[LD 0212] **August 2013** **Sub.code: 1521**

B.Sc. CARDIAC TECHNOLOGY
THIRD YEAR
PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code : 801521

Time: Three hours **Maximum: 100 Marks**

Answer ALL questions

I. Elaborate on: **(3 x 10 = 30)**

1. Describe the Fick and thermodilution method of Cardiac out put measurement and their advantages and disadvantages.
2. How do you calculate shunt in Atrial septal defect, Patent ductus arteriosus and Ventricular septal defect?
3. Describe in detail the setting of a cardiac cath lab about room size, geometry and table, other equipments and quality assurance.

II. Write Notes on: **(8 x 5 = 40)**

1. Indications for left ventriculography
2. What are the parameters set in the injector during ventriculography and what are the precautions
3. What are the access site complications of an angiogram and how do you manage the same?
4. Name the catheters used for coronary angiography. What is the common catheter used from radial access?
5. Describe the fluid filled pressure measurement system and source of error in pressure measurement and precautions to be taken in setting up the equipment.
6. What is micromanometer catheters and their advantage?
7. Name the factors that increase the amplitude of reflected waves
8. How many views are done for LV angio in post MI patient to assess regional wall motion abnormality and LV function? Why?

III. Write Notes on: **(10 x 3 = 30)**

1. Catheters used for left ventriculography and why?
2. What is the importance of isocentre in the lab
3. What is the advantage of radial access over femoral access
4. What is spider view and name the coronary segments best seen.
5. What are the precautions to be taken during pressure injection
6. What is the vasodilator cocktail used during radial access
7. Importance of frequency response in pressure measurement
8. Draw pressure waves indicating 1. damping 2. ventricularisation
9. Uses of an end hole catheter and name an end hole catheter used in wedge pressure measurement
10. How do you record pressure gradients between two chambers?

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[LF 0212] **AUGUST 2014** **Sub.code: 1521**

B.Sc. CARDIAC TECHNOLOGY
THIRD YEAR
PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code : 801521

Time: Three hours **Maximum: 100 Marks**

Answer ALL questions

I. Elaborate on: **(3 x 10 = 30)**

1. Various views in coronary angiography.
2. Pressure recording in catheterization lab.
3. Components of in catheterization lab.

II. Write Notes on: **(8 x 5 = 40)**

1. RAO view
2. Radiation safety
3. Right heart study
4. Reuse of catheters
5. Manifold
6. Oximetry in ASD
7. End hole Catheters
8. Pullback gradient

III. Write Notes on: **(10 x 3 = 30)**

1. Forssmann
2. Wedge pressure
3. Sone’s catheter
4. Guidewires
5. Non ionic contrast
6. Ventricularisation
7. Normal LV pressure tracing
8. Heparin
9. Pressure injector
10. DSA

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[LG 0215] **FEBRUARY 2015** **Sub.code: 1521**

B.Sc. CARDIAC TECHNOLOGY

THIRD YEAR

PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code : 801521

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

Answer ALL questions

I. Elaborate on: **(3 x 10 = 30)**

1. List the coronary catheters you know and discuss the methods to sterilize them.
2. Discuss about Pressure measuring systems.
3. What is Image intensifier? How is it operated in various diagnostic procedures?

II. Write notes on: **(8 x 5 = 40)**

1. Describe the methods of cardiac output calculation?
2. Discuss about oximetry findings in a case of patient ductus arteriosis.
3. What is damping? What is its importance?
4. Draw a picture of manifold and discuss its uses.
5. Draw Right ventricular pressure tracing and discuss.
6. Draw Amplatz Right catheter and discuss.
7. How is aortogram taken?
8. What is image play back system? What are the applications of it?

III. Short answers on: **(10 x 3 = 30)**

1. Name the parts of Judkins Right catheter.
2. What are the variables involved in shunt calculation?
3. What are balloon floatation catheters?
4. List the views used in left ventriculography.
5. What is meant by coronary dominance?
6. Mention three situations in which pressure injector is used.
7. Mention three drugs used during coronary angiogram.
8. What is DSA? Discuss about its applications.
9. Discuss about PA caudal view.
10. Mention three catheters used in right heart catheterization.

