trained in all aspects of cardiology starting from Basic Sciences to Recent Advances.

B) THEORY: The study will cover the entire scope of Cardiology.

2.1: BASIC SCIENCES RELATED TO CARDIOLOGY

2.1.1: CARDIAC ANATOMY

The cardiac anatomy with special emphasis on development of heart and blood vessels, foetal circulation and its changes in post natal life; coronary circulation; venous drainage of heart ; the heart and pericardium and its relation to neighbouring structures; anatomy of cardiac chambers and valves; arteries and veins; histology of heart and blood vessels. Functional anatomy of the heart, orientation of the heart within the Thorax, Methods used to study cardiac anatomy, correlative anatomy, New developments and future challenges, Quantum computing, Ultrastructure of the heart, Cardiac Embryology and Histology.

2.1.2: CARDIAC PHYSIOLOGY

Cardiac Physiology will cover all the physiological changes in the heart during its normal function with special reference to cardiac cycle; myocardial contractility; pressure changes in the cardiac chambers; cardiac output; factors controlling blood flow; regulation of cardiac function; cardiac reflexes; coronary blood flow; exercise physiology; physiology of blood pressure regulation; normal influence on cardiovascular system; preload; after-load; assessment of

ventricular function; regulation of cardiac contraction; action potentials; the cellular basis of cardiac contraction, Integration of the cardiovascular system the response to dynamic exercise, etc.

2.1.3. CARDIAC MOLECULAR BIOLOGY

Principles of molecular biology including Gene Structure, Expression and regulation; Recombinant DNA Technology; PCR Techniques, Molecular basis for cellular growth, Molecular and cellular bilology of the normal, hypertrohied and failing heart including cardiac growth and hypertrophy, Molecular and Cellular biology of the blood vessels including endothelial cell vascular smooth muscle interactions, atherosclerosis etc, The Human Genome and its future implications for cardiology including bioethical implications and genetic counselling, Cardiovascular Tissue modification by genetic approaches including Gene Transfer etc, Molecular Development of the heart including anomalies.

2.1.4 CARDIAC BIOCHEMISTRY

All aspects of normal and abnormal patterns of cardiac biochemistry including cardiac enzymes; lipid profile, cardiac metabolism, electrolytes and their effect on cardiac function etc.

2.1.5 CARDIAC PHARMACOLOGY

All the drugs used in the treatment of cardiac disorders inclusive of antianginal agents like beta-blocking agents, nitrates and calcium channel blockers, antifailure agents like diuretics, Angiotensin-Converting Enzyme (ACE) Inhibitors, Angiotensin-II Receptor Blocking Drugs (ARBs) and aldosterone antagonism, Digitalis, Acute Inotropes and inotropic Dilators, Antihypertensive Drugs, Antiarrhythmic Drugs, Antithrombotic agents like Platelet Inhibitors, Anticoagulants and Fibrinolytics, Lipid-Lowering and Atherosclerotic Drugs , choice of drugs, which drug for which disease?, Adverse Cardiovascular Drug Interactions and Complications.

2.1.6 CARDIAC PATHOLOGY

All pathological changes in various cardiac diseases with special reference to clinical correlation included. Special emphasis on pathological changes in the pulmonary vascular system in various cardiac disorders; pathogenesis and pathology of rheumatic fever and rheumatic heart disease; cardiomyopathies dilated, hypertrophic and obliterative / restrictive; congenital heart diasease-cyanotic and acyanotic; atherosclerosis; coronary artery disease; cardiac involvement in other systemic diseases and storage disorders etc.

2.1.7 CARDIAC MICROBIOLOGY

The various microbiological aspects of cardiac diseases including rheumatic fever, infective endocarditis, myocarditis are included. Cardiac Molecular Biology has been included under a separate head.

THERE WILL BE ONE THEORY PAPER OF 100 MARKS ENTIRELY DEVOTED TO BASIC SCIENCES AS RELATED TO CARDIOLOGY.

2.2 CLINICAL CARDIOLOGY INCLUDING PEDIATRIC CARDIOLOGY.

2.2.1 GENERAL EVALUATION OF THE PATIENT

The History, Physical Examination and Cardiac Auscultation including elements of accurate history taking, symptoms associated with cardiovascular disease, The physical examination of adults, children, infants and neonates, syndromes associated with congenital heart disease, measurement of arterial blood pressure, venous pulse, examination of the retina, inspection and palpation of the precordium, cardiac auscultation.

2.2.2 HEART FAILURE

Pathophysiology and diagnosis of Heart Failure, Diagnosis and management of heart failure, Cardiac transplantation and mechanical ventricular support.

2.2.3 RHYTHM AND CONDUCTION DISTURBANCES

Mechanisms of cardiac arrhythmias and conduction disturbances, Recognition, clinical assesment and management of arrhthmias and conduction disturbances, antiarrhythmic drugs, etc

2.2.4 SYNCOPE, SUDDEN DEATH AND CARDIO-PULMONARY RESUSCITATION

Diagnosis and management of syncope, sudden cardiac death, Cardiopulmonary Resuscitiation and the subsequent management of the patient etc.

2.2.5 CORONARY HEART DISEASE

Atherogenesis and its determinants, Pathology of coronary atherosclerosis, Coronary blood flow and myocardial ischemia, Dyslipidemia, other risk factors, and the prevention of coronary heart disease, Non atherosclerotic coronary heart disease, Diagnosis and management of patients with chronic ischemic heart disease, Diagnosis and management of patients with unstable angina, Diagnosis and management of patients with acute myocardial infarction, The electrocardiogram in Acute myocardial infarction, Thrombogenesis, antithrombotic and thrombolytic therapy, rehabilitation of the patient with coronary heart disease etc.

2.2.6 SYSTEMIC ARTERIAL HYPERTENSION

Hypertension, epidemiology, pathophysiology, diagnosis and treatment.

2.2.7 PULMONARY HYPERTENSION AND PULMONARY DISEASE

Pulmonary hypertension, Pulmonary embolism, Chronic Cor pulmonale etc.

2.2.8 VALVULAR HEART DISEASE

Acute rheumatic fever, Aortic valve disease, Mitral valve disease, Mitral valve prolapse syndrome, tricuspid valve, pulmonic valve and multivalvular disaese, Clinical performance of prosthetic heart valves, Antitihrombotic therapy for valvular heart disease etc.

2.2.9 CONGENITAL HEART DISEASE

Cardiovascular disease due to genetic abnormalities, the pathology, pathophysiology, recognition and treatment of congenital heart diseases, Congenital heart disease in adults etc.

2.2.10 CARDIOMYOPATHY AND SPECIFIC HEART MUSCLE DISEASES

Classification of cardiomyopathies, Dilated cardiomyopathy, hypertrophic cardiomyopathy, Restrictive, obliterative and infiltrative cardiomyopathies, Myocarditis and specific cardiomyopathies endocrine disease and alcohol, AIDS and the cardiovascular system, Effect of noncardiac drugs, electricity, poisons and radiation and the heart etc.

2.2.11 PERICARDIAL DISEASES AND ENDOCARDITIS

Diseases of the pericardium, Infective endocarditis

2.2.12 THE HEART, ANESTHESIA, AND SURGERY

Perioperative evaluation and management of patients with known or suspected cardiovascular disease who undergo noncardiac surgery, Anesthesia and the patient with cardiovascular disease, etc.

2.2.13 MISCELLANEOUS DISEASES AND CONDITIONS

The connective tissue diseases and the cardiovascular system, Neoplastic heart disease, Diabetes and cardiovascular disease, traumatic heart disease, effects of mood and anxiety disorders on the cardiovascular system, Heart disease and pregnancy, The heart and obesity, the heart and kidney disease, exercise and the cardiovascular system, Acute hemodynamics conditioning training the athelete’s heart and sudden death, Cardiovascular aging in health and therapeutic considerations in older patients with cardiovascular diseases, women and coronary artery disease etc.

2.2.14 TROPICAL CARDIOLOGY

Conditions which are specifically found in the tropics like rheumatic heart disease, Endomyocardial Fibrosis, Eosinophilic Heart Disease, Aortoarteritis etc.

2.2.15 DISEASES OF THE GREAT VESSELS AND PERIPHERAL VESSELS

Diagnosis and treatment of diseases of the aorta, Cerebrovascular disease and neurologic manifestations of heart disease, diagnosis and management of diseases of the peripheral arteries and veins, surgical treatment of peripheral vascular diseases, etc.

THERE WILL BE ONE THEORY PAPER OF 100 MARKS ENTIRELY DEVOTED TO CLINICAL CARDIOLOGY INCLUDING PEDIATRIC

THE CLINICAL EXAMINATION WOULD BE ENTIRELY DEVOTED TO CLINICAL CARDIOLOGY INCLUDING PEDIATRICS ON THE ABOVE SYLLABUS AND WOULD INCLUDE ONE LONG CASE OF 100 MARKS AND TWO SHORT CASES OF 50 MARKS EACH, TOTALLING TO 200 MARKS

2.3 DIAGNOSTIC AND INTERVENTIONAL CARDIOLOGY INCLUDING CARDIAC INSTRUMENTATION

2.3.1 DIAGNOSTIC CARDIOLOGY

The resting Electrocardiogram, The Chest roentgenogram and cardiac fluoroscopy, The Echocardiogram, ECG Exercise Testing, Cardiac Catheterization, Coronary Arteriography, Coronary Blood Flow and Pressure Measurements, Cardiac Ventriculography, Pulmonary Angiography, Angiography of the Aorta and Peripheral Vessels, Nuclear Cardiology, Computed tomography of the Heart, Magnetic resonance Imaging of the heart, Magnetic Resonance imaging of the Vascular System, Positron Emission Tomography for the noninvasive study and quantification of blood flow and metabolism in human cardiac disease, long-term continuous electrocardiographic recordings, Signal Averaging techniques and measurement of Late Potentials, Techniques of Electrophysiologic evaluation of Brady and tachyarrhythmias, Coronary Intravascular Ultrasound Imaging endomyocardial biopsy etc.

2.3.2 INTERVENTIONAL CARDIOLOGY

Percutaneous Coronary Interventions, Coronary Angioplasty, Atherectomy, Atheroablation and Thrombectomy, Coronary Stenting, Balloon Valvuloplasty, Peripheral Intervention, Pediatric interventions, Intraaortic Balloon Counterpulsation and other Circulatory Assist Devices, Interventional Electrophysiology, Cardiac pacemakers, implantable devices for heart failure and for the treatment of cardiac arrhythmias etc.

2.3.3 CARDIAC INSTRUMENTATION

Principles of cardiac instrumentation, pressure recording, ECG Machines, Cardiac Monitors, Defibrillators, Cath-Lab Equipment, EP Lab Equipment, Gamma Camera, CT Scan, MRI Equipment, PET Scans, Echocardiography including Stress Echo, Colour Doppler and

TEE, Pacemakers temporary and Permanent, ICDs, Triple Chamber Devices, radiofrequency ablation equipment, programmed stimulators, IABP, Holter and Signal Averaging and ABP machines, Treadmill equipments, Hemodynamic recorders, oximeters, Computers and image processing in Cardiology etc.

THERE WILL BE ONE THEORY PAPER OF 100 MARKS ENTIRELY DEVOTED TO DIAGNOSTIC AND INTERVENTIONAL CARDIOLOGY INCLUDING CARDIAC INSTRUMENTATION.

2.4 RECENT ADVANCES IN CARDIOLOGY, CARDIAC EPIDEMIOLOGY, PREVENTIVE CARDIOLOGY INCLUDING RELATED CARDIAC SURGERY

2.4.1: Atherosclerosis and Prevention: Epidemiology of Cardiovascular Diseases, Risk factors for atherosclerotic diseases, assessment of cardiac risk, Special Problems in the prevention of cardiovascular disease; (a) Diabetes mellitus type 2; (b) Menopausal women; (c) Non-traditional risk factors for coronary disease, Special problems in hyperlipidemia therapy; (a) Child with hypercholesterolemia; (b) Transplant patient; (c) Hypercholesterolemia in the elderly; (d) Elevated lipoprotein.

