Syllabus

Objective Structured Clinical Examination (OSCE) of DM/MCh Programs Conducted by Different Departments of SCTIMST

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1. GENERAL INFORMATION

Objective Structured Clinical Examination (OSCE) will be conducted with the internal assessment of all DM/MCh programs offered by various departments of SCTIMST. First OSCE (termed OSCE 1) will be conducted along with the internal assessment 2. The second OSCE (termed OSCE 2) will be conducted along with internal assessment 4. Maximum marks awarded for OSCE 1 and OSCE 2 are 50 each. The syllabi for OSCE for different DM and MCh programs conducted at various departments/divisions of SCTIMST are given below along with the syllabi for internal assessment.

2. DEPARTMENT OF ANESTHESIOLOGY

2.1. PROGRAM: DM CARDIOVASCULAR AND THORACIC ANESTHESIA

2.1.1. Syllabi of Internal Assessments

Sl. No.	Syllabus
Internal Assessment 1	1. Anatomy of Heart, and coronary arteries 2. Anatomy of Aorta and branches 3. Coronary blood flow 4. Cardiac physiology 5. Basics of mechanical ventilation, modes of ventilation 6. Basics of acid-base disorders 7. Respiratory physiology relevant to pulmonary circulation. 8. Spinal cord circulation and spinal perfusion pressure
Internal Assessment 2 (Theory)	1. **APPLIED PHARMACOLOGY**: Basic and correlative pharmacology of drugs acting on the cardiovascular system and principles of vaso-active drugs used in the perioperative period. 2. **APPLIED PATHOLOGY**: General and Medical cardiac pathology (e.g., CCP, pulmonary oedema, circulatory shock, brain heart and other organs interactions in pathological; state, ARDS, disorders of fluid, electrolyte, blood glucose, biomarkers, etc.). 3. **APPLIED MICROBIOLOGY**: Pulmonary infections, Bloodborne infections, Surgical site infection following cardiac and thoracic surgery, and nosocomial infection in the intensive care units, sepsis. Management, Prevention of infections, Infection control in OT and ICU. 4. **Biostatistics** - Sensitivity, specificity, type 1&2 errors, correlation coefficient, Regression analysis, odds ratio, sample size, Test for means, meta-analysis, planning a research study. 5. Peri-operative and critical care hemodynamic and respiratory monitoring, basic and advanced. 6. Transthoracic echocardiography basics and views.
Internal Assessment 3	1. Anesthesia and Intensive care management of ruptured abdominal aortic aneurysm. 2. Anesthesia for coronary revascularisation. 3. Anesthesia for valvular heart diseases. 4. Anesthesia for cyanotic heart diseases. 5. Anesthesia for acyanotic CHD.

	6. Anesthesia for CT and MRI procedures for cardiac disorders. 7. Anaesthesia for cardiac interventions for CHD. 8. Anesthesia for electrophysiology and pacemakers. 9. Anaesthesia for Thoracic surgeries. 10. Anesthesia management for coronary interventions and percutaneous valve implantations. 11. Intraoperative Transesophageal echocardiographic monitoring. 12. Intraoperative neuromonitoring (TCD, evoked potentials, NIRS, etc.). 13. Intraoperative coagulation monitoring. 14. Cardiac output monitoring
Internal Assessment 4 (Theory)	1. Recent advances in cardiac anesthesia, cardiac surgery, cardiology procedures relevant to anaesthesia including minimally invasive and robotic surgery. 2. Hemodynamic monitoring. 3. Vascular interventions for aortic aneurysmal diseases. 4. Cerebral protection during CPB related events and carotid artery surgery. 5. Recent major trials, guidelines in cardiac anesthesia. 6. Intensive care of patients following cardiac surgery, thoracic surgery and vascular surgery. 7. Acute pain services, regional blocks for cardiac surgeries.

2.1.2. Syllabus for OSCE 1

OSCE 1 will be conducted along with internal assessment 2 in 5 different stations.

Station 1	**Station 2**	**Station 3**	**Station 4**	**Station 5**
Drugs	**Investigations**	**Equipment**	**Guidelines/ Procedures/ Recent Advances in Anesthesia**	**Acute Cardiac Care**
Anesthetic Agents Opioids, Analgesics Muscle Relaxants Vasoactive Vasodilators Anticoagulants Osmotic Agents	Arterial Blood Gases Pulmonary Function Tests Lung And Airway - Xray, USG, CT Scan Basics of Cardiac and Vascular CT	Ventilators Anesthesia Machine Airway Adjuncts Systemic And Pulmonary Pressure Monitoring	Central Venous Catheters Tracheostomy Patient Transport Sepsis, VAP Anesthesia Guidelines	Shock Patients Arrhythmia Brain Oriented Resuscitation Post OP Bleeding and Cardiac Tamponade

Hormones Steroids	Preanesthetic Evaluation Adult CHD	Cardiac Output Monitoring Techniques NMT Lung &Airway Ultrasound	Airway Guidelines Radiation/ MRI Safety	Pulmonary Hypertensive Crisis Cyanotic Spell Infection Control in ICU Massive Blood Transfusion

2.1.3. Syllabus for OSCE 2

OSCE 2 will be conducted along with internal assessment 4 in 5 different stations.

