

**Cardiology - I**

**Year: Third Year D.voc**

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Examination Scheme					Total
L	T	P	External		Internal			
			Theory	Practical	Theory	*C.E.	Practical	
3	-	-	70	-	15	15	-	100

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

**Contents**

Sr. No.	Topic	Weightage %	Teaching hours
	<ul style="list-style-type: none"> <li>Presentation of a case of common cardiac diseases by students including differentiation of cardiac vs Non cardiac chest pain etc.</li> <li>Knowledge on common cardiac drugs, different modes of administration, adverse affects of a drug. How to give drugs by infusion pumps and immediate management in case of adverse effect of a drug including antidotes.</li> <li>Different methods of administration of oxygen, Endo tracheal intubations, tracheotomy tube insertion, suction procedure etc.</li> <li>Cardiac arrest- Diagnosis and first line treatment -- cardiopulmonary resuscitation- knowledge of basic life support and advanced cardiac life support ( BLS &amp; ACLS), Anaphylactic Shock.</li> </ul>		<b>54</b>
<b>Total teaching hours for the academic year</b>			<b>54</b>

## Cardiology – II

Year: Third Year D.voc

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Examination Scheme					Total
L	T	P	External		Internal			
			Theory	Practical	Theory	*C.E.	Practical	
3	-	-	70	-	15	15	-	100

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

### Contents

Sr. No.	Topic	Weightage %	Teaching hours
	<ul style="list-style-type: none"> <li>• Enlisting common cardiac emergencies, its presentations, bed side methods of diagnosis and first line treatment. With special emphasis on vasopressors like Adrenaline, nor adrenaline, dopamine, dobutamine and vasopressors.</li> <li>• Acute coronary syndrome (ST segment, MI and non ST segment MI, unstable angina etc.) Diagnosis &amp; management</li> <li>• Basics of: Acute cardiac failure including Acute pulmonary oedema, Acute Pericarditis –cardiac tamponade</li> <li>• Brief introduction of other killer causes of chest pain &amp; breathlessness like acute dissection of aorta, Tension Pneumothorax and Acute Pulmonary embolism. Cardiogenic shock</li> <li>• Introduction and basics of – Echocardiography, Tread mill test (TMT), Cardiac cath. Laboratory and Heart, Lung Machine and Pace makers</li> <li>• X-ray findings of common cardiac conditions</li> <li>• ECG findings in acute cardiac emergencies.</li> <li>• Human approach and ethical issues.</li> </ul>		<b>54</b>
<b>Total teaching hours for the academic year</b>			<b>54</b>

**Clinical posting: Cardiology**

**Year: Third Year D.voc**

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Examination Scheme					Total
L	T	P	External		Internal			
			Theory	Practical	Theory	*C.E.	Practical	
-	-	-	-	140	-	30	30	200

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

**Contents**

Topic
<ul style="list-style-type: none"> <li>• Presentation of a case of common cardiac diseases</li> <li>• Differentiation of cardiac vs non cardiac chest pain</li> <li>• How to give drugs by infusion pumps and immediate management in case of adverse effect of a drug including antidotes</li> <li>• Different methods of administration of oxygen, Endo tracheal intubations, tracheotomy tube insertion, suction procedure etc.</li> <li>• Cardiac arrest - Diagnosis and first line treatment</li> <li>• Cardiopulmonary resuscitation - knowledge of basic life support and advanced cardiac life support (BLS &amp; ACLS)</li> <li>• Anaphylactic Shock.</li> <li>• First line treatment with special emphasis on vasopressors like adrenaline, nor adrenaline, dopamine, dobutamine and vasopressors.</li> <li>• Acute coronary syndrome (ST segment, MI and non ST segment MI, unstable angina etc.) Diagnosis &amp; management</li> <li>• Identification of other killer causes of chest pain &amp; breathlessness like acute dissection of aorta, Tension Pneumothorax and Acute Pulmonary embolism. Cardiogenic shock</li> <li>• Setup and conducting Echocardiography, Tread mill test (TMT), Cardiac cath. Laboratory and Heart, Lung Machine and Pace makers</li> <li>• Analysis of X-ray findings of common cardiac conditions</li> <li>• Analysis of ECG findings in acute cardiac emergencies.</li> <li>• Training and maintenance of instruments and equipments.</li> <li>• Patient handling for different procedures.</li> <li>• Case studies. Clinical examinations. Report presentation and analysis.</li> </ul>