2.4.2: Non Cardiac Vascular Disease: Special problems in Vascular Disease; (a) Compromise of an internal thoracic artery to coronary artery graft by subclavian artery disease; localised lymphedema

2.4.3: Ischemic Heart Disease: Special Diagnostic issues in Ischemic Heart Disease:

(a) The patient with chest pain, a positive stress test and normal coronary arteries; (b) The patient with coronary artery disease and acute and chronic heart failure

2.4.4: Stable Coronary Syndromes: Special problems in myocardial ischemia; (a) management of variant angina breakthrough; (b) management of the non-revascularization patient with severe angina; (c) treatment of silent ischemia; (d) treatment of microvascular angina; (e) Viagra, sexual activity and the cardiac patient.

2.4.5: Acute Coronary Syndromes: Special problems in Acute Myocardial Infarction; (a) right ventricular infarction (b) acute myocardial infarction and normal coronary arteries; (c) non perfused acute myocardial infarction after thrombolytic therapy.

2.4.6: Non Pharmacological treatment of Ischemic Heart Disease: Special problems in non pharmacologic therapy: (a) unprotected left main coronary angioplasty; (b) chronic total occlusion; (c) saphenous vein graft interventions; (d) percutaneous intervention of cardiac allograft vasculopathy; (e) In-stent restenosis.

2.4.7: Hypertension: Management issues in difficult hypertension like (a) Hypertension and ethnicity; (b) hypertension in pregnancy preeclampsia; (c) perioperative hypertension; (d)

ambulatory blood pressure monitoring; (e) diabetes and hypertension; (f) resistant hypertension; (g) hypertension in the context of acute myocardial infarction or coronary interventions; (h) concomitant therapy in hypertension.

2.4.8: Cardiac Arrhythmias: Special problems in cardiac pacing like (a) pacemaker syndrome; (b) temporary cardiac pacing; (c) diagnostic and surgical procedures in pacemaker patients; (d) pacemaker lead extraction; (e) biventricular pacing for congestive heart failure. Special problems in supraventricular arrhythmias like (a) Syncope in PSVT; (b) paroxysmal and perioperative atrial fibrillation; (c) cycle length alternantion in supraventricular tachycardia; (d) atrial flutter; (e) atrial fibrillation and anticoagulants. Special problems in ventricular arrhthmias like; (a) problems of implanted defibrillators; (b) syncope in a patient; (c) palpitations and VT in a young woman.

2.4.9: Heart Failure and Cardiomyopathy: Special problems in chronic heart failure like; (a) mechanisms of exercise intolerance and exercise testing; (b) cardiac cachexia; (c) anemia, renal dysfunction and depression inn heart failure; (d) disease management programs. Special problems in myocarditis and cardiomyopathy like (a) peripartum cardiomyopathy; (b) HIV myocarditis and cardiomyopathy; (c) Adriamycin induced cardiomyopathy; (d) Tachcardiomyopathy; (e) Diabetic Cardiomyopathy.

2.4.10: Valvular Heart Disease: Special problems in valvular heart diseases like; (a) new onset atrial fibrillation in asymptomatic mitral stenosis; (b) mitral stenosis and pregnancy; (c) low gradient, low ouput aortic stenosis; (d) mild to moderate aortic stenosis in patients undergoing by pass surgery; Special problems in surgical treatment of valvular diseases: (a) perivalvular leaks; (b) pregnancy and anticoagulation; (c) postoperative management of valvular dysfunction in valvular surgical treatment.

2.4.11: Congenital Heart Disease: Special problems in Adult Congenital heart diseases: (a) pregnancy in a woman with eisenmenger syndrome; (b) thromboembolism after fontan procedure; (c) late systemic RV failure in patients with TGA.

2.4.12: Special problems for the Cardiology Consultant.

THERE WILL BE ONE THEORY PAPER OF 100 MARKS ENTIRELY DEVOTED TO RECENT ADVANCES IN CARDIOLOGY, CARDIAC EPIDEMIOLOGY, PREVENTIVE CARDIOLOGY AND RELATED CARDIAC SURGERY

LEARNING RESOURCE MATERIALS

3. RECOMMENDED TEXT BOOKS AND JOURNALS

The following is only a partial recommended list of the prevailing text books and journals at the time of the compilation of the syllabus. As and when New Text Books or Journals become available, the candidates would be appraised accordingly.

3.1 : TEXT BOOKS

1. Braunwald E. Zipes D. Libby P.: Heart Disease : A Text Book of Cardiovascular Medicine: 6th Edition 2001 or Later.
2. Fuster V.: Hurst's The Heart: 10th Edition 2001 or Later.
3. Topol E. Comprehensive Cardiovascular Medicine: 2nd Edition 2003 or Later.
4. Crawford MH. DiMarco JP. Paulus WJ: Cardiology 2nd Edition 2004 or Later.
5. Baim DS. GrossmanW: Grossman's Cardiac Catheterization, Angiography and Intervention: 6th Edition 2000 or Later.
6. Feigenbaum H. Echocardiography: 6th Edition 2000 or Later.
7. Otto: Text book of Echocardiography: 2nd Edition 2003 or Later.
8. Perloff J: The Clinical Recognition of Congenital Heart Diseases: 4th Edition 1998 or Later.
9. Nadas AS. Pediatric Cardiology; 4th Indian Edition; 1992 or Later.
10. Garson A. The Science and Practice of Pediatric Cardiology: 2nd Edition 2000 or Later.
11. Moss and Adams: Heart Disease in Infants, Children and Adolescents: 6th Edition 2003 or Later.
12. Anderson RH: Pediatric Cardiology: 2nd Edition 2003 or Later.
13. Constant J. Bedside Cardiology: 5th Edition 1999 or Later
14. Marriot HJL: Practical Electrocardiography: 7th Edition 1987 or Later.
15. Opie LH. Drugs for the Heart 5th Edition 2001 or Later.
16. Topol E. Text Book of Interventional Cardiology 4th Edition 2004 or Later.

3.2 JOURNALS

1. Indian Heart Journal
2. Journal of the Association of Physicians of India.
3. Journal of the Indian Medical Association.
4. Bulletin of the ICMR
5. Bulletin of the WHO
6. American Heart Journal
7. Journal of the American College of Cardiology.
8. American Journal of Cardiology.
9. New England Journal of Medicine.
10. British Medical Journal
11. The Lancet
12. The Heart (Formerly called the British Heart Journal).

13. International Journal of Cardiology.
14. American Journal of Medicine.
15. Journal of the American Medical Association.
16. European Heart Journal.
17. Circulation
18. Circulation Research
19. Cardiology Clinics of North America.
20. Medical Clinics of North America.
21. Journal of Clinical Ultrasound.
22. Catheterization, Cardiovascular Diagnosis.
23. PACE
24. Indian Journal of Echocardiography.
25. Current Problems in Cardiology.
26. Radiology Clinics of North America.

The Student should also be familiarised with Internet browsing for Journals, Special Articles, Review Articles and other recent recommendations of International Societies like the American Heart Association, NASPE, European Cardiac Society etc.

4. MODE OF SELECTION

4.1 SELECTION OF POST GRADUATE STUDENTS MCI GUIDELINES

1. Students for DM Cardiology shall be selected strictly on the basis of their academic merit.
2. For determining the academic merit, the Institution may adopt course :- (i) On the basis of merit as determined by a competitive test conducted by a competent authority on a national level.

4.2 ELIGIBILITY

1. Candidates should have passed M.D Degree in General Medicine or in Pediatric Medicine from any University recognised as equivalent thereto by the Pondicherry University and the Medical Council of India.
2. Candidates should have passed DNB in General Medicine or DNB in Pediatric Medicine with Thesis.
3. Candidates appearing for M.D General Medicine/DNB General Medicine or MD Pediatric Medicine/DNB Pediatric Medicine examination and expecting results before admission may also submit their application subject to the condition that they pass their qualifying examination before admission.

4.3 PROCEDURE FOR SELECTION

1. There will be an Entrance Examination conducted by the Institute on a National Level at JIPMER, Pondicherry in the month of June/July. The advertisement for the same would be

published in all the leading national newspapers and employment news in the month of April/May.

2. The written examination would consist of 100 MCQs (40 in General Medicine & Pediatrics and 60 in Cardiology). The duration of the examination will be $1^1/_2$ hours.
3. The correct answer should be blackened with black ball point pen.
4. Each answer with correct response will carry (1) mark and no negative marking for wrong answer and unanswered.
5. After the written examination there will be a personal interview for the merit listed candidates at the rate of 5 candidates for one seat.
6. The personal interview will carry 20 marks and will have X-Ray and ECG.
7. The final merit list will be drawn on the basis of marks obtained both in written examination and in personal interview.
8. A detailed prospectus would be published and sent along with the application form giving all details of the mode of eligibility of admission, submission of application, Procedure for selection, Date of Joining, Registration with University, Contract and Emoluments, Leave during residency, Accommodation, Duties and Responsibilities, Hours of work, Leave, Certificates, Fees etc.
9. The course would commence ordinarily on 1st August.

SAMPLE OF THE MULTIPLE CHOICE QUESTION PAPER FOR DM ENTRANCE

1. If there is history of maternal systemic lupus erythematosus the fetus is likely to have
   A. Corrected Transposition of the great arteries.
   B. Complete heart block.
   C. Ventricular Septal Defect. Ans: B
   D. Patent Ductus Arteriosus.
2. The typical "Diabetic Dyslipidemia" is
   A. Elevated Triglycerides, Mildly Elevated LDL, Reduced HDL.
   B. Elevated Triglycerides, Reduced LDL, Increased HDL.
   C. Normal Triglycerides, Increased LDL, Normal HDL. Ans: A
   D. Normal Triglycerides, Normal LDL, Reduced HDL.
3. Cardiac Resynchronisation Therapy is most effective in
   A. Patients with normal QRS duration and EF of <40%.
   B. Patients with Wide QRS, RBBB and EF<40%. Ans: C
   C. Patients with LBBB, Wide QRS and EF<40%.
   D. Patients with normal QRS duration and EF>40%.

TEACHING LEARNING EXPERIENCE

5. TRAINING

5.1 PERIOD OF TRAINING MCI GUIDELINES

The period of training for obtaining the degree of D.M in Cardiology shall be three completed years (including the examination period) after obtaining M.D degree, or equivalent recognised qualification in the required subject.

5.2 TRAINING PROGRAMME MCI GUIDELINES

1. The training given with due care to the post graduate students in the recognised institutions for the award of D.M Cardiology , shall determine the expertise of the specialist and /or medical teachers produced as a result of the educational programme during the period of stay in the institution.
2. All the candidates joining the D.M Cardiology training programme shall work as full time residents during the period of training , attending not less than 80%(Eighty percent) of the training during the calendar year, and given full time responsibility, assignments and participation in all facets of the educational process.
3. D.M Cardiology students shall maintain a record (log book) of the work carried out by them and the training programme undergone including details of the Non-Invasive, Invasive Cardiac Diagnostic and Interventional Work assisted or done independently by the D.M Candidates.
4. During training for the D.M Cardiolgy there shall be proper training in basic medical sciences related to cardiology. Emphasis to be laid on preventive and social aspects and emergency care services.
5. The D.M Cardiology student shall be required to participate in the teaching and training programme of undergraduate and post graduate students in the departments of medicine, pediatrics etc.
6. Training in Medical Audit, management, health economics, health information system, basics of statistics, exposure to human behaviour studies, knowledge of pharmacoeconomics and introduction to non linear mathematics shall be imparted.
7. In Service training with the students being given 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, Advanced Diagnostic, Therapeutic and Laboratory techniques in cardiology.

5. 3 TEACHING LEARNING SCHEDULE

5.3.1 CLINICAL POSTINGS

YEAR	NO OF MONTHS	FROM TO	POSTING
FIRST YEAR	3	AUG-OCT	WARD/OPD
FIRST YEAR	3	NOV-JAN	ICU
FIRST YEAR	3	FEB-APR	NON-INVASIVE LAB
FIRST YEAR	3	MAY-JULY	CATH-LAB
SECOND YR	3	AUG-OCT	ICU
SECOND YR	3	NOV-JAN	NON-INVASIVE LAB
SECOND YR	3	FEB-APR	CATH-LAB

SECOND YR	3	MAY-JULY	WARD/OPD
THIRD YR	1	AUG	PED CARDIOL
THIRD YR	2	SEP-OCT	ICU
THIRD YR	3	NOV-JAN	CATH-LAB
THIRD YR	1	FEB	CTVS
THIRD YR	3	MAR-MAY	NON INVASIVE LAB
THIRD YR	1	JUNE	WARD/OPD
THIRD YR	1	JULY	EXAMN

5.3.1.1: WARD / OPD

These would be the first posting of the D.M Candidate. The candidate would first familiarize himself/herself with the general working of the hospital, the Wards, admission norms, sending of investigations, geography of the hospital, location of the various services, posting of cases for catheterization / intervenion, consent forms, blood availability, discharge protocol, medical records section etc. In addition the candidate would examine all the cardiac cases in the wards and give consultation to all other departments of the hospital with the help of the consultant.