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[LH 0815] **AUGUST 2015** **Sub.code: 1521**

B.Sc. CARDIAC TECHNOLOGY

THIRD YEAR

PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code : 801521

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

Answer ALL questions

I. Elaborate on: **(3 x 10 = 30)**

1. Right Heart Catheterization and angiography.
2. Left ventriculography – Catheters, views, use of injections.
3. Cardiac Output determination.

II. Write Notes on: **(8 x 5 = 40)**

1. Angiographic views in coronary angiography.
2. Oxygen dilution method.
3. Use of manifold.
4. Pressure gradient recording – Pull back, peak to peak.
5. Principles of Oximetry.
6. Artifacts, damping, Ventricularization.
7. Catheter cleaning and packing.
8. Intra Cardiac pressures.

III. Short Notes on: **(10 x 3 = 30)**

1. Image play back.
2. Pressure recording systems.
3. Table movement.
4. Types of catheters.
5. Image Intensifier.
6. ASD shunt calculation.
7. Radiation protection.
8. Coronary Angiographic catheters.
9. Thermo dilution method.
10. Techniques of Sterilization.

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[LI 0216] FEBRUARY 2016 **Sub.code: 1521**

B.Sc. CARDIAC TECHNOLOGY

THIRD YEAR

PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code : 801521

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

Answer ALL questions

I. Elaborate on: **(3 x 10 = 30)**

1. Fluid filled catheters versus catheter tipped manometers.
2. Right heart catheterization and angiography.
3. Shunt detection and calculations.

II. Write Notes on: **(8 x 5 = 40)**

1. Coronary Angiography.
2. Use of manifold.
3. Terumo dilution method.
4. Artifacts and damping.
5. Principles of Oximetry.
6. Angiographic views.
7. Left ventriculography – Catheters.
8. Pressure recording systems.

III. Short Notes on: **(10 x 3 = 30)**

1. Types of catheters.
2. Table movement.
3. Image playback.
4. Radiation protection.
5. Pressure gradient recording.
6. Coronary angiographic catheters.
7. Oxygen dilution method.
8. Laboratory preparation for Coronary angiography.
9. Catheters packing.
10. Intra cardiac pressures.

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[LJ 0816] AUGUST 2016 **Sub. Code: 1521**

B.Sc. CARDIAC TECHNOLOGY
THIRD YEAR
PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code: 801521

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

Answer all questions

I. Elaborate on: **(3 x 10 = 30)**

1. How will you set up cath-lab for diagnostic coronary angiography?
2. Describe various conventional view of coronary angiography.
3. Principles of oxymetry. Shunt detection and calculation.

II. Write notes on: **(8 x 5 = 40)**

1. Damping and ventricularization.
2. Catheter tipped manometer.
3. Swan ganz catheter.
4. Pigtail catheter.
5. Ficks principle.
6. Indications for coronary angiography.
7. Contraindications for Left ventriculography.
8. Manifold – various ports and its use.

III. Short answers on: **(10 x 3 = 30)**

1. Fluid filled catheter.
2. Spider view.
3. Coronary Guide catheter.
4. Causes of artefacts in coronary angiography.
5. Views for Left ventricular angiography.
6. Contraindications for coronary angiography.
7. Complications of Left Ventricular angiography.
8. Drugs used during coronary angiography.
9. Left ventricular end diastolic pressure.
10. Types of diagnostic coronary angiography catheter.

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[LK 0217] FEBRUARY 2017 **Sub. Code: 1521**

B.Sc. CARDIAC TECHNOLOGY
THIRD YEAR
PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code: 801521

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

Answer all questions

I. Elaborate on: **(3 x 10 = 30)**

1. What is Ficks principle? Describe Shunt detection and calculation.
2. Left ventriculography-indications, contra indications, catheters used and views taken.
3. Preparation of catheterization laboratory for diagnostic coronary angiography.