**SKILL MODULE -1 ECHOCARDIOGRAPHY**

Type of Course: UG- D.voc Med. Sci.

Total duration of Skill Module: 100 hrs in Year 3rd Diploma Cardiology

Teaching and Examination Scheme:

Teaching Scheme			Credit	Examination Scheme					TOTAL
LectHrs/ Tut Hrs/	Week	ClinHrs/ Week		External		Internal			
				T	P	T	CE	P	
2	-	1	-	30	-	10	10		50

Lect- Lecture, Tut - Tutorial, Clin. - Clinical, T - Theory, P - Practical, CE - CE, T - Theory, P – Practical

**Contents**

SR. NO	TOPICS	WEIGHTAGE	TEACHING HOURS
1	<ul style="list-style-type: none"> <li>Development and principle - Transducers and its types - Views used in transthoracic echocardiography - M- mode and 2D transthoracic echocardiography - Doppler echocardiography: Principle - Pulsed, continuous wave and colour - Measurement of cardiac dimensions - Evaluation of systolic left ventricular function and methods - Evaluation of diastolic left ventricular function and grading - Regional wall motion abnormalities - Hemodynamic assessment - Stroke volume and cardiac output assessment - Regurgitant volume and fraction - Pulmonary – systemic flow ratio - Transvalvular gradients - Pressure half time - Continuity equation - Intracardiac pressure- Assist Cardiologist in obtaining images of Heart- Positioning of patient for testing.</li> <li>Echocardiography in Valvular heart disease - Mitral stenosis - Mitral regurgitation - Mitral valve prolapse - Aortic stenosis - Aortic regurgitation - Pulmonary stenosis - Pulmonary regurgitation - Infective endocarditis - Prosthetic valve assessment - Pulmonary hypertension - Echocardiography in Cardiomyopathies: - Dilated - Hypertrophic - Restrictive - Constrictive pericarditis - Pericardial effusion and cardiac tamponade - Left atrial thrombus - Left atrial myxoma - Complications of MI - Transoesophageal echocardiography - Paediatric echocardiography - Segmental analysis - Cardiac malpoistions - Atrial segment - Situs solitus - Situs inversus - Situs ambiguus - Ventricular segment and spatial position - Atrioventricular connections - Arterial segment and spatial</li> </ul>	100%	100

	relation - Ventriculo arterial segment - Congenital heart disease - Atrial septal defect - Ventricular septal defect - Patent ductus arteriosus - Tetralogy of Fallot - Coarctation of aorta - Transposition of great arteries- Knowledge about the equipment – Roles and responsibilities of Cardiac Technologist in assisting with Echocardiography		
	<b>Total teaching hours for the academic year</b>	<b>100%</b>	<b>100</b>

**SKILL MODULE -2 PERFUSION SCIENCE / TECHNOLOGY**

**Type of Course:** UG- D.voc Med. Sci.

**Total duration of Skill Module:** 150 hrs in Year 3rd Diploma Cardiology

**Teaching and Examination Scheme:**

Teaching Scheme			Credit	Examination Scheme					TOTAL
LectHrs/ Tut Hrs/	Week	ClinHrs/ Week		External		Internal			
				T	P	T	CE	P	
3	-	2	-	70	-	15	15		100

Lect- Lecture, Tut - Tutorial, Clin. - Clinical, T - Theory, P - Practical, CE - CE, T - Theory, P – Practical