Station 1	**Station 2**	**Station 3**	**Station 4**	**Station 5**
Drugs	**Investigations**	**Equipment**	**Guidelines/ Procedures/ Recent Advances In Cardiac Anesthesia**	**Acute Cardiac Care**
Antibiotics Prostacyclin and Thrombolytics Managing Anticoagulation Antiplatelet Drugs Resuscitation Fluids Blood and Blood Products Local Anesthetics	EEG Processed EEG in Anesthesia and ICU TCD MRI Sequences SJVO2 Biomarkers Echo, Cardiac Output	NIRS Echo EEG, Depth of Anesthesia Monitoring ONSD Advaced Airway Devices TEE IABP Bronchoscopy	Cardiac Tamponade Myocardial Infarction Cyanotic Spell Paraplegia after Thoracic Aortic Surgery Regional Anesthesia-USG Guided Awake Intubation Minimally Invasive Cardiac Surgery ECMO	Brain Death and Organ Donation Massive Blood Transfusion Myasthesnia Crisis Sepsis and Blood Stream Infection Acute Limb Ischemia Emergency Coronary Intervention

2.2. PROGRAM: DM NEUROANESTHESIA

2.2.1. Syllabi of Internal Assessments

Sl. No.	Syllabus
Internal Assessment 1 (Theory)	1. Anatomy of brain, cranial nerves, blood vessels 2. Anatomy of the spinal cord, vertebral column 3. Cerebral blood flow 4. Cerebral metabolism 5. Physiology of CSF 6. Basics of mechanical ventilation, modes of ventilation 7. Basics of acid-base disorders 8. Respiratory physiology relevant to neuroanesthesia 9. Cardiovascular physiology relevant to Neuroanesthesia. 10. Intracranial pressure.
Internal Assessment 2 (Theory)	1. **APPLIED PHARMACOLOGY**: Basic and correlative pharmacology of drugs acting on the nervous system and principles of neurotherapeutics, various drugs used in anesthesia and neurocritical care. 2. **APPLIED PATHOLOGY**: General and Medical neuropathology. (e.g. ICP, cerebral edema, neurogenic pulmonary edema, brain heart and other organs interactions in pathological; state, ARDS, disorders of fluid, electrolyte, blood glucose, biomarkers, etc. 3. **APPLIED MICROBIOLOGY**: Pulmonary infections, infection of the brain, spinal cord and its meninges, infection following Neurosurgery, and nosocomial infection in the intensive care units, sepsis. Management, Prevention of infections, Infection control in OT and Neuro ICU. 4. **BIOSTATISTICS:** Sensitivity, specificity, type 1&2 errors, correlation coefficient, Regression analysis, odds ratio, sample size, Test for means, meta-analysis, planning a research study. 5. Perioperative and critical care hemodynamic and respiratory monitoring, basic and advanced.
Internal Assessment 3 (Theory)	1. Anesthesia and Intensive care management of head injured, SAH, acute stroke 2. Anesthesia for supratentorial surgeries 3. Anesthesia for infratentorial surgeries 4. Anesthesia for epilepsy surgery 5. Anesthesia for pediatric neurosurgery 6. Anesthesia for MRI procedures, intervention neuroradiology 7. Anesthesia for aneurysm, AVMs and neurovascular procedures 8. Pituitary hormones and anesthesia for pituitary surgery, neuroendoscopy 9. Anesthesia management of head injury and spinal trauma. 10. Intraoperative neuromonitoring (EEG, Depth of anesthesia, TCD, evoked potentials, NIRS, etc.)

Internal Assessment 4 (Theory)	1. Recent advances in Neuroanesthesia, Neurosurgery, neuroradiology procedures relevant to neuroanesthesia (image guidance, Intraoperative MRI, robotic surgeries). 2. Neuromonitoring. 3. Neuroradiology. 4. Neuroprotection, neuronal plasticity, gene therapy, Neurorehabilitation, Brain death and Organ donation, 5. Recent major trials, guidelines in neuroanesthesia 6. Intensive care of patients following Neurosurgery, Neuro medical disorders. surgery. (Myasthenia gravis, GBS, acute stroke, status epilepticus, neurotrauma, Meningitis) 7. Acute pain services, Chronic pain syndromes, Neuropathic Pain, Trigeminal neuralgia, etc. management.

2.2.2. Syllabus for OSCE 1

OSCE 1 will be conducted along with internal assessment 2 in 5 different stations.

Station 1	**Station 2**	**Station 3**	**Station 4**	**Station 5**
Drugs	**Investigations**	**Equipment**	**Guidelines/ Procedures/ Recent Advances in Anesthesia**	**Acute Neurocare - PBLD**
Anesthetic Agents Opioids, Analgesics Muscle Relaxants Vasoactive/ Vasodilators Antiepileptics Osmotic Agents Hormones Steroids	ABG Pulmonary Function Tests Lung and Airway - X-ray, USG, CT Scan Basics of Head CT Preanesthetic Evaluation of Complex Problems	Ventilators Anesthesia Machine Airway Gadgets ICP Monitoring NMT Lung &Airway Ultrasound	Central Lines Tracheostomy Patient Transport Sepsis, VAP Anesthesia Guidelines Airway Guidelines Radiation/ MRI Safety	Unconscious Patient Raised ICP Brain Oriented Resuscitation Status Epilepticus Triage of Trauma Infection Control in ICU Anaphylaxis

2.2.3. Syllabus for OSCE 2

OSCE 2 will be conducted along with internal assessment 4 in 5 different stations.

Station1	Station 2	Station 3	Station 4	Station 5
Drugs	**Investigations**	**Equipment**	**Guidelines/ Procedures/ Recent Advances In Neuro Anesthesia**	**Acute Neurocare-Pbld**
Antibiotics Inmmunosuppressants, IVIG Managing Anticoagulation/ Antiplatelet Drugs IV Fluids, Blood Products Local Anesthetics	EEG Processed EEG in Anesthesia and ICU TCD MRI Sequences SJVO2 Biomarkers Echo, Cardiac Output	TCD Echo IONM EEG, Depth of Anesthesia Monitoring NIRS ONSD Advanced Airway Devices	SAH Stroke Brain, Spinal Trauma Epilepsy Regional Anesthesia-USG Guided Awake Intubation Minimally Invasive Neurosurgery	Brain Death And Organ Donation Vasospasm Myasthenia Gravis Meningitis GB Syndrome Acute Paralysis Emergency Neuroradiology

3. DEPARTMENT OF CARDIOLOGY

3.1. PROGRAM: DM CARDIOLOGY

3.1.1. Syllabi of Internal Assessments

Sl. No.	Time Line	Syllabus
Internal Assessment 1	At the end of 6 months	Cardiac Anatomy, Cardiac Physiology, Genetics, Cardiac development, Cardiac Pathology, Pharmacology, Electrocardiography and Holter
Internal Assessment 2	At the end of 12 months	Non-invasive imaging in cardiology: Echo Doppler, MRI, Cardiac CT, Radionuclide studies ii) Cardiac hemodynamics, cardiac angiography, iii) Cardiac failure
Internal Assessment 3	At the end of 24 months	Clinical Cardiology, Cardiac Electrophysiology and rhythm disorders, Cardiac therapeutics, Cardiac Epidemiology.