II. Write notes on: **(8 x 5 = 40)**

1. Indications and contra indications for aortic root angiography.
2. Branches of Right coronary artery.
3. Spider view.
4. Types and branches of left anterior descending artery.
5. Indications and contraindications for Left Ventricular angiography.
6. Judkins LEFT diagnostic coronary catheter.
7. Catheter tipped manometer.
8. Damping and ventricularization.

III. Short answers on: **(10 x 3 = 30)**

1. Name the diagnostic coronary catheters you know.
2. Non dominant Right coronary artery.
3. Type 3 left anterior descending artery.
4. Name the branches of Right coronary artery.
5. What are the views taken to demonstrate Left circumflex artery.
6. Catheters used for left ventriculography.
7. Manifold – ports and use.
8. Multipurpose catheter.
9. Causes for artefacts.
10. Indications for abdominal aortography.

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[LL 0817] AUGUST 2017 **Sub. Code: 1521**

B.Sc. CARDIAC TECHNOLOGY
THIRD YEAR
PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code: 801521

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

Answer all questions

I. Elaborate on: **(3 x 10 = 30)**

1. Describe various conventional views of coronary angiography.
2. Cardiac output determination. List the factors that influence cardiac output in normal subjects.
3. Methods of sterilization and their advantages and disadvantages.

II. Write notes on: **(8 x 5 = 40)**

1. Catheters used for bypass graft angiography.
2. Damping and ventricularization.
3. Left ventricular end-diastolic pressure.
4. Left-dominant coronary circulation.
5. Micromanometers.
6. Gorlin's formula.
7. Principles of radiation safety.
8. Calculation of pulmonary and systemic blood flow.

III. Short answers on: **(10 x 3 = 30)**

1. What is total pulmonary resistance? How is pulmonary vascular resistance calculated? What is the normal range for pulmonary vascular resistance?
2. Mention three catheters used in right heart catheterization.
3. Draw and illustrate Judkin's left catheter, Amplatz right catheter and multipurpose catheter.
4. List three common coronary artery anomalies.
5. What is the vasodilator cocktail used during radial access?
6. Rotational angiography.
7. Name three vascular closure devices and their characteristics.
8. List three factors that augment pressure wave reflections.
9. Side-hole catheters. List three catheters for pulmonary angiography.
10. List three complications of coronary angiography and their management.

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[LN 0818] AUGUST 2018 **Sub. Code: 1521**

B.Sc. CARDIAC TECHNOLOGY

THIRD YEAR

PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code: 801521

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

Answer all questions

I. Elaborate on: **(3 x 10 = 30)**

1. Adjunctive pharmacological agents used during cardiac catheterization.
2. Complications of diagnostic cardiac catheterization.
3. Angiographic views for diagnostic coronary angiography. Discuss briefly on coronary artery anomalies.

II. Write notes on: **(8 x 5 = 40)**

1. Detection of right to left shunts.
2. Hakki's and Gorlin's formula.
3. TIMI frame count.
4. Total pulmonary resistance.
5. Complications of ventriculography.
6. Oximetry findings in atrial septal defect.
7. Pulmonary angiography.
8. Berman angiographic catheters.

III. Short answers on: **(10 x 3 = 30)**

1. Deterministic effects of radiation. Give three examples for deterministic effects of radiation.
2. Name 3 catheters used for right heart catheterization.
3. List 3 factors that diminish the magnitude of reflected pressure waves.
4. Wedge pressure. List three examples for wedge pressure measurement.
5. List the artifacts encountered in clinical pressure measurement.
6. Fractional flow reserve.
7. Iodixanol- What are its advantages?
8. Selection of puncture site for cardiac catheterization procedures.
9. Judkins left diagnostic coronary catheter.
10. Digital subtraction angiography.