**Contents**

SR. NO	TOPICS	WEIGHTAGE	TEACHING HOURS
1	<p><b>Unit-1 PHYSICS FOR PERFUSIONISTS</b></p> <ol style="list-style-type: none"> <li>1. Introduction to thermal sciences, review of calculus</li> <li>2. Pressure, hydrostatics, and intro concepts in thermodynamics</li> <li>3. Conservation of mass</li> <li>4. The first law of thermodynamics and mechanical energy balance</li> <li>5. Applications of conservation of energy</li> <li>6. Integral conservation of linear momentum</li> <li>7. Concepts in cardiovascular fluid mechanics Flow through tubes</li> <li>8. Intro to differential analysis and the continuity equation</li> <li>9. The Navier-Stokes equations</li> <li>10. Transport applications in cardiopulmonary bypass: oxygenation and ultrafiltration</li> <li>11. Mass transfer and the differential component mass balance</li> <li>12. Gas laws, solubility of gases</li> <li>13. Volume, pressure, flow</li> <li>14. Mass, density, viscosity</li> <li>15. Heat units, temperature scales, heat transfer</li> <li>16. Diffusion/osmosis Molarity, concentrations</li> </ol>	100%	30
2	<p><b>Unit-2 PERFUSION TECHNOLOGY</b></p> <ol style="list-style-type: none"> <li><b>1. Basics of diagnostic techniques</b> <ul style="list-style-type: none"> <li>• Chest of X-ray, ECG, Angiography, Echo</li> <li>• Laboratory investigations in relation to perfusion technology</li> </ul> </li> <li><b>2. Monitoring and instrumentation</b></li> </ol>		30

	<ul style="list-style-type: none"> <li>• Instrumentation technology of ECG machine, pressure transducers, syringe and peristaltic pumps, monitors, ventilators, pulse oximeters, temperature probes and thermo regulatory monitoring, defibrillators.</li> <li>• Hemodynamic monitoring, Haemostatic monitoring.</li> <li>• Maintenance of oxygen, carbon dioxide and acid base status and their monitoring</li> </ul> <p><b>3. Physiology of extra-corporeal circulation</b></p> <ul style="list-style-type: none"> <li>• Assessment of patients before bypass; going on &amp; coming off bypass.</li> <li>• Hemodilution and priming solutions</li> </ul> <p><b>4. Principles of extracorporeal gas exchange</b></p> <ul style="list-style-type: none"> <li>• Analyzing &amp; correction of ABG, VBG and other blood investigations</li> </ul> <p><b>5. Perfusion Equipment - Hardware:</b></p> <ul style="list-style-type: none"> <li>• Heart-lung machines/centrifugal pumps</li> <li>• Pressure and low level alarm devices</li> <li>• Heart-lung heater/coolers</li> <li>• Mechanical/electronic flow meters, blenders</li> <li>• Perfusion data's recording, store keeping</li> <li>• In-line oxygen saturation devices</li> <li>• In-line blood gas devices</li> <li>• Oxygen analyzers</li> <li>• Cell savers</li> <li>• Intra-aortic balloon pump</li> </ul> <p><b>6. Support of Cardiac Operation Theatre Techniques</b></p> <ul style="list-style-type: none"> <li>• Monitoring</li> <li>• Setup for ECG and intravascular pressure monitoring</li> <li>• Coronary artery and graft flow measurement</li> <li>• Resuscitation and support</li> <li>• Catheterisation</li> <li>• Angiography</li> <li>• Angioplasty</li> <li>• EPS Studies</li> <li>• Valvuloplasty</li> <li>• Intra-aortic balloon</li> </ul>		
3.	<p><b>Unit-3 CLINICAL APPLICATION OF CPB TECHNIQUES</b></p> <p>1. Conduct, Monitoring &amp; Termination of CPB Check lists</p> <ul style="list-style-type: none"> <li>• Flow/pressure</li> <li>• Hemodilution</li> <li>• Acid/base balance</li> <li>• Oxygen and carbon dioxide exchange</li> <li>• Patient core temperature</li> </ul>		30