Internal Assessment 4	At the end of 30 months	Recent advances (last 5 years) in Cardiology, Areas for future research in cardiology, Areas of advancement in cardiology.

3.1.2. Syllabus for OSCE 1

OSCE 1 will be conducted along with internal assessment 2 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Drugs	**ECG**	**Echo**	**Hemo-Dynamics**	**Pediatric Cardiology**
Antianginals Antiplatelets Anticoagulants Thrombolytic Agents Antilipidemic Agents GDMT for HF (Betablockers, ARNI, ACEI, ARBS, MRAS, SGLT2i) Diuretics Antihypertensives Antiarryhtmics Inotropes PAH	STEMI NSTEMI Exercise ECG Bradyarrythmias Tachyarrythmias Pacemaker ECG Electrolyte Imbalances Cardiomyopathy (HCM, ARVD) HUTT/Holter	Rheumatic VHD DCM RCM HCM Pericardial Diseases Pulmonary Hypertension CAD DSE Shunt Lesions Prosthetic Valves	Basic Cath Catheter Course Oxymetry (Blood Gas) PAH Assessment Of Valves RCM Vs CCP Pericardial Tamponade Prosthetic Valves (Profiling, Etc.)	CCHD (Cynotic Spell) X-Ray ECG Echo (Situs, Shunt, Pah, Anatomy) Management (Medical/ Intervention/ Surgical)

3.1.3. Syllabus for OSCE 2

OSCE 2 will be conducted along with internal assessment 4 in 7 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Electrophysiology	**Angiograms**	**Interventional Cardiology**	**Imaging**	**Preventive Cardiology**
Basic EP Study HUTT	CAG Access (Radial Vs. Femoral)	PTCA – Primary & Elective	TEE ICE	Diet Yoga

Holter Sinus Node/AV Node Dysfunction Atrial Arrhythmias (Diagnosis & Management) SVT (Diagnosis & Management) Ventricular Arrhythmias (Diagnosis & Management) TPI, PPI CRT, ICD Pacemaker & ICD Programming	LV/RV Angiogram RSOV/ CAVF Aortic & PA Angiogram Coronary Venogram Peripheral Angiogram Special Angiographic Techniques Prosthetic Valves Contrast Agents	Adjuctive Devices for PTCA (ROTA, IVL, Laser, Orbital Atherectomy, etc.) CTO Techniques Intravascular Imaging (IVUS, OCT, etc.) Hardware Complications Valve Interventions (BMV, BAV, BPV, TAVR, Newer advances) SHD Intervention (RSOV, CAVF, Paravalvular Leak, Pulmonary AV Malformations)	Cardiac CT Cardiac MRI PET-CT Nuclear Imaging Acess Site Doppler DSE	Stress/Anxiety/ Depression Exercise Prescription CAD Diabetis Hypertension Dyslipidemia Smoking Cessation Immunisation Cardiac Rehabilitation & Palliative Care Counselling & Discharge Advice

Station 6	**Station 7**
Intensive Cardiac Care	**Advanced Heart Failure Care**
BLS/ACLS/ PALS Prescription For Acute Cardiac Emergencies Ventilator Management Inotropes Renal Support Systems	MCS (IABP, LVAD, RVAD) ECMO Cardiac Transplant

4. DEPARTMENT OF CARDIOVASCULAR AND THORACIC SURGERY

4.1. PROGRAM: MCh CVTS

4.1.1. Syllabi of Internal Assessments

Sl. No.	Time Line	Syllabus
Internal Assessment 1	At the end of 6 months	• Principles of Cardiopulmonary bypass history, equipment, pathophysiology, clinical applications of CPB, myocardial protection, DHCA. CPB in infants and children. Recent advances in CPB. • Surgical anatomy and embryology of the heart, lungs, aorta, blood vessels, thoracic duct and esophagus. • Physiology of respiration and blood circulation in the fetus, infants and adults • Cardiac pharmacology • Pre and Post-op management of cardiac surgical patients
Internal Assessment 2	At the end of 12 months	• Morphology of the heart, pathophysiology, and diagnostic methodology in congenital heart diseases. • Pathophysiology of atherosclerosis, ischemic heart disease, valvular heart disease, rheumatic heart disease, aortic aneurysms and dissections, and pericardial disease. • Mechanical assist devices and heart transplantation • Cardiovascular and thoracic imaging • Aetio pathogenesis and diagnosis of congenital, inflammatory, and malignant diseases of the lung, mediastinum, pleura, esophagus, diaphragm, and thoracic lymphatics
Internal Assessment 3	At the end of 24 months	**Adult Cardiac Surgery and Vascular Surgery** • Indications, Risk stratification, surgical management, and prognostic factors of • Ischemic Heart disease – CAD and its complications (VSR, LV aneurysm, Ischemic MR, etc.), TMLR, MICS, Stem cell therapy. • Valvular heart disease- Mitral, Aortic and Tricuspid replacement and repair. surgery for Infective endocarditis, Mechanical and tissue valves, minimally invasive and robotic surgeries. • Diseases of the aorta and great vessels- aneurysms, dissections, pulmonary embolism, EVAR. • Surgery for arrhythmias, cardiac neoplasms, pericardial disease, HOCM