If there are undergraduate MBBS or Post Graduate MD students from Medicine, Pediatrics or other specialties posted then he would impart relevant clinical examination and diagnostic skills to them.

The candidate would also be working in the OPD and assessing the suitability of the patients for admission, making an OPD diagnosis, planning the relevant investigations etc. In addition the candidate would manage the special clinics like Post Intervention Clinic and the Pacemaker Clinic of the Department.

The DM candidate would be put on regular 24 hour duties and would take the call from the Casualty and other department of the hospital. He/she would relieve the ICU person for Lunch etc.

A typical Ward / OPD posting would be

Sl. No.	DAY	9 AM-1 PM	2 PM-4.30 PM	4.30 PM-8 PM	8 PM - 9 AM
1	MONDAY	Ward	Post Intervention Clinic	Journal Club / Short Reviews / Rounds	Emergency Duty (On rotation)
2	TUESDAY	Ward	OPD	OPD/Rounds	Emergency Duty

					(On rotation)
3	WEDNESDAY	Ward	Pacemaker Clinic	Bedside Clinics / Rounds	Emergency Duty (On rotation)
4	THURSDAY	Ward	OPD	OPD / Rounds	Emergency Duty (On rotation)
5	FRIDAY	Ward	Cardio-Thoracic Conference	Cardio-Thoracic Conference / Rounds	Emergency Duty (On rotation)
6	SATURDAY	Ward	Post Hemodynamic Conference		Emergency Duty (On rotation)
7	SUNDAY	Ward			Emergency Duty (On rotation)

5.3.2: INTENSIVE CARE UNIT

This posting is essential for the candidate to learn all the aspects of Cardiac Intensive Care like Thrombolytic Therapy in Acute Myocardial Infarction, Hemodynamic Monitoring in Acute Myocardial Infarction using the Swan-Ganz Balloon Floatation Thermodilution Catheter with monitoring of Pulmonary Wedge Pressures, Cardiac Output and Resistances, management of Bradyarrhythmias with Temporary Cardiac Pacing, management of Tachyarrhythmias with DC Cardioversion / DC shock, Overdrive suppression, management of Acute Coronary Syndromes, all cardiac sick patients with shock states and hemodynamic compromise, post cath and intervention patients who are unstable, insertion of Intra Aortic Balloon Pump, Emergency Non invasive diagnosis like ECHO etc, Pericardiocentesis, Ventilator therapy, all emergency cardiac consultations etc. The candidate should familiarize himself/herself with all the monitoring gadgets in the ICU like Monitors, Cardiac Output Recorders, Defibrillators, IABP Machine, Ventilators, ABG machines etc.

The candidate would be on duty in the Intensive Care Unit from 9 A.M to 9 P.M and 24 hours by rotation. He / she would also attend the teaching programmes of the department when free from patient care. He/she would be relieved for lunch by the ward resident. The candidate would also be taking calls from the casualty and giving consultations to all department of the hospital.

A typical ICU posting would be

Sl. No.	DAY	9 AM – 1 PM	1 PM – 2 PM	2 PM - 9 PM	9 PM - 9AM
1	MONDAY	ICU	Lunch	ICU+Journal Club/Short Reviews	ICU(On rotation)
2	TUESDAY	ICU	Lunch	ICU	ICU(On rotation)
3	WEDNESDAY	ICU	Lunch	ICU+Bedside Clinics	ICU(On rotation)
4	THURSDAY	ICU	Lunch	ICU	ICU(On rotation)
5	FRIDAY	ICU	Lunch	ICU+Cardio-Thoracic Conference	ICU(On rotation)
6	SATURDAY	ICU	Lunch	ICU+Post Hemodynamic Conference	ICU(On rotation)
7	SUNDAY	ICU	Lunch	ICU	ICU(On rotation)

5.3.3: NON-INVASIVE LABORATORY POSTING

The candidate would be posted in the Non-Invasive Laboratory wherein he/she would receive training and independently perform Computerised ECG Recording and Evaluation, Colour Doppler Echocardiographic Examination, Transesophageal Echocardiographic Examination, Dobutamine Stress Echocardiographic Examination, Holter Monitoring and evaluation, Event Recorder and analysis, Ambulatory Blood Pressure Monitoring. The candidate would learn all aspects of Cardiac Instrumentation like ECG machines, Treadmill, Echocardiography machines, holter, event recorders etc. In addition the candidate would also learn Nuclear Cardiology when he/she is posted to a Centre where facility for the same exists during the period of Pediatric Cardiology posting. The candidate would also be attending the OPD. During this period the candidate would also be attending all teaching programs of the department and would be doing emergency duties also in the ICU / taking casualty calls and giving consultations to all departments of the hospital.

A typical Non-Invasive Lab Posting would be

Sl. No.	DAY	9 A.M TO 1 P.M	2 P.M TO 4.30 P.M	4.30 P.M TO 8 P.M	DUTY 9 P.M TO 9 A.M
1	Monday	TMT Holter	Post Intervention Clinic	Journal Club Short Review Long	Emergency Duty (On rotation)

				Review Rounds	
2	Tuesday	Colour Doppler TEE	OPD	OPD	Emergency Duty (On rotation)
3	Wednesday	TMT Holter	Pacemaker Clinic	Bed-side Clinics	Emergency Duty (On rotation)
4	Thursday	Colour Doppler TEE	OPD	OPD	Emergency Duty (On rotation)
5	Friday	TMT Holter	Cardio-Thoracic Conference	Cardio-Thoracic Conference Rounds	Emergency Duty (On rotation)
6	Saturday	Dobutamine Stress Test	Post Hemodynamic conference		Emergency Duty (On rotation)
7	Sunday				Emergency Duty (On rotation)

5.3.4 : CATH –LAB POSTING

The Candidate would be posted in the cath-lab only after he/she is familiar with all aspects of cardiac care like wards, OPD, ICU and all non invasive cardiac diagnosis.

In the First Year of Cath-Lab posting the candidate would assist in all the diagnostic procedures like right heart catheterization, left heart catheterization, coronary angiography, peripheral angiography, electrophysiological studies etc. After a certain period, he/she would start assisting in Interventional Procedures like PTCA / STENT implantations, Balloon Valvuloplasties, Peripheral Interventions, PDA coil occlusions, Radio-Frequency Ablations, Permanent Pacemaker Implantations, ICD Implantations, CRT etc. He/she would familiarize himself / herself with all the cardiac instruments in the cath-lab like X-Ray I/I System, Hemodynamic Cath Lab recorder, EP Recorder, Oximeter etc. The candidate is responsible for all the precath instructions, explaining and counselling to the patients and relatives, preparing the cath list, consent, checking all the investigations, getting the pre-anesthetic check up done in case of necessity and posting the patients. He / she would give the necessary post cath care, secure hemostasis after the procedure, prepare the complete cath report and ensure that all records are maintained correctly and given to the patient etc. He / she should be available for Emergency Cath Procedures like Acute Primary PTCA etc even when not on duty. In routine conditions the candidate need not attend OPDs but it is necessary that he/she attends the rounds and does the emergency duties on rotation. The candidate would attend all the teaching programmes of the department and would present the data in the post hemodynamic conference.

In the Second Year of the Cath-Lab posting the candidate would be permitted to perform independently but under supervision all the diagnostic procedures. However, he/she would continue to assist in the Interventional Procedures. The rest of the work remains the same.

In the Third Year of the Cath-Lab posting the candidate would be permitted to perform Cardiac Interventions independently but under strict Supervision. The rest of the work remains the same.

The candidate should also learn all the consumables and the hardware used in diagnostic and interventional cardiac catheterization. He / she should be familiar with interpretation and diagnosing all the hemodynamic and angiographic data.

The candidate must learn all the ethical, legal considerations of the invasive work and learn to use them with wisdom and discretion.

A typical Cath-Lab Posting would consist of

Sl. No.	Day	8 AM - 4.30 PM	4.30 PM - 8 PM	Duty 9 PM - 9 AM
1	Monday	Cath-Lab	Pre/Postcath Rounds Journal Club Short/Long Reviews	Emergency Duty (On rotation)
2	Tuesday	Cath-Lab	Pre/Postcath Rounds	Emergency Duty (On rotation)
3	Wednesday	Cath-Lab	Pre/Postcath Rounds Bed-side Clinics	Emergency Duty (On rotation)
4	Thursday	Cath-Lab	Pre/Postcath Rounds	Emergency Duty (On rotation)
5	Friday	Cath-Lab	Pre/Postcath Rounds Cardio-Thoracic Conference	Emergency Duty (On rotation)
6	Saturday	Post Hemodynamic Conference		Emergency Duty (On rotation)
7	Sunday	Pre Cath Rounds		Emergency Duty (On rotation)

5.3.5 PERIPHERAL POSTINGS

1. PEDIATRIC CARDIOLOGY

The candidate should undergo one month peripheral posting in a Centre of Excellence in the field of Pediatric Cardiology. The Centres of Excellence in Pediatric Cardiology in India are

a) The All India Institute of Medical Sciences New Delhi
b) The Amritha Institute of Medical Sciences at Kochi
c) The Narayana Hridayalaya at Bangalore

2. CARDIO-THORACIC AND VASCULAR SURGICAL POSTING

One month of Posting in a CTVS Unit should be undertaken by the candidate at JIPMER, Pondicherry.

5.4 ACADEMIC PROGRAMME

5.4.1 Departmental Academic Programmes

1. **Journal Clubs:** Critical analysis of original research articles in Indian and International Journals, Journals from the Internet, recommendations of various committees like the American Heart Association, American College of Cardiology etc regarding indications of various procedures.

2. **Short Reviews:** Short review of the literature on a simple specified topic based upon the various theory papers in the examination like Basic Sciences applied to Cardiology, Clinical Cardiology including Pediatrics, Diagnostic Cardiology, Intervention and Cardiac Instrumentation and recent advances in cardiology, Preventive cardiology, cardiac epidemiology and cardiac surgery.

3. **Long Reviews:** Complete updated review of literature with critical analysis of major topics in cardiology e.g. Risk factors of atherosclerosis etc. These should be presented with slides and should be bound in the form of a book. Minimum number of Long reviews to be done is three during the entire course.

4. **Bed-Side Clinics:** Both short cases and long cases to be taken by the candidate and presented to the consultants in the same pattern as examination.

5. **Post Hemodynamic Conference:** Complete work up of each case with ECG, X-Ray, Colour Doppler, TEE and Cardiac Cath and Angio presented to the consultants and reviewed. All diagnostic and interventional cases done in one week reviewed.

5.4.2 INTER DEPARTMENTAL PROGRAMMES

1. Cardio-Thoracic Conference: A weekly inter departmental programmes between the departments of Cardiology and Cardio-Thoracic and Vascular Surgery Department.
2. Interdepartmental Colloquiam: Monthly meetings between the departments of Medicine and Cardiology.
3. Modular Teaching: Participation in Undergraduate Modular Teaching in the subjects of Cardiology.
4. Bed-side Clinics for Undergraduates in the Cardiology OPD.
5. Bed-side Clinics for Post Graduates i.e. M.D (Med) students.

CENTRAL ACADEMIC PROGRAMMES

1. Clinico-Pathological Exercise.
2. PG Seminar
3. Monthly meeting of the JIPMER Scientific Society.
4. Monthly Medical Review Meeting

6.1.1: **Log Book:** The candidate is expected to maintain a Log Book of all his/her activities with respect to (1) Bio-data (2) Complete List of Postings with periods and dates (3) Interesting cases seen and worked up during the period of posting (4) List of Short Reviews presented (5) List of Long Reviews presented (6) List of Journals reviewed (7) List of Cases presented and discussed in Bed-side clinics (8) List and abstracts of presentations in JIPMER Scientific Society, Conferences, PG Seminars, CPCs etc. (9) List of TMT, ECHO, TEE, Holter etc performed and analysed. (10) List of Cardiac Caths-Diagnostic and Interventional assisted and performed independently. (11) Samples of ECG, X-Ray, TMT, ECHO, TEE, Holter, Angio, EP Tracings, etc to be pasted in the Log Book. (12) Abstracts and lists of papers published or sent for publication. (13) Any other research projects undertaken. (14) Any other interesting detail.