	<ul style="list-style-type: none"> <li>• Anticoagulation</li> <li>• Hypothermia</li> <li>• Pressure, flow, resistance</li> <li>• Adequacy of perfusion</li> <li>• Myocardial preservation General bypass Coronary Valvular Re-Operations Congenital Fem-Fem bypass Emergency</li> </ul> <p>2. Accidents and safeguards</p>		
4.	<p><b>Unit-4 PERFUSION FOR SPECIAL PROCEDURES</b></p> <p>1. Aortic Surgery</p> <p>2. Management of Unusual Problems &amp; Special Consideration in Perfusion</p> <p>I. Sickle cell A. Pathophysiology B. Considerations for CPB C. Other blood disorders</p> <p>II. Methemoglobinemia A. Pathophysiology B. Considerations for CPB III. Thalassemia</p> <p>IV. Spherocytosis &amp; elliptocytosis</p> <p>V. Hemosiderosis &amp; hemochromatosis</p> <p>VI. Erythroblastosis fetalis</p> <p>VII. Hereditary coagulation disorders A. Von Willebrand’s disease a) Type I b) Type II c) Type III B. Hemophilia A C. Hemophilia B</p> <p>VIII. Acquired coagulation disorders A. Disseminated intravascular coagulation (DIC) B. Primary fibrinolysis C. Vitamin K dependent deficiency</p> <p>IX. Platelet disorders 1. Thrombocytopenia 2. Cold Agglutinin</p> <p>X. Perfusion techniques for Pregnant Patients.</p> <p>XI. Malignant Hyperthermia.</p>		30
5.	<p><b>Unit-5 ADVANCED PERFUSION TECHNIQUES &amp; PEDIATRIC PERFUSION</b></p> <p>1.ECMO</p> <p>2. Counter pulsation and VENTRICULAR ASSIST DEVICES(VAD)</p> <p>3. Minimally Invasive Cardiac Surgery(MICS)</p> <p>4. Perfusion for Non cardiac Procedures Liver transplant Isolated Limb Perfusion</p> <p>5. Recent advances in Perfusion Techniques</p> <p><b>PEDIATRIC PERFUSION</b></p> <p><b>Preparation for CPB: Equipment Preparation of the Patient for CPB</b></p> <p>2. Blood Flow, ECC component and circuit selection Cannulation</p> <p>3. Priming Conduct of Bypass CO2 management &amp; Choice of Acid Base management Fluid Management and Drug management during CPB Myocardial Protection</p> <p>4. ECMO for Neonates, Infants and Children – Components Circulatory assist devices for Infants and children Blood</p>		30



	<p>Conservation Techniques</p> <ol style="list-style-type: none"> <li>1. Preparation for CPB: Equipment Preparation of the Patient for CPB</li> <li>2. Blood Flow, ECC component and circuitselection Cannulation</li> <li>3. Priming Conduct of Bypass CO2 management &amp; Choice of Acid Base management Fluid Management and Drug management during CPB Myocardial Protection</li> <li>4. ECMO for Neonates, Infants and Children – Components Circulatory assist devices for Infants and children Blood Conservation Technique</li> </ol>		
	<b>Total teaching hours for the academic year</b>	<b>100%</b>	<b>150</b>

**SKILL MODULE -3 ADVANCED CARDIAC TECHNOLOGY**

**Type of Course:** UG- D.voc. Med. Sci.

**Total duration of Skill Module:** 80 hrs in Year 3rd Diploma Cardiology

**Teaching and Examination Scheme:**

Teaching Scheme			Credit	Examination Scheme					TOTAL
LectHrs/ Tut Hrs/	Week	ClinHrs/ Week		External		Internal			
				T	P	T	CE	P	
2	-	1	-	70	-	15	15		100