		• Surgeries for heart failure-Transplant and non-transplant options, Assist devices and artificial heart, tissue engineering.
Internal Assessment 4	At the end of 30 months	**<u>Pediatric cardiac surgery and Thoracic Surgery</u>** • Indications, Risk stratification, surgical management and prognostic factors of ASD, VSD, PAPVC, TAPVC, Cortriatriatum, unroofed CS, AVCD, SOV aneurysm, PDA, aortico LV tunnel, CoA, VSD-PS, TOF, Tricuspid atresia, pulmonary atresia. single ventricle physiology, Ebstein anomaly, AP window, truncus, interrupted aortic arch, coronary anomalies, PA from ascending aorta, HLHS, congenital Aortic and mitral valve disease, vascular rings and slings, DORV, TGA and other av discordance, DILV, Atrial isomerism, etc. • Congenital, inflammatory and malignant disease of lung, Solitary Pulmonary Nodule, staging of Ca lung Pulmonary resections, Surgery for emphysema, empyema, VATS, • Chest wall deformities, Thoracic outlet syndrome • Diaphragmatic disease and its management, pleural disease, tracheal disease

4.1.2. Syllabus for OSCE 1

OSCE 1 will be conducted along with internal assessment 2 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Cardiac Anatomy Physiology	**CPB**	**Ischaemic Heart Disease and Vascular**	**Valvular Heart Disease And Thoracic**	**Pediatric Cardiac Surgery**
Embryology of the heart Fetal circulation and circulatory changes at birth Anatomy of the heart,	Haemostasis, thrombosis and bleeding GIT, renal and hepatic physiology	The assessment of patients with coronary heart disease, including elective and	The assessment and management of patients with valvular heart disease; including both isolated and combined aortic	Fetal circulation and circulatory changes at birth Sequential cardiac analysis and terminology of cardiac malformations

pericardium and great vessels Anatomy of the cardiac chambers and valves Anatomy of the peripheral vascular system and vascular conduits Anatomy of conduction system Electro-physiology, including conduction disorders Coronary anatomy and variants Anatomy of femoral triangle and peripheral vascular system Myocardial cellular physiology Haemodynamics ; physiology and measurement Haemostasis, thrombosis and bleeding Acid base balance Pulmonary physiology, ventilation and gas exchange	Temperature regulation Inflammation Systemic inflammatory response syndrome ARDS Anticoagulant and thrombolytic drugs Heparin Protamine axis Principles and practice of CPB Relevant equipment and technology and its application Monitoring during CPB Inflammatory and pathophysiological response to bypass Pulsatile and non pulsatile flow Effect of CPB on pharmacokinetics Priming fluids and haemodilution Acid base balance – pH and alpha stat	emergency presentations. To include the preliminary assessment and initial management of patients with compli-cations of myocardial infarction, including mitral regurgitation, ventricular aneurysm and septal defects. Coronary anatomy and variants Coronary angiography Anatomy of the peripheral vascular system and vascular conduits Atheroma, medial necrosis and arteritis Intimal hyperplasia and graft athero-sclerosis	and mitral valve disease The assessment and management of patients with combined coronary and valvular heart disease, including operative management Cardiovascular physiology including valve physiology and haemodynamics Pathophysiology of valve incompetence and stenosis Consequences of valve disease on cardiac function and morphology Pathophysiology of mixed valve disease and combined valve pathology (eg aortic and mitral) Combined valvular and ischaemic heart disease Atrial fibrillation and other arrhythmias	Drugs used in the treatment of congenital heart disease Drugs for PAH Diagnosis, investigation and treatment of congenital heart disease Role of interventional cardiology. Risk assessment and stratification Types of cardiac prosthesis and indications for use Anatomy, pathophysiology, natural history of the following conditions - Patent ductus arteriosus - Aortopulmonary window - Atrial septal defect - Ventricular septal defect - Coarctation - Aortopulmo-nary and venous shunts - Transposition of the great arteries - Congenitally corrected TGA - Single ventricle/ univentricular heart - Tetralogy of Fallot/Pulmo-

Vascular biology and reactivity Physiology of pulmonary vasculature Inotropes, vasodilators and vasoconstrictors Blood transfusion and blood products Routine haematology and biochemical investigations Chest radiograph and ECG	Neuropsychological consequences of CPB Cell salvage and blood conservation Cannulation and institution of cardiopulmonary bypass Safe conduct of CPB Weaning from bypass and decannulation Femoral cannulation and decannulation Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation Relevant cannulation techniques and appropriate delivery of cardioplegia Myocardial function and dysfunction Principles and practice of myocardial protection	Myocardial infarction and compli-cations Drugs used in the treatment of hypertension, heart failure and angina Cardiac arrhythmias Anti-arrhythmic drugs Antiplatelet, anticoagulant and thrombolytic drugs Risk assessment and stratification Natural history of aortic disease Diagnosis, investigation and assessment of aortic disease The preliminary assessment and initial management of patients with acute dissection of	Endocarditis and prosthetic valve endocarditis Risk assessment and stratification Management of cardiovascular risk factors Diagnosis investigation and assessment of valvular heart disease Timing of surgical intervention in valve disease Tracheobron-chial tree and lungs Bronchopul-monary segments Thoracic inlet, neck and mediastinum Oesophagus and upper GI tract Chest wall and diaphragm Benign and malignant tumours of trachea, bronchus and lung parenchyma Oesophagitis	nary atresia plus VSD - Pulmonary atresia and intact septum - Hypoplastic left heart - Truncus arteriosus - Double outlet right ventricle - Pulmonary atresia plus VSD and MAPCAs - Partial and complete atrioventricular septal defects. - Anomalies of the pulmonary venous drainage (partial and total) - Anomalies of systemic venous drainage. - Congenital aortic valve disease (including supra-valve stenosis). - LV outflow tract obstruction - Sinus of Valsalva aneurysm - Congenital mitral valve disease - Congenital tricuspid valve disease (including - Ebsteins abnormality). - Anomalies of the coronary arteries (including ALCAPA) - Vascular rings - Cardiac tumours - Pericardial disease