This Log Book would be scrutinised and certified by the Head of Department and other Consultants and presented to the external examiners at the time of the final examination.

6.1.2: **Long Reviews:** The long reviews presented during the period of the course should be compiled and bound in the form of a book incorporating any diagrams, flow charts, algorithms etc and a complete list of up to date references and this along with the CD containing slides of these reviews should be submitted for scrutiny before the examination.

This Long Review book would also be scrutinised and certified by the Head of the Department and other Consultant and presented to the External Examiners at the time of the final examination.

6.1.3: **Publications:** Xerox copies or reprints of full paper/ abstracts published or sent for publication in National / International Journals should be submitted to the department before the examination..

EXTERNAL EVALUATION

6.2.1: **Organisation of the Examination:** The Examination shall be organised on the basis of marking system to evaluate and certify candidate's level of knowledge, skill and competence at the end of the training and obtaining a minimum of 50% marks in theory as well as practical separately shall be mandatory for passing the whole examination. This examination shall be at the end of 3rd Academic Year (Six Academic terms). The academic terms shall mean six months training period

6.2.3: **Number of Candidates:** The maximum number of candidates to be examined in Clinical/practical and oral on any day shall not exceed two.

6.2.4: **Number of Examinations:** The University shall conduct not more than two examinations in a year, with an interval of not less than 4 and not less than 6 months between the two examinations.

6.2.5: **Theory:** There will be Four Theory Papers. One paper out of these shall be on Basic Medical Sciences and another paper on Recent Advances. The Theory examinations will be held sufficiently earlier than the Clinical and Practical examination, so that the answer books can be assessed and evaluated before the start of the Clinical/Practical and Oral examinations.

MODEL QUESTION PAPER

D.M CARDIOLOGY

PAPER-I

Basic Medical Sciences as related to Cardiology

Time: 3Hours All questions carry equal marks Max Marks: 100

Write Briefly on

1. Coronary Collateral Circulation.
2. Hemodynamic parameters of Left Ventricular Function.
3. Gp II b/ III a receptor blocking drugs.
4. Pathology of Sudden Cardiac Death.
5. Culture-Negative Infective Endocarditis.
6. Genetics of Hypertrophic Obstructive Cardiomyopathy.
7. Homocysteine and its relation to coronary atherosclerosis.
8. Cono-Truncal Septation and the anomalies that can arise due to defective development of it.
9. Actions of Betablockers on the cardiovascular system.
10. Immunology in Cardiac Transplantation.

D.M CARDIOLOGY

PAPER-II

Clinical Cardiology including Pediatric Cardiology

Time: 3 Hours All questions Carry Equal Marks Max Marks: 100

Write Briefly on:

1. Management of Unstable angina pectoris.
2. Hypertensive Crisis.
3. Diagnosis and management of neonatal cyanosis.
4. Rheumatic prophylaxis.
5. Endomyocardial Fibrosis.
6. Acute aortic regurgitation.
7. Syndrome X
8. Clinical features of acute infective endocarditis.
9. Double Outlet Right Ventricle
10. Diagnosis and management of a patient with wide QRS tachycardia.

D.M CARDIOLOGY

PAPER III

Diagnostic and Interventional Cardiology including Cardiac Instrumentation

Time: 3 Hours All Questions Carry Equal marks Max Marks: 100

Write Briefly on:

1. Time Constant of an ECG Machine.
2. Myocardial Contrast Echocardiography.
3. Dobutamine Stress Testing.
4. Diagnosis of Acute Pulmonary Embolism.
5. Unprotected Left Main Angioplasty.
6. Quantitative Coronary Angiography.
7. ECHO-Planar Magnetic Resonance Imaging.
8. Use of Radio-Frequency Ablation in the management of Tacharrhythmias.
9. Vena Contracta.
10. Heart Rate variability assessment.

D.M CARDIOLOGY

PAPER IV

Recent advances in Cardiology, Cardiac Epidemiology, Preventive Cardiology and related Cardiac Surgery

Time: 3 Hours All Questions carry equal marks Max Marks: 100

Write Briefly On:

1. Cardiac Resynchronisation Therapy.
2. Epidemiology of Coronary Artery Disease in India.
3. Rheumatic Prophylaxis.
4. Arterial Switch operation.
5. Vascular remodelling.
6. Diabetic Dyslipidemia.
7. Pharmacological Defibrillation.
8. Xenotransplantation.
9. Cardiac Interventions in the fetus in utero.
10. Epidemiological Transitions.

6.2.6: **Clinical/Practical and Oral:** Clinical examination would consist of 3 Cases, 1 Long Case and 2 Short Cases.

Long Case: The candidate would have one hour to take a detailed history, and do a complete clinical examination. If there is any language problem he / she would be provided with an interpreter for the same. On the basis of the history and examination, the candidate is expected to come to a reasonable provisional diagnosis. He / she would then present the case to the examiners and after the provisional diagnosis is assessed, the candidate would be given the ECG and the X-Ray. After this he/she may be asked to perform an echocardiographic examination o the patient or a recorded Video-Tape/CD of the ECHO of the patient would be played and the candidate asked to interpret. In case, a cardiac catheterization and angiocardiography has been performed on the patient, the hemodynamic, oximetry and angiograms would be shown to the candidate and then asked to make a complete confirmed diagnosis. He / she would then be questioned on the management strategies and related matters.

Total Marks for the long case is 150.

Partial List of Long cases kept for the examination

1. Rheumatic Multivalvular Disease.
2. Coronary Artery Disease with complications like Ventricular aneurysm, ischemic cardiomyopathy, papillary muscle dysfunction with MR etc.
3. Congenital Cyanotic Heart Disease.
4. Congenital Acyanotic Heart Disease with additional features like ASD with MS, ASD with MR, Endocardial Cushion Defects etc.
5. Aortoarteritis with hemiplegia, renal bruits etc.
6. Hypertrophic Obstructive Cardiomyopathy.
7. Any type of heart disease with infective endocarditis.

8. Post surgical patient with complications like Post CABG with angina, heart failure and valve dysfunction or Post Prosthetic Valve Patient with new valvular lesions etc.
9. Restrictive type of heart disease like Constrictive Pericarditis, Endomyocardial Fibrosis.
10. Coarctation of Aorta with associated abnormalities etc.

Short Cases 2: The candidate would have to present 2 short cases. In each, he/she has to take a short history, do a complete clinical examination and come to a reasonable provisional diagnosis. The time allotted is 30 minutes for each short case. The pattern of the examination is the same as that for the long case except for the fact that the discussion is faster. It is generally the case that the candidate would get different categories of cases for each of the cases he/she is given for the examination. For example, a candidate is usually given one Congenital, One Rheumatic and One Coronary/Myocardial etc as long or short case. However, there is no rigid compartment that a particular case should be given as long or short case and this usually is decided by the External Examiners.

Total Marks for the Short Cases; Each 75 Total: 150

Partial List of Short Cases

1. Simple ASD, VSD, PDA etc.
2. TOF.VSD with PS or PS alone etc.
3. Multivalvular Rheumatic Heart Diseases or isolated AS, AR, MR etc.
4. Eisenmenger's Syndrome or Pulmonary Arterial Hypertension Status.
5. Complete Heart Block and Permanent pacemaker with pacemaker Dysfunction or pacemaker syndrome.
6. Ebsteins anomaly or non hypertensive TR.
7. Tricuspid Valve Disease with Rheumatic Mitral Stenosis.
8. Renovascular Hypertension
9. Cardiac Malpositions like Dextrocardia.
10. Marfan's Syndrome, Noonan's Syndrome with heart disease.
11. Aortic Aneurysms, Stable dissection of aorta.
12. Coronary Artery Disease with Carotid or Peripheral Vascular Diseases.
13. Pregnancy with Congenital or Valvular heart disease.
14. Cardiomyopathy, Atrial Fibrillation, Tachycardiomyopathy etc.
15. Post surgical patient like Post BT Shunt etc.

Oral/Viva-Voce Examination: (100 marks)The candidate may be shown ECGs, X-Rays, ECHO Pictures, CDs or Video Tapes, Angiograms CDs, Films, Hemodynamic Tracings, EP Tracings, Pacemaker Parameters or ECGs, for spot diagnosis. This examination shall be comprehensive to test the candidates' overall knowledge of the subject.

SAMPLE MARKS SHEET

Theory : Paper I. 100 Marks

Paper II. 100 Marks

Paper III 100 Marks

Paper IV 100 Marks

Total Theory : 400 Marks	**Pass 200/400 (50%)**

1. Clinics : Long Case : 150 Marks
   Short Case: 75 Marks

   Short Case: 75 Marks

   Total Clinics : 300 Marks

3. Viva-Voce : 100 Marks

Total of Clinics and Viva-Voce: 400 Marks Pass 200/400(50%)

At the end of the examination the minutes of the meeting shall be prepared and after all the external and internal examiners sign the minutes this is despatched to the university in a sealed cover.

CONCLUSION

1. The current syllabus, selection, evaluation are based on the current MCI guidelines for post graduate medical education 2000.
2. This would be subject to revision based on the change in MCI Guidelines, New Syllabus and topics in Cardiology, New Professors and Heads of Departments being inducted as External Examiners etc.

M.Ch. (MASTER OF CHIRURGIE)

CARDIO THORACIC VASCULAR SURGERY

1. COURSE OBJECTIVES

The Higher Speciality Post-Doctoral Course M.Ch. (Cardiothoracic & Vascular Surgery) is conducted at JIPMER, Puducherry.

The course has been commenced after due permission from the Medical Council of India and the Ministry of Health & Family welfare, Government of India

The course duration is 3 years as per the norms of the Medical Council of India Recommendations on Post graduate medical education adopted by the Medical Council of India in January 1992 Revised up to April 1993, & opening of higher Course of Study regulation 1993 as amended by Gazette notification part III section 4 dated 24th June 1997, amended again and called as the Postgraduate Medical Education Regulations and Published in part III, section 4 of Gazette of India Dated the 7th October, 2000.

GENERAL CONDITIONS TO BE OBSERVED AS PER MCI GUIDELINES

1. Post-graduate Medical Education in the case of Super-specialities shall be of three years duration after MS as prescribed.
2. Post graduate Curriculum shall be competency based.
3. Learning in post-graduate programme shall be essentially autonomous and self directed.
4. A combination of both formative and summative assessment is vital for the successful completion of the PG Programme.
5. A modular approach to the core curriculum is essential for achieving a systematic approach to the various sub-specialities concerned with the discipline of Cardiothoracic & Vascular Surgery

The training of PG students shall involve learning experience derived from and targeted to the needs of the community. It shall, therefore, be necessary to expose the students to community base activities.

1.1: TRAINING OBJECTIVES.

GENERAL OBJECTIVES OF POST-GRADUATE TRAINING EXPECTED FROM STUDENTS AT THE END OF POSTGRADUATE TRAINING AS RECOMMENDED BY THE MEDICAL COUNCIL OF INDIA.

At the end of the Postgraduate training in the discipline concerned the student shall be able to

1. Recognize the importance of Cardiothoracic & Vascular Surgery in the context of the health needs of the community and national priorities in the health sector.
2. Practice Cardiothoracic & Vascular Surgery ethically and in step with the principles of primary health care.

3. Demonstrate sufficient understanding of the basic sciences relevant to Cardiothoracic & Vascular Surgery
4. Identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning therapeutic, rehabilitative, preventive and promotive measures/strategies.
5. Diagnose and manage majority of the conditions in the specialty of Cardiothoracic & Vascular Surgery on the basis of clinical assessment, and appropriately selected and conducted investigations
6. Plan and advise measures for the prevention and rehabilitation of patients suffering from disease and disability related to the specialty of Cardiothoracic & Vascular Surgery
7. Demonstrate skills in documentation of individual case details as well as morbidity and mortality data relevant to the assigned to the situation.
8. Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behavior in accordance with the social norms and expectation.
9. Play the assigned role in the implementation of National Health Programmes effectively and responsibly.
10. Organize and supervise the Cardiothoracic & Vascular Surgical Health care services demonstrating adequate managerial skills in the clinic/hospital in the field situation.
11. Develop skills as a self-directed learner, recognize continuing educational needs, select and use appropriate learning resources.
12. Demonstrate competence in basic concepts of research methodology and epidemiology and be able to critically analyze relevant published research literature.
13. Develop skills in using educational methods and techniques as applicable to the teaching of medical/nursing students, general physicians and paramedical health workers.
14. Function as an effective leader of a health team engaged in health care, research or training.