Lect- Lecture, Tut - Tutorial, Clin. - Clinical, T - Theory, P - Practical, CE - CE, T - Theory, P – Practical

**Contents**

SR. NO	TOPICS	WEIGHTAGE	TEACHING HOURS
1	<p><b>ADVANCED CARDIOVASCULAR INVESTIGATIONS</b></p> <ol style="list-style-type: none"> <li>Parts of an ultrasound</li> <li>Monitoring of hemodynamic parameters</li> <li>Identify Parts of a defibrillator</li> <li>Basic Life support</li> <li>Advanced Cardiac Life Support</li> <li>Identify rhythms for defibrillation</li> <li>Perform the procedure for defibrillation.</li> <li>Setting up of a cardiac catheterization unit for PTCA / Angiography</li> <li>Identification of the various instruments used in a cath study / BMV / PTCA</li> <li>Packing and washing of all equipments in a cardiac catheterization lab.</li> <li>Perform an ECHO 2D on a patient - identification of various abnormalities.</li> <li>The student must perform a Screening ECHO / Bedside ECHO.</li> <li>The student must be exposed to various abnormalities that can be identified by using the ECHO.</li> <li>Independently maintain the cath lab table and its movements</li> </ol> <p><b>General:</b></p> <ul style="list-style-type: none"> <li>Cardiac Monitoring - definition, purpose of cardiac monitoring, how to Recognise various arrhythmias how to set up a intensive coronary care unit and usefulness of ICCU</li> <li>Interpretation of TMT report - criteria for TMT positive test</li> </ul>	100%	80

	<p>contraindication for TMT conditions where TMT is not useful, complications that may occur in TMT room and its management</p> <ul style="list-style-type: none"> <li>• Use of defibrillator- indications, how to use the defibrillator, complications during the procedure and its management</li> <li>• Management of cardiac arrest - definition, causes external cardiac massage, artificial respiration and other drugs and procedures used in the management of Cardiac arrest</li> <li>• Myocardial perfusion scan - procedures and usefulness of myocardial perfusion scan</li> <li>• Cardiac arrhythmias - bradyarrhythmia and tachy arrhythmias and ECG diagnosis of all rhythm disturbances. Sinus arrhythmia, APC, FPC, VPC, VF, VT, AF, SVT, IOHB, IIOHB, complete heart block</li> <li>• Electrolyte disturbances - ECG in hypokalemia, hyperkalemia etc.,.</li> <li>• Holter monitoring - procedure and usefulness</li> <li>• Valvoplasties- procedure, indications, complications and treatment of ballons, mitral valvuloplasty, ballon aortic valvuloplasty ballon pulmonary valvuloplasty and balloon tricuspid valvuloplasty.</li> <li>• Coil closure and device closure of PDA - procedure, indications and materials used for coil and device closure of PDA Device closure of ASD - procedure, indications and materials used for device closure of ASD.</li> <li>• Device closure of VSD - procedure, indications and materials used for device closure of VSD</li> <li>• Electrophysiological studies - basic knowledge of EP studies mapping and ablation</li> <li>• Oxymetry - handling of the instrument and usefulness of the instrument, normal and abnormal values.</li> <li>• Pressure recording- handling of the instrument and pressures in various chambers, normal and abnormal values</li> <li>• Temporary and permanent pacing - materials used, procedure, complications one may encounter and management. Implantable Cardioverter defibrillator devices</li> <li>• CD recording and storage- recording and storage of all the procedures over CD</li> <li>• Procedure during pregnancy- precautions to be followed.</li> <li>• Nuclear Cardiology - instrumentation, radiopharmaceuticals, patient imaging techniques.</li> </ul>		
	<b>Total teaching hours for the academic year</b>	<b>100%</b>	<b>80</b>