	Cardioplegia solutions and delivery modes. Non-cardioplegic techniques of myocardial protection Mechanical circulatory support in the pre-operative, peri-operative and post-operative periods IABP Ventricular assist devices	the ascending aorta. Classification of aortic aneurysms	Oesophageal motility disorders Malignant and benign tumours of the oesophagus, pleura and chest wall, mediastinum Anatomy and physiology of the pleura Pneumothorax Pleural effusion Empyema Haemothorax Chylothorax	- Interrupted aortic arch Cardiac catheterisation data including interpretation of haemodynamic data, shunt and resistance calculations Echocardiography in congenital heart disease, including 2D, doppler, and TOE Principles of Paediatric Intensive Care.

4.1.3. Syllabus for OSCE 2

OSCE 2 will be conducted along with internal assessment 4 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Postoperative Management and Intensive Care	**CPB**	**Ischaemic Heart Disease And Vascular**	**Valvular Heart Disease And Thoracic**	**Pediatric Cardiac Surgery**
Haemodynamics: physiology and measurement Haemostasis, thrombosis and bleeding Acid base balance Pulmonary physiology, ventilation and gas exchange	Anticoagulant and thrombolytic drugs Heparin Protamine axis Principles and practice of CPB Relevant equipment and technology	Operative treatment Off pump and on pump surgery Results of surgery - survival, graft patency, recurrence	Operative treatment Options for operative management including: valve replacement/repair (mechanical, biological stented and stentless grafts, homografts and autografts)	Operative management Sternotomy - open and close, including resternotomy in children Thoracotomy Approaches for ECMO, cannulation

GIT, renal and hepatic physiology Nutrition Temperature regulation Myocardial infarction and complications Endocarditis Pericarditis Systemic inflammatory response syndrome Bronchopulmonary infection ARDS Drugs used in the treatment of hypertension, heart failure and angina Inotropes, vasodilators and vasoconstrictors Anti-arrhythmic drugs Haemostatic drugs Antiplatelet, anticoagulant and thrombolytic drugs Organisms involved in cardiorespiratory infection Antimicrobial treatment and policies	and its application Monitoring during CPB Inflammatory and pathophysiological response to bypass Pulsatile and non pulsatile flow Effect of CPB on pharmaco-kinetics Priming fluids and haemo-dilution Acid base balance – pH and alpha stat Neuropsychological consequences of CPB Cell salvage and blood conservation Cannulation and institution of cardiopul-monary bypass Safe conduct of CPB Weaning from bypass and decannulation Femoral cannulation	Arterial revascularisation Redo coronary artery surgery Role of PCI and non-operative treatment Management of cardio-vascular risk factors Complica-tions of myocardial infarction and ischaemic heart disease VSD, mitral regurgitation, aneurysm. Knowledge of operative treatment including spinal cord and cerebral protection strategies • Type A aortic dissection • Type B aortic dissection • Traumatic aortic rupture	Valve design: materials, configuration and biomechanics. Results of surgery – survival, valve thrombosis, endocarditis, bleeding Interpretation of survival and follow up data Cardiac performance and long term functional status Surgery for conduction problems Surgical treatment of arrhythmias Management of complications of surgery Cardiac rehabilitation Non operative management of endocarditis Valve selection Anticoagulation management including complications. Isolated, aortic valve replacement Isolated mitral valve replacement Mitral valve repair	and management Surgical management of the following conditions: - Patent ductus arteriosus - Atrial septal defect - Ventricular septal defect. - Coarctation - Aortopulmonary window. - Vascular ring - Aortopulmonary and venous shunts - PA banding - Partial atrioventricular septal defect - Aortic and mitral valve surgery including Ross procedure. - Open aortic valvotomy - Open pulmonary valvotomy - Tricuspid valve surgery including Ebsteins Tetralogy of Fallot. - Complete atrioventricular septal defect - Interrupted aortic arch

Cardiac arrhythmias and treatment of cardiac arrhythmias Blood transfusion and blood products Wound infection and sternal disruption Neuropsychological consequences of surgery and critical care Analysis and interpretation of post-operative and critical care charts and documentation Chest radiograph and ECG Echocardiography including TOE Management of fluid balance and circulating volume Pain control Management of post-operative haemorrhage Cardiopulmonary resuscitation (ALS) Management of complications of surgery Use of intra-aortic balloon pump Use of defibrillator Understanding and use of cardiac pacing	and decannulation Repeat sternotomy, with pericardial dissection, cardiac mobilisation and cannulation Relevant cannulation techniques and appropriate delivery of cardioplegia Myocardial function and dysfunction Principles and practice of myocardial protection Cardioplegia solutions and delivery modes. Non-cardioplegic techniques of myocardial protection Mechanical circulatory support in the pre-operative, peri-operative and post-operative periods IABP	• Thoraco-abdominal aneurysm Results of surgery – survival, complication rates Non-surgical management including the role of endovascular stenting Management of cardiovas-cular and non-cardio-vascular risk factors Preparation for and management of cardiopul-monary bypass, including alternative, non-bypass strategies for descending aortic surgery Organ protection strategies including DHCA, RCP and SACP Femoral cannulation Axillary cannulation	Tricuspid valve surgery Combined valve and graft surgery Surgical strategies for managing the small aortic root Redo Valve surgery Valve surgery for endocarditis Techniques for surgical ablation of arrhythmias Alternative surgical approaches to valve surgery including thoracotomy, trans-septal approaches, and minimal access surgery Thoracic Incisions -Types of incisions and appropriate use, including lateral, anterior, muscle sparing and video-assisted approaches Early and late complications of thoracic incisions Complex chest wall reconstruction Lung volume reduction surgery: techniques, complications and management of complications	- Total anomalous pulmonary venous drainage. - Transposi-tion of the great arteries - Double outlet right ventricle - Pulmonary atresia plus VSD and MAPCAs Fontan procedures Extra cardiac conduits and their replacement Rastelli procedure Norwood procedure Truncus arteriosus repair Results of surgery - common complications and management. Late complications of surgery for congenital heart disease Management of adults and children following