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[LO 0219] FEBRUARY 2019 **Sub. Code: 1521**

B.Sc. CARDIAC TECHNOLOGY

THIRD YEAR

PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code: 801521

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

Answer all questions

I. Elaborate on: **(3 x 10 = 30)**

1. Contrast agents used during coronary angiography. Discuss briefly on their side effects.
2. Describe and illustrate the various views for diagnostic coronary angiography.
3. Biological effects of radiation. What are the methods to reduce radiation exposure in the Cath lab?

II. Write notes on: **(8 x 5 = 40)**

1. Laboratory preparation for coronary angiography.
2. List various cardiac arrhythmias encountered during cardiac catheterization.
3. Sources of error and artefact in pressure measurement.
4. Pulmonary vascular resistance.
5. Flat-panel X-ray detector.
6. Oximetry findings in ventricular septal defect.
7. Indications for cardiac catheterization.
8. Swan Ganz catheter.

III. Short answers on: **(10 x 3 = 30)**

1. List any three methods of cardiac output determination.
2. Gorlin’s formula.
3. Valve resistance.
4. Left-dominant circulation.
5. Calculation of systemic blood flow.
6. Fourier analysis.
7. Body surface area estimation.
8. Selection of puncture site for cardiac catheterization procedures.
9. Judkins left diagnostic coronary catheter.
10. Name three common ionotropic agents used in the Cath lab.

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[LP 0819] AUGUST 2019 **Sub. Code: 1521**

B.Sc. CARDIAC TECHNOLOGY

THIRD YEAR

PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code: 801521

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

Answer all questions

I. Elaborate on: **(3 x 10 = 30)**

1. Right Heart Catherization and Angioplasty – Indications/Procedure/Catheters.
2. PDA Device Closure – Indications and Procedure.
3. Cardiac Pressure monitoring in Lab.

II. Write notes on: **(8 x 5 = 40)**

1. Guide Catheters.
2. Oxygen Dilution method.
3. Radiation Protection.
4. LV Angiogram.
5. Indications for Coronary Angioplasty.
6. Thermo Dilution.
7. Contrast Agents.
8. Image Intensifier.

III. Short answers on: **(10 x 3 = 30)**

1. Right Coronary Artery.
2. Multi Purpose Catheter.
3. Aortogram.
4. Nicorandil.
5. Coronary Stents.
6. Catheter Sterilization.
7. Image Playback.
8. Damping.
9. RV Pressure Curve.
10. Forsmann.

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[LQ 0220] FEBRUARY 2020 **Sub. Code: 1521**

B.Sc. CARDIAC TECHNOLOGY

THIRD YEAR

PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code: 801521

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

Answer all questions

I. Elaborate on: **(3 x 10 = 30)**

1. Describe the various methods of cardiac output determination in detail. List their advantages and disadvantages.
2. Describe and illustrate the various views for diagnostic coronary angiography.
3. Techniques of sterilization.

II. Write notes on: **(8 x 5 = 40)**

1. Ficks's Principle.
2. Radiation safety in the cath lab.
3. Ventricularization and damping.
4. Image Play back.
5. Image intensifier.
6. Oximetry findings in a patent ductus arteriosus.
7. Mean gradient.
8. Manifold – Uses.

III. Short answers on: **(10 x 3 = 30)**

1. Drugs used during trans-radial coronary angiography.
2. Spider view.
3. Pulmonary capillary wedge pressure.
4. Artefacts during coronary angiography.
5. Views for Left ventricular angiography.
6. Indications for coronary angiography.
7. What are Iodixanol and Iohexol?
8. List three vascular complications encountered during cardiac catheterization procedure.
9. Scatter Radiation.
10. Table movement.