COMPONENTS OF THE POSTGRADUATE CURRICULUM

The major components of the Post-Graduate Curriculum are according to the guidelines issued by the MCI are:

1. Theoretical Knowledge
2. Practical & Clinical skills
3. Attitudes including communication skills
4. Knowledge about research methodology

TRAINING OBJECTIVES IN THE HIGHER SPECIALTY OF CARDIOTHORACIC & VASCULAR SURGERY

KNOWLEDGE: At the end of the course, upon successful completion of training and passing the examination the candidate is expected to

1.1.1: Acquire comprehensive knowledge of the basics of Cardiothoracic & Vascular Surgery including all allied specialties related to Cardiothoracic & Vascular Surgery like Cardiac, Pulmonary, Thoracic and Vascular Anatomy, Physiology, Biochemistry, Pharmacology, Pathology, Microbiology and Epidemiology, Preventive Cardiothoracic &

Vascular Surgery, Pediatric cardiothoracic surgery, Thoracic Medicine, Cardiothoracic Anesthesia and Cardiology

SKILLS:

1.1.2 : Possess complete clinical diagnostic skills for the recognition of common heart, lung, mediastinal & vascular diseases.

1.1.3 : Possess complete knowledge of all the commonly used Non-invasive cardiothoracic & Vascular diagnostic skills like Chest Roentgenogram, CT scan of Chest, Electrocardiogram, Echocardiogram, Vascular Doppler Tests, Pulmonary function tests, etc.

1.1.4 : Acquire skills in the performance of invasive diagnostic procedures like Flexible fibreoptic bronchoscopy, Rigid bronchoscopy, Rigid Esophagoscopy, Transthoracic fine needle aspiration and cytology and cardiac catheterization and angiography

1.1.5 : Apply sound clinical judgement and rational cost effective investigations for the diagnosis and management of cardiac, thoracic & vascular cases in the outpatient department, Wards, intensive care / postoperative units and Emergency room.

1.1.6 : Acquire ability to manage patients of chest trauma, acute limb ischemia and other conditions requiring urgent attention being referred from the department of Emergency Services.

1.1.7 : Assist and perform Cardiothoracic & Vascular Operations of wide spectrum involving patients of different age groups.

1.1.8 : Manage postoperative patients in the intensive care units which also includes special procedures like placement of arterial pressure line, central venous line, pulmonary arterial catheter, Intra-aortic Balloon pump, intubation and management of ventilators, therapeutic bronchoscopy, etc,.

1.1.9 : Possess understanding of the recent advances in the subject of Cardiothoracic & Vascular Surgery and all its allied specialties and working knowledge of the sophisticated and routine equipments, consumables used in Cardiothoracic & Vascular Surgery

1.1.10: Possess knowledge of research work in the field of Cardiothoracic & Vascular Surgery in both the clinical & experimental field with the ability to usefully analyse the data.

1.1.11: Be able to teach undergraduate students (MBBS) as well as Post Graduate students of Surgery (MS) and also to train Post graduate students of MD Anesthesiology & Chest Medicine during their specialty postings.

1.1.12: Be able to perform clinical & investigative studies and to present in seminars, conference, etc.

1.1.10: Have the ability to organize specific teaching and training programmes for paramedical staff, associated professionals and patient education programmes. Shiuld be able

to develop good communication skills and give consultations to all other departments of the hospital.

ATTITUDE AND VALUES

Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behavior in accordance with the social norms and expectation.

1.2 : NATIONAL OBJECTIVES

1.2.1: Should be able to work in any hospital in India with minimum of facilities and should be able to diagnose and treat cardiothoracic & vascular disease swiftly and efficiently both on an elective and emergency basis.

1.2.2: Should be able to start Cardiothoracic & Vascular Surgical unit with effective functioning with minimum inputs.

1.2.3: Should be able to work effectively in National Programmes for the Prevention or eradication of cardiac, thoracic & vascular diseases.

1.3 : INTERNATIONAL OBJECTIVES

1.3.1: Should be able to participate in International Conferences, Workshops, etc,. to bring honor and fame to our country.

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2. COURSE CONTENT

(A). AIM: To produce specialists with necessary skills, judgment and sense of dedication to tackle all major and minor cardiac, thoracic and vascular problems. The candidates will be trained in all aspects of Cardiothoracic & Vascular Surgery starting from Basic sciences to Recent Advances.

(B). THEORY: The study will cover the entire scope of Cardiothoracic & Vascular Surgery.

2.1: BASIC SCIENCES RELATED TO CARDIOTHORACIC & VASCULAR SURGERY

2.1.1: CARDIAC, THORACIC AND VASCULAR ANATOMY :

Regional and developmental – chest wall, diaphragm, lungs, mediastinum, esophagus, heart, pericardium, great vessels and branches, congenital anomalies.

2.1.2: CARDIAC, THORACIC AND VASCULAR PHYSIOLOGY

Respiration, pulmonary function tests, assisted ventilation, blood pressure, cardiac output, heart sounds, murmurs, regional circulation, cardiac metabolism, acid-base balance, fluid and electrolyte balance, extracorporeal circulation, assisted circulation, hypothermia, esophageal function, gastro-esophageal reflux.

2.1.3: CARDIAC, THORACIC AND VASCULAR MOLECULAR BIOLOGY

Cardiac cellular genetics, ultrastructural studies of cardio-myocytes, alveolar epithelial cells and endothelial cells, stem cell study; immunology with respect to graft rejection, Tumor cells.

2.1.4: CARDIAC, THORACIC AND VASCULAR BIOCHEMISTRY

Electrolytes, acid-base status, cardiac metabolism, inflammatory mediators,

2.1.5: CARDIAC, THORACIC AND VASCULAR PHARMACOLOGY

Inotropes, vasodilators, anti-arrhythmic agents, digitalis, diuretics, anti-lipid agents, coronary vasodilators, anticoagulants, Protamine, bronchodilators, anti-tuberculosis drugs, Immunosuppressants, Anti-neoplastic agents.

2.1.6: CARDIAC, THORACIC AND VASCULAR PATHOLOGY

Thoracic injuries, chest wall tumors, intrapleural and pulmonary suppuration, pulmonary tuberculosis, lung tumors, pericarditis, diaphragmatic hernia, congenital and acquired lesions of the heart and great vessels, benign and malignant strictures of esophagus, reflux esophagitis, pulmonary embolism.

2.1.7: CARDIAC, THORACIC AND VASCULAR MICROBIOLOGY

Pulmonary and pleural infections, rheumatic fever, infective endocarditis, chest wall & sternal infections, mediastinal infections and infections following operations.

2.2: CLINICAL CARDIO-THORACIC & VASCULAR SURGERY:

2.2.1 : GENERAL EVALUATION OF THE PATIENT: The history, Physical examination including cardiac and respiratory auscultation and percussion.

2.2.2 : CARDIAC CONDITIONS (Congenital) : Includes the entire spectrum of both cyanotic & acyanotic heart diseases – Atrial Septal Defect, Ventricular Septal Defect, Persistent Ductus Arteriosus, Right ventricular outflow obstruction, Pulmonary stenosis, Rupture of sinus of Valsalva, Atrioventricular septal defect, Coarctation of Aorta, congenital aortic stenosis (Valvular, supravalvular & subaortic), Congenital aortic regurgitation, Congenital mitral stenosis, Hypoplastic Left heart syndrome, Aorto-pulmonary window, Vascular rings, Truncus Arteriosus, tricuspid atresia, Transposition of great arteries, Anomalous Pulmonary Venous Connections, Cor-triatriatum, Tetrology of Fallot, Pulmonary atresia, Congenital coronary anomalies.

2.2.3 : CARDIAC CONDITIONS (Rheumatic Heart disease): Mitral valve disease, Aortic valve disease, Tricuspid valve disease.

2.2.4 : CARDIAC CONDITIONS (Pericardial disease): Pericarditis, Constrictive pericarditis, Pericardial effusion and tamponade.

2.2.5 : CARDIAC CONDITIONS (Miscellaneous): Cardiac Tumors, Cardiac failure, Arrhythmias, Cardiopulmonary bypass, Myocardial protection, Cardiac data processing, Cardiac transplantation.

2.2.6 : AORTIC DISEASES: Aorto-arteritis, Aortic aneurysm, Dissecting aortic aneurysm.

2.2.7 : VASCULAR CONDITIONS: Acute limb ischemia, Chronic limb ischemia, Thoracic outlet syndrome, Vascular grafts.

2.2.8 : PULMONARY CONDITIONS: Lung resection, Benign tumors of the lung, Carcinoma of lung, Lung abscess, Bronchiectasis, Bullous lung disease,Emphysema, Pulmonary tuberculosis, Hydatid cyst of lung, Sequestration, Pulmonary arteriovenous malformation, Aspergilloma of lung, High frequency jet ventilation, Conduct of anesthesia for pulmonary operations, Bronchoscopy.

2.2.9 : **TRACHEAL CONDITIONS:** Tracheal injuries, Tracheal tumors, Tracheostomy, Tracheal operations.

2.2.10 : PLEURAL & PARIETAL CONDITIONS: Empyema, Pneumothorax hemothorax, Fibrothorax, Fracture of ribs & sternum, Chest wall and Sternal deformities, Diaphrahmatic paralysis & hernia, Chest wall tumors.

2.2.11 : ESOPHAGEAL CONDITIONS: Esophageal trauma, esophageal stricture, benign esophageal tumors, Esophageal cancer, Gastro-esophageal reflux disease, Esophageal diverticula, surgical palliation, Esophageal inflammatory diseases, Esophageal motility disorders.

2.2.12 : MEDIASTINAL CONDITIONS: Mediastinal tumors, Medistinal cysts.

4. MODE OF SELECTION

4.1 : SELECTION: Students for the MCh (CTVS) will be selected strictly on the basis of their academic merit as determined by the competitive test.

5. RECOMMENDED TEXTBOOKS AND JOURNALS

The following is only a partial list of recommended text books and journals for the candidates.