Interpretation of blood gas results Airway management Understanding of ventilatory techniques and methods Recognition, evaluation and treatment of multiorgan dysfunction Feeding and nutrition Re-exploration for bleeding or tamponade	Ventricular assist devices	Surgery for acute dissection of the ascending aorta Aortic root replacement Complex aortic surgery including arch surgery, descending aortic and thoraco-abdominal aortic surgery	Myasthenia gravis: medical, surgical and peri-operative management Surgery for benign and malignant conditions of the lungs, including uncomplicated lobectomy/pneumonectomy for lung cancer, wedge resection and metastasectomy Segmentectomy and lobectomy for benign and malignant disease.	congenital heart surgery Management of compli-cations of surgery Cardiopul-monary resuscitation Role of mechanical assist (IABP, VAD and ECMO) Indications for referral for transplantation

4.2. PROGRAM: MCh VASCULAR SURGERY

4.2.1. Syllabi of Internal Assessments

Sl. No.	Time Line	Syllabus
Internal Assessment 1	At the end of 6 months	Applied Anatomy - Regional and developmental - of Aorta and arteries and branches. Exposure of blood vessels at every body part in the chest, abdomen, and neck, Veins in extremities and inferior vena cava. Applied Physiology - Arterial, venous and lymphatic physiology. Applied Bacteriology - Infection in Vascular Surgery, prosthetic graft infection, primary and secondary aorto-enteric fistula. Noninvasive Vascular Laboratory evaluation.
Internal Assessment 2	At the end of 12 months	Applied Pathology-Pathology of diseases of the Aorta, Arteries, Pathology of Deep Venous thrombosis, and AV malformation. Imaging in vascular surgery. Radiation Safety. Perioperative care of Vascular surgery patients. Vascular grafts and devices.
Internal Assessment 3	At the end of 24 months	Aortic aneurysm- Arch/ Thoracic/Thoraco abdominal and abdominal aortic aneurysm- evaluation, decision making and management Peripheral and splanchnic aneurysms- decision-making and management. Cerebrovascular diseases- presentation and management Acute and chronic limb ischemia – evaluation, decision making and management. Vascular Trauma Chronic venous insufficiency- presentation, decision making and management.
Internal Assessment 4	At the end of 30 months	Diabetic foot and its management Renovascular disease- evaluation, decision making and management Thoracic Outlet syndrome- presentation and management Mesenteric Vascular Disease- Presentation, evaluation and management Vascular Malformations Hemodialysis access – creation, follow-up and management of complications Recent advances in vascular and endovascular surgery

4.2.2. Syllabus for OSCE 1

OSCE 1 will be conducted along with internal assessment 2 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Vascular Anatomy Physiology and Atherosclerotic Risk Factors	**Vascular Applied Bacteriology, Pharmacology and Pathogenesis**	**Assessment and Pre-Operative Optimiza-tion of Patients with Peripheral Vascular Disease**	**Vascular Grafts And Devices**	**Post-Operative Care of Vascular Surgery Patients**
Embryology of the Aorta and IVC Anatomy of the Peripheral Vascular System and Vascular Conduits Anatomy of Femoral Triangle and Peripheral Vascular System Exposure of Blood Vessels at Every Body Part in the Chest, Abdomen, and Neck Haemostasis, Thrombosis and Bleeding Blood Transfusion and Blood Products Radiation Safety	Haemostasis, Thrombosis and Bleeding Systemic Inflammatory Response Syndrome ARDS Anticoagulant and Thrombolytic Drugs Antiplatelet Agents Cell Salvage and Blood Conservation NOACS Graft Infection Mycotic Aneurysms Pathogenesis of Various Arterial and Venous Diseases	ABI Plethysmo-Graphy Duplex Scan DSA CT/MRI PET CT IVUS Preoperative Cardiac Optimization Preoperative Renal Optimization Preoperative Pulmonary Optimization	Autogenous Grafts (Including Vein Harvest, Surgical and Endoscopic) Prosthetic Grafts Biologic Grafts Bioeng-Ineered Vascular Grafts Nonaortic Stents And Stent Grafts Aortic Stent Grafts Fenestrated And Branched Stent Grafts	Systemic Complications: Cardiac Systemic Complications: Respiratory Systemic Complications: Renal Systemic Complications: Neurologic Graft Thrombosis Graft Infection Anastomotic Aneurysms Local Complications: Aorto-Enteric Fistula Local Endovascular Complications Venous Complications Local Complications: Lymphatic

4.2.3. Syllabus for OSCE 2

OSCE 2 will be conducted along with internal assessment 4 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Aortic Aneurysm and Peripheral Aneurysm	**Extra Cranial Carotid Artery Disease, and Splanchnic Aneurysms**	**Acute And Chronic Limb Ischemia, Diabetic Foot Management**	**Mesenteric Vascular Disease and Reno-vascular Hyper-tension**	**Venous Disorders And Vascular Trauma**
Aortic Arch Aneurysm DTA Aneurysm Thoraco abdominal aortic aneurysm Iliac Artery aneurysm Femoral aneurysm Inflammatory aneurysm Mycotic aneurysm Takayasu arteritis-related aneurysm Acute Type B aortic dissection Chronic Type B aortic dissection Connective tissue disease-associated aneurysm	Symptomatic Carotid artery stenosis Asympto-matic Carotid artery stenosis Vulnerable carotid plaque Carotid aneurysm Carotid dissection Vertebral artery disease Mesenteric artery aneurysms	Acute limb ischemia Aortoiliac occlusive disease Femoro popliteal occlusive disease Infragenicular occlusive disease Diabetic foot pathogenesis Diabetic foot management Vasculitis associated PAD	Acute mesenteric ischemia Chronic mesenteric ischemia Mesenteric dissection Mesenteric venous thrombosis Patho-genesis of Renovas-cular hypert-ension Open surgical options for renal artery stenosis Endovascul ar options for renal artery stenosis	Acute DVT: Mechanical and Pharmacologic Prophylaxis Acute DVT: Surgical and Interventional Treatment Superficial Thrombophlebitis and its Management Vena Cava Interruption Varicose Veins: Surgical/Endovenous Treatment Treatment of Perforator Vein Incompetence Deep Vein Valve Reconstruction Iliocaval Venous Obstruction: Surgical Treatment/Endovascular Treatment Portal Hypertension Nutcracker Syndrome Superior Vena Cava Occlusion and Management

5. DEPARTMENT OF IMAGING AND INTERVENTIONAL RADIOLOGY

5.1. PROGRAM: DM CARDIOVASCULAR IMAGING AND VASCULAR INTERVENTIONAL RADIOLOGY

5.1.1. Syllabus for OSCE 1

OSCE 1 will be conducted along with internal assessment 2 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Drugs	**Hardware Devices in Intervention**	**Measurements or Image Processing**	**Contrast Agents**	**Guidelines in Management of Vascular Problems or Imaging**
Rate Regulators Vasodilators Emergency drugs Antiemetics Antihypertensives Anticoagulants IVF Local anesthetic agents.	Sheaths Wires Catheters Guide catheters Microcatheters Embolising Agents	Measuring Aortic Dimensions for TAVR Cardiac Function Analysis - EF, Flow assessment Coronary artery reconstructions Congenital heart disease reconstructions	Iodinated contrast Agents Gadolinium-based agents Ultrasound contrast agents	Management of Claudication Management of Varicose Veins Management of DVT Aortic Dissection-imaging Myocarditis-Imaging DCM - Imaging TOF – CT Imaging

5.1.2. Syllabus for OSCE 2

OSCE 2 will be conducted along with internal assessment 4 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Drugs for Cardiac CT and Cardiac MRI	**Hardware Devices in Intervention**	**Measurements or Image Processing**	**Contrast Agents**	**Guidelines in Management of Vascular Problems or Imaging**

Stress perfusion agents Antidotes during stress Imaging Thrombolytics NOACS Vasopressors Blood products	Stents Vascular plugs Lipiodol DCB Hypressure Balloons Closure devices	Plan aortic aneurysm management- TEVAR and EVAR Plan TEVAR in aortic dissection Cardiac MR analysis	Iodinated contrast Agents- Their interactions Newer Gadolinium based Agent Ultrasound contrast agents in specific situations	Acute Limb ischemia Interventions in Acute dissection, IMH, PAU Interventions in Renovascular hypertension Imaging in Fontan failure Imaging in Lymphatic leaks

5.2. PROGRAM: DM NEUROIMAGING AND INTERVENTIONAL NEURORADIOLOGY

5.2.1. Syllabus for OSCE 1

OSCE 1 will be conducted along with internal assessment 2 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Drugs	**Neuropathology, Neuro-microbiology and Neuro-chemistry**	**Imaging, Image processing, and Instrumentation**	**Contrast Agents**	**Neuroanatomy/ Embryology/ Genetics**
Vasodilators Emergency drugs Antihypertensives Anticoagulants Fibrinolytics Antiplatelets Anti-anaphylaxis management Common local aesthetic/pain medications.	Identification of common intracranial intraaxial and extra axial, adult and pediatric tutors. Identification of common bacteria/fungi /parasites/ virus causing the intracranial pathology. CSF biochemistry	Reconstruction and or processing of basic and advanced MRI/CT studies (Eg:fmri/DTI/Spectroscopy post processing flow studies/VRT/Fusion imaging, etc.) DSA/CT/MR machines and principles Stereotactic Radiosurgery Radiation protection	Iodinated contrast Agents Gadolinium based agents Ultrasound contrast agents Contrast reactions	Gross and imaging anatomy of the brain and spine Gross and Imaging anatomy of head and neck Vascular anatomy of the brain, head, and neck Embryology of brain, spine, and neuro-vasculature Genetics, advanced sequencing methods for common pediatric genetic neurological diseases.

5.2.2. Syllabus for OSCE 2

OSCE 2 will be conducted along with internal assessment 4 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Diagnostic Neuro-radiology	**Interventional Neuroradiology**	**Devices and hardware, Drugs, Complications management**	**Neuro otology/ Neuro-ophthalmology, Head and neck /fetal neuroradiology**	**Guidelines**
Neurotrauma White matter disease Intracranial Infections Brain tumors Metabolic diseases Pediatric neurological diseases Spine diseases (developmental /neoplastic, trauma and inflammatory/degenerative/vascular/miscellaneous)	Ischemic and hemorrhagic stroke Aneurysmal disease Arterial occlusive disease Arteriovenous fistula Venous diseases (venous thrombosis, IIH/intracranial hypotension) Vasculopathy Brain vascular malformations Spine neurovascular diseases Vascular tumors Craniofacial malformations Pediatric vascular diseases Functional neurointerventions tests	Devices used for cerebral angiography Devices used for neurointer-ventional procedures Embolic agents Sheaths/ catheters/guide catheters/ microcatheters/ wires/microguidewires/closure devices Common drugs used in neuro-interventions Procedural complications and management	Temporal bone Skull base Ocular and orbital pathology Head and neck diseases Neck spaces Paranasal sinuses Fetal Neuroimaging	Guidelines, algorithms / strategies in imaging workup of neurological diseases (eg: MS, Glioma follow-up, pituitary tumors, radiation necrosis, stroke, etc.) Guidelines in the management of neurovascular diseases in interventional neuroradiology (eg: stroke, AVM, aneurysms, dural fistula, dural sinus thrombosis, etc.)