A. TEXT BOOKS:

1. Kirklin/Barratt-Boyes Cardiac Surgery:
   By John Webster Kirklin, Nicholas T. Kouchoukos, Jill A. Rhead, Eugene H. Blackstone, Brian G. Barratt-Boyes, Donald B. Doty, Frank L. Hanley, Robert B. Karp

2. Mastery of Cardiothoracic Surgery

By Larry R. Kaiser, Irving L. Kron, Thomas L. Spray

3. Cardiac Surgery In the Adult
   By Lawrence M. Cohn, MD.

4. The Johns Hopkins Manual of Cardiothoracic Surgery
   by David Daiho Yuh, Luca A. Vricella, William A. Baumgartner

5. Surgery of the Chest
   by David C. Sabiston, Jr.

6. The Evolution of Cardiac Surgery
   by Harris B. Shumacker

7. Adult Cardiac Surgery
   by Robert M. Bojar

8. Gibbon's Surgery of the Chest
   by John Heysham Gibbon, David C. Sabiston, Frank Cole Spencer

9. Atlas of Cardiothoracic Surgery
   by David C. Sabiston, Stanley M. Coffman, Robert G. Gordon -

10. Atlas of Cardiothoracic Surgery
    by L. Henry Edmunds, William I. Norwood, David W. Low

11. The History of Cardiothoracic Surgery from Early Times: From Early Times by Raymond Hurt

12. General Thoracic Surgery
    by Thomas W. Shields, Joseph LoCicero, Ronald B Ponn, Valerie W Rusch

13. Thoracic Surgery
    by F. Griffith Pearson

14. Techniques in General Thoracic Surgery
    by Raleigh Maurice Hood

15. Landmarks in Cardiac Surgery - Page 649
    by Stephen Westaby, Cecil Bosher

16. Complications in Cardiothoracic Surgery: Avoidance and Treatment
    by Alex G. Little

17. Techniques in Cardiac Surgery
    by Denton A. Cooley, George J. Reul, O. Howard Frazier

18. Cardiopulmonary Bypass: Principles and Practice
by Glenn P. Gravlee, Richard E. Davis, Alfred H. Stammers, Ross M Ungerleider

19. Vascular Surgery
by Robert B. Rutherford

20. Vascular Surgery: A Comprehensive Review
by Wesley S. Moore

21. Wylie's Atlas of Vascular Surgery
by Ronald J. Stoney, David J. Effeney

22. Complications in Cardiothoracic Surgery
by John A. Waldhausen, Mark B. Orringer

23. Cardiac Surgery: Safeguards and Pitfalls in Operative Technique
by Siavosh Khonsari

B. JOURNALS

1. Indian Journal of Thoracic and Cardiovascular Surgery
2. Annals of Thoracic Surgery
3. European Journal of Cardiothoracic Surgery
4. Asian Cardiovascular & Thoracic Annals
5. Journal of Thoracic and Cardiovascular Surgery
6. Operative Techniques in Thoracic and Cardiovascular Surgery
7. Pediatric Cardiac Surgery Annual
8. Seminars in Thoracic and Cardiovascular Surgery
9. American Heart Journal
10. Circulation
11. Chest
12. Heart, Lung and Circulation
13. Journal of the American College of Cardiology
14. Journal of Cardiac Surgery
15. Journal of Cardiothoracic Surgery
16. Journal of Cardiothoracic and Vascular Anesthesia
17. Journal of Vascular Surgery
18. Texas Heart Institute Journal
19. The Thoracic and Cardiovascular Surgeon

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5. TRAINING PROGRAMME

The training programme shall aim to provide sound knowledge in the diagnostic and investigative aspects of Cardiothoracic & Vascular Surgery for the candidate.

It will provide practical training in clinical and operative surgery including open heart surgery. In addition to the exposure to Cardiothoracic & Vascular Surgery at the institute, the candidate, will also received an opportunity during the training period to spend a period up to two months in other specialized centers for enriching his experience in Cardiothoracic & Vascular Surgery

During the training period, the candidate shall work for **all three years on full-time resident basis** under the Head of the Department of Cardiothoracic & Vascular Surgery. He shall take part in all activities of the department including participation in seminars, conferences, teaching assignments, operating sessions, experimental surgery and other duties that may be assigned to him by the Head of the Department.

The training programme will be divided as follows:

a) **FOUR MONTHS**: Clinical work in in-patient and out-patient sections, Methods of workup & follow up in Cardiothoracic & Vascular Surgery.

b) **ONE MONTH**: Assignment to medical **Cardiology,** cardiac catheterization laboratory, coronary care unit, Pacemaker clinic, Echocardiographic laboratory, stress test clinic.

c) **TEN MONTHS:** Clinical Cardiothoracic & Vascular Surgery, work up of surgical patients, preoperative & postoperative care, interpretation of Chest X–ray, electrocardiogram, echocardiogram, CT scan of chest, blood gas determination, cardiac hemodynamic parameter studies, cardiac and vascular angiogram; Performing & interpreting pulmonary function tests, rigid & flexible bronchoscopy, rigid esophagoscopy, trans-thoracic fine needle aspiration & cytology; Procedures like placing arterial catheter, central venous cathter, pulmonary arterial catheter, Intra-aortic balloon pump, tube thoracostomy, etc,.

d) **SIX MONTHS**: During this period, the candidate shall act as first assistant to the Head of the Department and other senior surgeons in major operations including open heart procedures. He will receive progressively greater responsibility for independent performance of major surgical procedures. He will be responsible for preparation of operation notes and postoperative intensive care.

e) **TWO MONTHS:** The candidate will be sent to other recognized institutes for additional experience in Cardiothoracic & Vascular Surgery during this period.

f) **ONE MONTH**: The candidate will be posted to the Department of Chest diseases and allied sciences during this period.

g) **TWELVE MONTHS:** During this period the candidate will be posted to clinical service to round out his experience. He will receive opportunities to independently perform procedures such as mitral valvotomy, ligation of persistent ductus arteriosus, vascular bypass techniques, lung resections and a minimum of five open heart operations.

NB: The exact duration and timing of posting for a particular activity will be decided by the Dean's office in consultation with the Head of the department at the commencement of each year. As far as possible postings for research and visit to other centre, will be made towards the second half of second year of training.

A copy of the report of all the procedures performed shall be submitted by the candidate to the Head of the Department in the form of a logbook at least six weeks before the Final examination. The Head of the department will certify the completion of minimum number of procedures specified. He will point out any deficiency if any, and give his recommendations with reasons as to whether the candidate should be allowed to sit in the examination or not. The logbook will be forwarded to the Dean's office within a week of receipt by the Head of the department. Towards the conclusion of this period, the candidate shall have carried out a minimum of fifty Cardiothoracic and Vascular Surgical procedures including a minimum of five open heart operations.

CONCLUSION

- The Current syllabus, selection, evaluation are based on the current MCI guidelines for postgraduate medical education 2000.

- This would be subject to revision based on the change in MCI Guidelines, New Syllabus and topics in Cardiothoracic and Vascular Surgery, with changing trends in the disease pattern, newer developments in diagnostic and therapeutic procedures and also changing National health policies, etc,.

- Medical curriculum should be vibrant and requires changes periodically as and when necessary.

INTERNAL EVALUATION

1. Log Book:

The candidate must maintain a log book of all his/her activities with respect to:

1) Bio-data
2) Complete list of postings with periods and dates;
3) Complete list of all the inpatient cases managed by him/her directly;
4) List of important emergency cases and interdepartmental consultations attended by him;
5) List of diagnostic and therapeutic procedures including surgeries assisted or performed;
6) Summaries of some important emergency and elective cases managed by them ;
7) List of case presentations, postgraduate seminars, journal reviews and other important academic activities performed
8) List of abstracts and papers presented in JIPMER Scientific Society Meetings, Conferences, Clinico-pathological conferences, etc.
9) Research projects completed;
10) Papers published or sent for publication;
11) Teaching assignments performed and
12) Any other relevant details.

This log book would be scrutinized and certified by the Head of the Department of Urology and other Consultants of the Department and presented to the examiners at the time of final examination.

2. <u>THEORY</u> - 4 PAPERS out of which

One paper of Basic sciences

One paper of Recent advances

3. CLINICAL / PRACTICAL & VIVA

Scheme of Evaluation will be as per General Guidelines

UROLOGY

INTRODUCTION

The Higher Speciality Post-Doctoral Course M.Ch. (Urology) is being conducted at Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), Puducherry. This course is of 3 year duration designed to produce specialists in Urology. Urology is a branch of Medicine dealing with adult and pediatric diseases and disorders of the urogenital system.

COURSE OBJECTIVES

GENERAL CONDITIONS (AS PER M.C.I. GUIDELINES):

i) The M.Ch. Postgraduate Education in the super speciality of Urology shall be of three years duration after MS (Surgery).
ii) The M.Ch. Postgraduate (PG) curriculum in Urology shall be competency based.
iii) Learning in the postgraduate program shall be essentially autonomous and self directed.
iv) A combination of both formative and summative assessment is vital for the successful completion of the PG program.
v) A modular approach to the course curriculum is essential for achieving a systematic exposure to the various sub specialities concerned with Urology.
vi) The training of the PG students shall involve learning experience 'derived from' or 'targeted to' the needs of the community. It shall, therefore, be necessary to expose the students to community based activities.

GOALS AND GENERAL OBJECTIVES OF M.Ch. (UROLOGY) POST-GRADUATE MEDICAL EDUCATION PROGRAMME (AS PER M.C.I. GUIDELINES):

1. GOAL

The goal of the M.Ch. (Urology) postgraduate medical education shall be to produce competent specialists and/or medical teachers in the super speciality of Urology:

i) who shall recognize the health needs of the community as relevant to the super speciality of Urology, and carry out professional obligations ethically and in keeping with the objectives of the National Health Policy;
ii) who shall have mastered most of the competencies, pertaining to Urology, that are required to be practiced at the secondary and the tertiary levels of the health care delivery system;
iii) who shall be aware of the contemporary advances and developments in Urology;
iv) who shall have acquired a spirit of scientific inquiry and shall be oriented to the principles of research methodology and epidemiology; and
v) who shall have acquired the basic skills in teaching of the medical and paramedical professionals;

2. GENERAL OBJECTIVES OF POST-GRADUATE TRAINING EXPECTED FROM STUDENTS AT THE END OF POST-GRADUATE TRAINING IN UROLOGY: (AS PER M.C.I. GUIDELINES):

At the end of the postgraduate training program in Urology, the student shall be able to:

i) Recognize the importance of Urology in the context of the health needs of the community and the national priorities in the health sector.
ii) Practice Urology ethically and in step with the principles of primary health care.
iii) Demonstrate sufficient understanding of the basic sciences relevant to Urology.
iv) Identify social, economic, environmental, biological and emotional determinants of health in a given case, and take them into account while planning therapeutic, rehabilitative, preventive and promotive measures/strategies.
v) Diagnose and manage majority of the conditions in Urology on the basis of clinical assessment, and appropriately selected and conducted investigations.
vi) Plan and advise measures for the prevention and rehabilitation of patients suffering from disease and disability related to Urology.
vii) Demonstrate skills in documentation of individual case details as well as morbidity and mortality data relevant to the assigned situation.
viii) Demonstrate empathy and humane approach towards patients and their families and exhibit interpersonal behaviour in accordance with the societal norms and expectations.
ix) Play the assigned role in the implementation of national health programme, effectively and responsibly.
x) Organize and supervise the chosen/assigned health care services demonstrating adequate managerial skills in the clinic/hospital or the field situation.
xi) Develop skills as a self-directed learner; recognize continuing educational needs; select and use appropriate learning resources.
xii) Demonstrate competence in basic concepts of research methodology and epidemiology, and be able to critically analyze relevant published research literature.
xiii) Develop skills in using educational methods and techniques as applicable to the teaching of medical/nursing students, general physicians and paramedical health workers.
xiv) Function as an effective leader of a health team engaged in health care, research or training.

STATEMENT OF THE COMPETENCIES (AS PER M.C.I. GUIDELINES):

Keeping in view the general objectives of postgraduate training, each discipline shall aim at development of specific competencies which shall be defined and spelt out in clear terms. Each department shall produce a statement and bring it to the notice of the trainees in the beginning of the program so that he or she can direct the efforts towards the attainment of these competencies.

COMPONENTS OF THE POSTGRADUATE CURRICULUM (AS PER M.C.I. GUIDELINES):

The major components of the Postgraduate curriculum shall be:

1. Theoretical knowledge
2. Practical and clinical skills
3. Thesis skills.
4. Attitudes including communication skills.
5. Training in research methodology.

TRAINING OBJECTIVES IN THE HIGHER SPECIALITY OF UROLOGY:

At the end of the course, upon successful completion of training and passing the examination the candidate should:

1. Theoretical Knowledge:

Have comprehensive knowledge of the basics of Urology including all allied specialties related to Urology like Urological Anatomy, Neurourology, Urological Physiology, Urological Biochemistry, Urological Pathology, Urological Microbiology, Urological Pharmacology, Urological Epidemiology, Community Urology, Preventive Urology, Medical Urology, Urological Surgery, Urodynamics, Andrology, Urological Imaging, Urological Oncology, Paediatric Urology, Female Urology, Renal Replacement Therapy and Renal Transplantation.