6. DEPARTMENT OF NEUROLOGY

6.1. PROGRAM: DM NEUROLOGY

6.1.1. Syllabi of Internal Assessments

Exams	Topics
Internal Assessment 1 (Theory)	• Fundamentals of neuropsychology • Neuro-ophthalmology • Neuro-otology • Neuro-urology • Neuro-endocrinology • Microbiology and Neuropathology • Neuroimmunology
Internal Assessment 2 (Theory)	• Neuroanatomy • Neurophysiology and neurochemistry • Neuropharmacology • Neurogenetics • Neuroepidemiology
Internal Assessment 3 (Theory)	Approach to and management of • Stroke • Movement disorder • CNS infections
Internal Assessment 4 (Theory)	Approach to and management of • Neuromuscular disorders • Epilepsy • Neuroimmunological diseases, multiple sclerosis and related disorders • Neurodegenerative diseases

6.1.2. Syllabus for OSCE 1

OSCE 1 will be conducted along with internal assessment 2 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Basic Sciences	**Neurological symptoms and signs**	**Neuroimaging**	**Investigations**	**Acute Neurological emergencies**
Anatomy: Basal ganglia, cerebellum, thalamus, brainstem, limbic system, lobes,	Symptom analysis Localization Elicitation of signs	CT Brain Basic MRI sequences	Interpretation of CSF results Antibody test interpretation	Stroke Status epilepticus

spinal cord, blood supply Physiology: Circuits (including basal ganglia and its pathways, frontal subcortical circuits, papez circuit), pathways (ascending and descending pathways), receptors	Pattern recognition (clinical/video) Identification of semiology (movement disorders, epilepsy)	MRI Stroke protocol interpretation including angiogram, and venogram	Analysis of fundus photographs	Neuromuscular respiratory failure Neuroinfections Movement disorder emergencies

6.1.3. Syllabus for OSCE 2

OSCE 2 will be conducted along with internal assessment 4 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Clinical scenarios and management protocols	**EEG**	**NCS/EMG/ EPs**	**Neuropathology and genetics**	**Neuroimaging**
Analysis of specific clinical scenarios Formulation of differential diagnosis Management protocols for neurological conditions	Interpretation and analysis of EEG	Interpretation and analysis of nerve conduction reports, EMG and evoked potential studies	Gross specimens Histopathology: - Muscle - Nerve - Brain parenchyma - Meninges Genetic report interpretation	MRI and CT including angiogram, venogram, vessel wall imaging, MRS, and perfusion imaging Pattern recognition

7. DEPARTMENT OF NEUROSURGERY

7.1. PROGRAM: MCh NEUROSURGERY

7.1.1. Syllabi of Internal Assessments

Sl. No.	Syllabus
Internal Assessment 1	1. Anatomy of brain, cranial nerves, blood vessels 2. Anatomy of the spinal cord, vertebral column 3. Cerebral blood flow and Physiology of CSF 4. Basics of neurophysiology

	5. Pharmacology – basics (anti-epileptics, drugs for treating cerebral edema) 6. History of Neurosurgery 7. Basics of electrolyte balance
Internal Assessment 2 (Theory)	1. General and Medical neuropathology 2. Infection of the brain, spinal cord and its meninges, infection following Neurosurgery, and nosocomial infection in the intensive care units, sepsis. Management, Prevention of infections, Infection control in OT and Neuro ICU. 3. Biostatistics- Sensitivity, specificity, type 1&2 errors, correlation coefficient, Regression analysis, odds ratio, sample size, Test for means, meta-analysis, planning a research study. 4. Basic Neuro radiology 5. Basics of neuro monitoring
Internal Assessment 3	1. Intra Cranial Aneurysms and Their Management. 2. Vascular Malformations of The Brain (Other Than Saccular Aneurysm) 3. Meningiomas of the Brain And Management 4. Supratentorial Gliomas and Intraventricular Tumors 5. Pineal Region Tumours 6. Pit Net Pituitary Adenomas and Their Management 7. Head Injury and Management 8. Epilepsy Surgery 9. Tumours of the Posterior Fossa 10. Spine Surgery Including Trauma
Internal Assessment 4 (Theory)	1. Recent advances in Neurosurgery (image guidance, Intraoperative MRI, robotic surgery) and neuroradiology 2. Intra operative Neuromonitoring. 3. Surgery for movement disorder 4. Cerebral revascularization surgery and surgery for stroke 5. Surgical management of pain 6. Pediatric neurosurgery, surgery for malformations, hydrocephalus 7. Craniovertebral junction anomalies 8. Skull base surgery and its applications 9. Recent landmark trials in Neurosurgery 10. Metastatic lesions of the brain and spine

7.1.2. Syllabus for OSCE 1 and 2

OSCE 1 and 2 will be conducted along with internal assessments 2 and 4 in 5 different stations.

Station 1	Station 2	Station 3	Station 4	Station 5
Radiology	**Osteology (Skull, Vertebrae)**	**Instruments**	**Case Scenario**	**Pathology Specimen**

Xray CT Scan MRI	Various anatomical aspects	Brain cannula VP shunt Leila retractor Rongeours Dissectors Aneurysm clip Hudsons brace Gigli wire saw LP shunt Micro scissors	SAH Lobar hemorrhage / IVH Acute stroke Acute herniation Apoplexy Status epilepticus	Various intracranial tumors / hemorrhage / colloid cyst / hydrocephalus