2. Skills:

1. Possess complete clinical diagnostic skills for recognition of urological diseases.
2. Possess complete knowledge of application of biochemical, microbiological and pathological tests in the diagnosis and management of urological diseases.
3. Possess complete knowledge of the application and interpretation of imaging studies in the diagnosis and management of urological diseases.
4. Perform simple imaging studies like basic ultrasound evaluation of the kidney, ureter, bladder and prostate, transrectal ultrasonography of prostate and seminal vesicles, retrograde and antegrade urethrogram, cystogram and voiding cystourethrogram, nephrostogram, retrograde ureteropyelogram, etc.
5. Perform all commonly used urodynamic studies and apply and interpret the results appropriately.
6. Be able to apply sound clinical judgment to plan cost effective investigation and management of most urologic diseases.
7. Be able to medically treat most urologic diseases.
8. Be able to use ESWL and manage complications arising out of its application.
9. Have the skill to perform common outpatient urological procedures like urethral catheterization, suprapubic cystostomy, urethral dilatation, prostate biopsy, ultrasound and fluoroscopy guided percutaneous nephrostomy and cyst aspiration, drainage of periurethral abscess, dorsal slit etc.,
10. Be able to perform common urological endoscopic procedures like diagnostic cystoscopy and bladder biopsy, ureteral catheterization, endoscopic urethrotomy, ureteral stenting and stent removal, foreign body removal from bladder, cystolithotripsy, bladder neck incision, transurethral incision of prostate, resection of small prostates and bladder tumors, ureteroscopy and retrieval of ureteral calculi, etc.
11. Be able to perform common open ablative and reconstructive surgical procedures like nephrectomy, pyelolithotomy, ureterolithotomy, open prostatectomy, cystolithotomy, urethroplasties for simple urethral strictures, penectomy, orchiectomy, orchidopexy, etc.,
12. Manage effectively and efficiently common urological emergencies in the casualty outpatient department and wards including patients in other disciplines.
13. Manage effectively urological emergencies detected or occurring during surgery in other disciplines like bladder or ureteral injuries etc. during surgical, gynaecological procedures.
14. Possess understanding of recent advances in the subject of Urology and its allied specialities.
15. Possess working knowledge of consumables used in Urology and the upkeep and maintenance of the special equipment used in Urology especially the endoscopes.

16. Be able to conduct research work in the field of Urology both clinical and experimental and be able to critically analyse data as well as research papers.
17. Be able to teach Undergraduate students of MBBS, Postgraduate students of surgery as well as students of nursing and other paramedical courses the elements of Urology appropriate to them.
18. Be able to and have demonstrated ability to conduct research studies and presented the papers in conferences or published in journals.
19. Be able to recognise and refer appropriately cases that are beyond his competence.
20. Be able to work as a member of a team of medical and paramedical staff as well as be able to work as a team leader for effectively and efficiently carrying out urological services.

3. Thesis/Research Skills:

1. Be able to undertake and complete a research project;
2. Be able to formulate a research question;
3. Design an appropriate study;
4. Collect and analyse data using appropriate statistical techniques; and
5. Present his findings in the form of a research paper for publication.

4. Attitudes and Values including Communication Skills:

1. Demonstrate empathy and humane approach to patients and their families.
2. Exhibit interpersonal behaviour with other professionals in accordance with the societal norms and expectations.
3. Have good communication skills for functioning effectively as an urologist.

5. Training in Research Methodology:

1. Have acquainted with basics of statistics to understand and critically evaluate published research paper.
2. Attend to a few lectures or other type of exposure to human behavior studies.
3. Possess basic understanding of pharmaco-economics.
4. Have an introduction to the non-linear mathematics.

NATIONAL OBJECTIVES

1. Be able to work in any hospital in India with minimum of facilities and be able diagnose urological diseases, treat swiftly and efficiently and if appropriate refer both on an elective and emergency basis.
2. Be able to start a urological service of maximum effectiveness with available resources.
3. Be able to work effectively and contribute to National Programs like National Family Welfare Program, National Cancer Control Program, programs for prevention and control of non communicable urological diseases, etc.

INTERNATIONAL OBJECTIVES

Be able to participate in international conferences, workshops etc., and bring honour and fame to the country.

COURSE CONTENT

The Course Content will cover the entire scope of Urology. The theory will comprise four parts:

I. Basic Sciences related to Urology
II. Clinical and Medical Urology
III. Urological Surgery
IV. Recent Advances in Urology

I. BASIC SCIENCES RELATED TO UROLOGY

1. UROLOGICAL ANATOMY;

Comprehensive knowledge of gross, regional, developmental and microscopic anatomy of the kidneys, ureters, bladder, urethra, male and female genital systems, male and female pelves, perineum, adrenals, retroperitoneum and abdominal wall including the embryological basis of congenital anomalies of the above organs and parts, basic genetics relevant to urological diseases and the application of above knowledge in the understanding and management of urological diseases.

2. UROLOGICAL PHYSIOLOGY;

Comprehensive knowledge of physiology of the kidneys, upper urinary tract, lower urinary tract, adrenals, male and female genital systems including the role of kidneys in homoeostasis of the body, acid-base and electrolyte balance, urinary transport, storage and emptying, and male reproductive physiology.

3. UROLOGICAL BIOCHEMISTRY;

Comprehensive knowledge of biochemistry relevant to kidneys, urinary tract and male genital system and their application in the understanding and management of urological diseases including metabolic aspects of stone disease and renal failure, etc.

4. UROLOGICAL PATHOLOGY;

Comprehensive knowledge of the pathological basis of the diseases affecting the kidneys, urinary tract, male genital system and adrenals with special reference to clinical correlation including traumatic, inflammatory, metabolic, degenerative and neoplastic diseases, pathophysiology of urinary tract obstruction both neurogenic and non-neurogenic, pathophysiology of erectile dysfunction and acute and chronic renal failure.

5. UROLOGICAL MICROBIOLOGY:

Comprehensive knowledge of various microbiological aspects of infective diseases of kidneys, urogenital tract and adrenals including urinary tract infection, genitourinary tuberculosis, urinary tract fungal infection, filariasis and hydatidosis affecting the urogenital system, gram negative septicemia, postoperative infection and sexually transmitted diseases.

6. UROLOGICAL PHARMACOLOGY:

Comprehensive knowledge of the pharmacology of drugs used in the diagnosis and management of diseases of the kidneys, urogenital system and adrenals including antibiotics, anticholinergics, alpha blockers, androgens and antiandrogens, antineoplastic drugs, immuno suppressive agents, etc., adverse effects of drugs on renal function, male genital tract function and urinary tract function and dose modification in patients with renal failure.

7. UROLOGICAL JURISPRUDENCE;

Comprehensive knowledge of urological jurisprudence including informed consent, consumer protection act, organ transplantation act, medical record keeping, laws relating male and female sterilization, etc.

8. UROLOGICAL MOLECULAR AND CELLULAR BIOLOGY:

Comprehensive knowledge of cellular and molecular biology relevant to the understanding and management of urological diseases including basic principles of immunology, molecular genetics and cancer biology and tissue engineering and cell therapy.

9. UROLOGICAL RESEARCH:

Comprehensive knowledge of principles and application of urological research including urological epidemiology, clinical trials and essential medical statistics, etc.

10. INFORMATION AND COMMUNICATION TECHNOLOGY:

Comprehensive knowledge of principles and application of information and communication technology in Urology including use of this in patient care, research, management and education.

II. CLINICAL AND MEDICAL UROLOGY

Comprehensive knowledge of the evaluation and diagnosis and medical management of congenital, hereditary, traumatic, inflammatory, neoplastic, metabolic, degenerative, idiopathic and other urological diseases and disorders of the kidneys, ureters, bladder, urethra, male and female genital systems, male and female pelves, perineum, adrenals, retroperitoneum and abdominal wall.

Basic knowledge of the diseases of other surgical and medical specialities relevant to the evaluation, diagnosis and management of urological problems.

A. CLINICAL UROLOGY

Clinical Urology comprises history, physical examination, use of investigations, diagnostic decision making and formulating management plans. It includes principles and application of laboratory investigations like urinalysis, urine, blood, serum, other body fluid and tissue

investigations (biochemical, microbiological, pathological, hematological, immunological, pharmacological, etc.), principles and application of radiology and imaging in the evaluation of urinary system, genital system, adrenals and retroperitoneum and the principles and application of urodynamic studies.

It will also include principles and application of diagnostic cystourethroscopy and knowledge of related instruments and equipments and andrological investigations like nocturnal penile tumescence.

B. MEDICAL UROLOGY

It comprises pharmacological and non-pharmacological management of all urological diseases and disorders.

Pharmacological management includes use of drugs in the management of urological diseases and disorders like genitourinary infective and inflammatory diseases, benign prostatic hyperplasia, urolithiasis, neurogenic and nonneurogenic transport, storage and emptying dysfunctions, male and female sexual dysfunctions, male infertility, urological cancers, renovascular hypertension, genetic and developmental urogenital disorders, cutaneous diseases of genitalia, geriatric urological disorders, acute and chronic renal failure, adrenal diseases, perioperative urological and co-morbid problems, etc.

Nonpharmacological management includes the principles, instrumentation and application of extracorporeal shock wave lithotripsy system, concepts of renal replacement therapy, concepts of male contraception, principles and application of radiotherapy in the management of urological cancers, principles and application of various energy sources like laser in the management of urological disorders, external appliances, behavioural therapy, life style modification, complimentary and alternative therapies, community urology, preventive and promotive urology, clinical audit, health economics, quality of care and quality of life issues.

III. UROLOGICAL SURGERY

Comprehensive knowledge of the surgical management of urological diseases of the kidneys, ureters, bladder, urethra, male and female genital systems, male and female pelves, perineum, adrenals, retroperitoneum and abdominal wall.

It includes preoperative evaluation, preoperative preparation, postoperative care, prevention and management of intraoperative and postoperative complications, basic knowledge of common medical and surgical diseases that impact on the safety of anaesthesia and surgery, basic knowledge of use of blood products and anesthesiological drugs and procedures relevant to Urology and prevention and management of perioperative infections.

It also includes comprehensive knowledge of principles and application of endoscopic, laparoscopic, open and other ultrasound guided and fluoroscopy guided minimally invasive surgical methods in the performance of urological operations, internal prostheses used in Urology, disposables and consumables used in various urological procedures and principles and maintenance of the instruments and equipments used.

Knowledge for each surgical procedure will include indications, contraindications, awareness of co-morbidities and their impact, required preparation for safe surgery, outcomes and complications of surgery, anatomical basis of surgery, steps involved in the operative procedures, knowledge of alternative procedures in case of intraoperative problems and counseling and informed consent.

IV. RECENT ADVANCES

Comprehensive knowledge of recent advances pertaining to basic sciences related to Urology, clinical and medical Urology and urological surgery.

Current areas of recent advances in basic sciences related to Urology include cellular and molecular biology in the understanding of urological disease processes, newer tumour markers and tests, drug assays, developments in information and communication technology, etc.

Current areas of recent advances in clinical and medical Urology include technological advances in imaging, endoscopy, clinical laboratory testing and urodynamic studies, clinical decision making, drug therapy, noninvasive therapy, newer diseases.

Current areas of recent advances in urologic surgery include technological advances in minimal access and minimally invasive surgery (e.g. robotic surgery), endoscopic surgery, open surgery, energy sources, perioperative monitoring devices, operative techniques and their outcomes, information and communication technology as applied to urological surgery (e.g. telesurgery and telementored surgery), etc.

Recent advances keep changing with time and accordingly the course content will change with time.

RECOMMENDED TEXT BOOKS AND JOURNALS

LIST OF RECOMMENDED TEXT BOOKS

S. no.	Title	Authors / Editors	Edition / Publication Year
1.	Campbell-Walsh Urology	Alan J. Wein, Louis R. Kavoussi, Andrew C. Novick; Alan W. Partin and Craig A. Peters	9th Edition Year: 2007 or later
2.	Adult and Pediatric Urology	Jay Y. Gillenwater, John T. Grayhack, Stuart S. Howards and Michael E. Mitchell	4th edition Year: 2001 or later
3.	Glenn's Urologic Surgery	Sam D. Graham, Jr., and James F. Glenn	6th Edition Year: 2004 or later
4.	Smith's General Urology	Emil A Tanagho	16th Edition Year: 2004 or later
5.	Traumatic and Reconstructive	Jack W McAninch	1st Edition Year:1996 or later

	Urology		
6.	Kelalis-King-Belman Textbook of Clinical Pediatric Urology	Stephen G. Docimo, Antoine Khoury, Douglas Canning	5th Edition Year:2000 or later
7.	Textbook of Female Urology and Urogynaecology	Linda Cardozo and David Staskin	1st Edition Year:2001 or later
8.	Atlas of Urosurgical Anatomy	Frank Hinman, Jr.	1st Edition Year: 1993 or later
9.	Atlas of Urologic Surgery	Frank Hinman, Jr.	2nd Edition Year: 1998 or later
10.	Urologic Oncology	Jerome P. Richie and Anthony D'Amico	2nd Edition Year: 2005 or later
11.	The Scientific Basis of Urology	A.R. Mundy	2nd Edition Year: 2005 or later
12.	Brenner & Rector's The Kidney	Brenner	7th Edition Year: 2004 or later
13.	Kidney Transplantation	P.J. Morris	5th Edition Year: 2001 or later

The list of recommended textbooks will change with the publication of new textbooks by new authors and new editions.

LIST OF RECOMMENDED JOURNALS:

1. Indian Journal of Urology
2. Journal of Urology
3. European Urology
4. Urology
5. BJU International
6. Urological Clinics of North America
7. Indian Journal of Surgery

The list of recommended journal will change with publication of newer journals or periodicals.

ELIGIBILITY AND MODE OF SELECTION

ELIGIBILITY REQUIREMENTS (AS PER M.C.I. GUIDELINES)

Eligibility requirements for registration for the Magister Chirurgiae (M.Ch.) Course in Urology (As per M.C.I. Guidelines)

The candidates must possess recognised degree of M.S. (or its equivalent recognised degree) in Surgery.

TRAINING PROGRAM

(TEACHING LEARNING EXPERIENCES)

PERIOD OF TRAINING

The period of training for the award of Magister Chirurgiae (M.Ch.) shall be three completed years (including the examination period) after obtaining M.D. /M.S. degrees, or equivalent recognised qualification in the required subject.

CLINICAL TRAINING PROGRAM

I. O.P.D. Training

All M.Ch. senior residents will attend all OPDs.

The first year M.Ch. senior residents will see new patients referred to Urology under the supervision of second year and third year senior residents and teaching consultants. They will undertake detailed history taking and physical examination and do screening investigations.

The second year and third year M.Ch. senior residents will see the patients already seen once in the Urology OPD and are coming for follow-up or review under the supervision of teaching consultants. They will review the cases, plan for further investigations and medical and/ or surgical management.

One third year M.Ch. senior resident will look after elective admissions under the supervision of teaching consultants. One third year M.Ch. senior resident will look after O.T. list making under supervision of teachers.

2. Ward Training

All M.Ch. Senior residents will do ward duties. They will look after the day to day investigations and management of ward patients under the supervision of teaching consultants. Each M.Ch. senior resident will be assigned approximately equal number of patients. Currently, each of six M.Ch. senior residents is assigned approximately one sixth of the number of patients admitted in wards.

3. O.T. Training

All M.Ch. senior residents attend all the O.Ts unless they are assigned some other work. O.T. assignments to the M.Ch. senior residents are given in a graded manner, starting with observation, going through being second assistant and first assistant and later performing under the supervision of teaching consultants. The M.Ch. senior residents are trained in all types of common out patient and inpatient surgical work.

4. Emergency Training

All M.Ch. senior residents are assigned 24 hour emergency duties under the supervision of teaching consultants. Each M.Ch. senior resident is assigned emergency duties on an equal basis by rotation. Currently, each of the six M.Ch. senior residents is assigned 24 hour emergency duty on every sixth day. In the emergency duties, the M.Ch. senior residents are trained to diagnose and manage all types of urological emergencies under the supervision of teaching consultants.

5. Uroradiology Training

In the Uroradiology posting the M.Ch. senior residents are trained to perform common uroradiological procedures like retrograde urethrography, static cystography, micturating cystourethrography, pericatheter urethrography, nephrostography, ultrasound of the kidney, ureter and urinary bladder, transrectal ultrasound of the prostate and seminal vesicles etc. under the supervision of teaching consultants.

6. Urodynamics Training

In the urodynamics posting, the M.Ch. senior residents are trained to perform various common urodynamic procedures like uroflowmetry, cystometry, pressure flow study, etc., under the supervision of teaching consultants.

DEPARTMENTAL ACADEMIC PROGRAMME

1. Audit meet:
   Weekly audit meet reviews the clinical work of the previous week.
2. Preoperative meet:
   Preoperative meet discusses the planning of the week's surgical procedures.
3. Case presentations:
   Formal case presentations are held on the pattern of M.Ch. University Examinations.
4. Seminar presentations:
   Seminar includes in depth presentations of theory topics.
5. Journal reviews:
   Journal reviews critically analyse journal articles from international and national urological journals.

TRAINING PROGRAMME IN RESEARCH SKILLS

The student shall undertake a research project. He/She must submit the Project proposal, prepared under the guidance of teaching consultants, within 3 months of joining the course for approval by the Institute Research Council and the Institute Ethics Committee. The student must complete the project under the guidance of teaching consultants, submit the report and submit a research paper for publication based on the project at least 6 months before the completion of the course.

The student shall in addition, participate in the research activities of the department under the guidance of teaching consultants and submit a minimum of three more scientific papers for publication of which at least one must be a formal research paper.

INTERDEPARTMENTAL PROGRAMS

Interdepartmental programs involve clinical discussions with the departments of Pathology, Radiology and Medicine (Nephrology).

CENTRAL ACADEMIC PROGRAMS

1. Monthly Medical Care Review Meeting.
2. Monthly Meeting of JIPMER Scientific Society.
3. Clinico-Pathological Conference

CURRENT CLINICAL TRAINING PROGRAM

Monday :	Uroradiology	2.00 PM
	Urodynamics	2.00 PM
Tuesday :	OPD	at 8.30 AM
Wednesday:	O.T.	8.00 AM
Thursday :	O.T.	8.00 AM
	Urodynamics	9.00 AM
	Uroradiology	2.00 PM
Friday :	OPD	8.30 AM
Saturday :	O.T.	8.00 AM

Ward Rounds every day at 4.30 PM from Monday through Friday.

CURRENT ACADEMIC TRAINING PROGRAM

Monday :	9.00 AM	Audit Meet
	10.00 AM	Preoperative Meet
	11.00 AM	Case presentations (2 cases)
	12 Noon	Seminar Presentation
	3.30 PM	Journal Presentations (2 articles)
Thursday :	3.30 PM	Seminar Presentation
	4.30 PM	Preoperative Meet

EXAMINATION AND EVALUATION

INTERNAL EVALUATION

2. Log Book:

The candidate must maintain a log book of all his/her activities with respect to:

13) Bio-data
14) Complete list of postings with periods and dates;
15) Complete list of all the inpatient cases managed by him/her directly;
16) List of important emergency cases and interdepartmental consultations attended by him;
17) List of diagnostic and therapeutic procedures including surgeries assisted or performed;
18) Summaries of some important emergency and elective cases managed by them ;
19) List of case presentations, postgraduate seminars, journal reviews and other important academic activities performed
20) List of abstracts and papers presented in JIPMER Scientific Society Meetings, Conferences, Clinico-pathological conferences, etc.
21) Research projects completed;
22) Papers published or sent for publication;
23) Teaching assignments performed and
24) Any other relevant details.

This log book would be scrutinized and certified by the Head of the Department of Urology and other Consultants of the Department and presented to the examiners at the time of final examination.

2. Research Project and submission of scientific papers:

a) The student must complete a research project and submit a research paper for publication based on the project, certified by the Head of Department as satisfactory, at least six months before the completion of the course failing which the course will be extended.

b) In addition the student must submit for publication a minimum of three scientific papers, certified as worthy of publication by the Head of Department, of which at least one paper must be a formal research paper. These papers must be submitted at least three months before the completion of the course.

EXTERNAL EVALUATION

The Examination (AS PER M.C.I. GUIDELINES)

The Examination shall be organized on the basis of marking system to evaluate and certify candidate's level of knowledge, skill and competence at the end of the training and obtaining a minimum of 50% marks in theory as well as practical separately shall be mandatory for passing the whole examination. This examination shall be at the end of third Academic Year (six academic terms). The academic terms shall mean six months training period.

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

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

Theory: There will be Four Theory Papers. One paper out of these shall be on Basic Medical Sciences, and another paper on Recent Advances. The Theory examinations will be held sufficiently earlier than the Clinical and Practical examination, so that answer books can be assessed and evaluated before the start of the Clinical/Practical and Oral examinations.

Clinical/Practical and Oral Examinations: There will be Clinical/Practical and Oral examinations following theory examinations.

SCHEME OF EXAMINATION

1. Number of Theory Papers (Please specify the portions in the syllabus for each paper):
   4 Theory Papers of 100 marks each as follows:
   a) Basic Sciences related to Urology,
   b) Clinical and Medical Urology,
   c) Urological Surgery
   d) Recent Advances in Urology

   Each Theory Paper will have two Essay type questions of 20 marks each and 6 Short Notes of 10 marks each.

2. Duration of Theory Exams: 3 hours each

3. Maximum and minimum marks for a pass:
   Maximum Marks: 100 each theory paper.
   Minimum Marks for Pass: Average of 50% in all the 4 Theory Papers

4. Duration of Practical exam / Clinical Exam:
   1 day for 2 Candidates

5. Pattern of Clinical Exam:

I. Clinical:

Long case	… 1 Case	- 50 Marks
Short cases	… 3 Cases	-100 Marks (33 x 3)

II. Practical:

Ward Round	… 3 cases	- 100 Marks (33 x 3)

III. Oral Examination:

- Uroradiology	… 20 Marks
- Uropathology	… 20 Marks

- Discussion on Urological Operations … 20 Marks
- Urological Instruments … 20 Marks
- Urological Pharmacology … 20 Marks

IV. Spotters / Objective Structured Clinical Examination …. 50 Marks

6. Maximum / Minimum marks for Pass:

Maximum Marks for Practicals/Oral .. 400

Minimum Marks for passing … 200 out of 400

MODEL QUESTION PAPERS

M.Ch. DEGREE EXAMINATION

BRANCH: UROLOGY

PAPER I: BASIC SCIENCES

Time: 3 Hours Maximum: 100 Marks

ANSWER ALL QUESTIONS

SECTION – I

(10 X 10 marks)

1. Anatomy of ureterovesical junction and the pathophysiology of vesicoureteral reflux.
2. Magnetic Resonance Imaging in urology.
3. Renal Tubular Acidosis
4. Alpha 1 Selective blockers
5. Captopril Renogram
6. Flowcytometry
7. Micturition reflex
8. Physiology of erection
9. Chemotherapy in Bladder cancer
10. Contrast media in uroradiology

M.CH. DEGREE EXAMINATION

Branch: UROLOGY

PAPER II: CLINICAL AND MEDICAL UROLOGY

Time: 3 hours Maximum 100 Marks

ANSWER ALL QUESTIONS

SECTION I

1. Discuss the metabolic evaluation and medical management for prevention of recurrent urolithiasis (25 Marks)

2. Discuss the evaluation and non operative management of a young male with erectile dysfunction. (25 Marks)

SECTION II

3. Write short notes on: (5 x 10 = 50 Marks)
   a) Antirejection therapy in renal transplants
   b) Immunotherapy in renal adenocarcinoma
   c) Medical management of benign prostate hyperplasic
   d) Evaluation and management of oligoasthenospermia
   e) Chronic Pelvic pain syndrome

M.Ch. EXAMINATIION
BRANCH: UROLOGY

PAPER III: UROLOGICAL SURGERY

Time: 3 Hours Maximum: 100 Marks

ANSWER ALL QUESTIONS

SECTION - I

1. Discuss in detail the treatment options for staghorn calculus (25 Marks)
2. Discuss the management of superficial bladder carcinoma. (25 Marks)

SECTION – II

3. Write short notes on: 5 x 10 = 50 Marks
   a) Snodgrass procedure
   b) Radical Nerve Sparing Prostatectomy
   c) Endopyelotomy
   d) Xanthogranulomatous pyelonephritis
   e) Retroperitoneal lymphnode dissection for testicular germ cell tumour

M.CH. DEGREE EXAMINATION

BRANCH: UROLOGY

PAPER IV: RECENT ADVANCES IN UROLOGY

Time: 3 Hours Maximum: 100 Marks

ANSWER ALL QUESTIONS

SECTION – I

1. Discuss in detail the gene therapy for urologic cancer. (25 Marks)
2. Discuss about nephron sparing surgery for renal cell carcinoma. (25 Marks)

SECTION – II

3. Write short notes on: 5 x 10 = 50 Marks
   a) Mycophenolate moftel.
   b) Tension free vaginal tape for stress incontinence.
   c) Lasers in urology.
   d) Laparoscopic radical nephrectomy.
   e) Robotic urological Surgery