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THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[LR 1220] DECEMBER 2020 Sub. Code: 1521
(AUGUST 2020 EXAM SESSION)

BACHELOR IN CARDIAC TECHNOLOGY

THIRD YEAR – (Regulation from 2010-2011 & 2014-2015)
PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS
Q.P. Code: 801521

Time: Three Hours **Answer ALL Questions** **Maximum: 100 Marks**

I. Elaborate on: **(3 x 10 = 30)**

1. Describe the various methods of Cardiac Output Determination in detail. List their advantages and disadvantages.
2. Describe and illustrate the various views for diagnostic Coronary Angiography.
3. Techniques of Sterilization.

II. Write notes on: **(8 x 5 = 40)**

1. Ficks's Principle.
2. Radiation safety in the Cath lab.
3. Ventricularization and Damping.
4. Image Play back.
5. Image intensifier.
6. Oximetry findings in a Patent Ductus Arteriosus.
7. Mean gradient.
8. Manifold – Uses.

III. Short answers on: **(10 x 3 = 30)**

1. Drugs used during Trans-radial Coronary Angiography.
2. Spider view.
3. Pulmonary capillary wedge pressure.
4. Artefacts during Coronary Angiography.
5. Views for Left ventricular Angiography.
6. Indications for Coronary Angiography.
7. What are Iodixanol and Iohexol?
8. List three Vascular complications encountered during Cardiac Catheterization procedure.
9. Scatter Radiation.
10. Table movement.

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THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0122] JANUARY 2022 Sub. Code: 1521
(FEBRUARY 2021 & AUGUST 2021 EXAM SESSION)

B.Sc. CARDIAC TECHNOLOGY

THIRD YEAR – (Regulation from 2010-2011 & 2014-2015)
PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS
Q.P. Code: 801521

Time: Three Hours **Answer ALL Questions** **Maximum: 100 Marks**

I. Elaborate on: **(3 x 10 = 30)**

1. Draw, describe, advantages and disadvantages of various diagnostic catheters used for coronary angiogram.
2. Describe various disinfectant methods used for cardiac cathlab hardwares and fumigation of cathlab.
3. Enumerate different Hyper osmolar, iso osmolar and low osmolar contrast agents. Describe their usage, advantage and disadvantage in specific situations.

II. Write notes on: **(8 x 5 = 40)**

1. Write down differences between Biplane cathlab and single plane cathlab.
2. What is TLD.(Thermoluminescent Dosimeter) and its uses.
3. Optical coherence Tomography.
4. Atrial Septal Occluder.
5. What is Cumulative Dose Area Product.
6. Enumerate difference between fluoroscopic and Cine acquisition of images.
7. Cardio pulmonary resuscitation.
8. 3 D Voltage mapping.

III. Short answers on: **(10 x 3 = 30)**

1. Bridging collaterals.
2. Balloon flotation catheter.
3. Covered stent and its uses.
4. Hybrid cathlab.
5. Precautions to reduce Contrast Induced Nephropathy.
6. What is the difference between “Seldinger” and “Modified Seldinger’s” Technique.
7. Mention the hardwares used in Percutaneous Transvenous Mitral Commissurotomy.
8. Decapolar catheter in electrophysiological study.
9. Thrombus aspiration catheters.
10. Unfractionated Heparin. Dosage, mode of administration and uses.

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THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0922] SEPTEMBER 2022 Sub. Code: 1521
(FEBRUARY 2022 & AUGUST 2022 EXAM SESSIONS)

B.Sc. CARDIAC TECHNOLOGY

THIRD YEAR – (Regulations from 2010-2011 & 2014-2015)
PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS
Q.P. Code: 801521

Time: Three Hours **Answer ALL Questions** **Maximum: 100 Marks**

I. Elaborate on: **(3 x 10 = 30)**

1. Right ventricular and left ventricular angiography.
2. Acute and chronic radiation injuries on human body and ways to reduce them. Treatment of radiation induced hazard.
3. Oximetry analysis and its use in assessing cardiac shunt lesions. Points to prevent errors in calculation.

II. Write notes on: **(8 x 5 = 40)**

1. TIMI flow.
2. Central venous catheter.
3. Mention the dosage and uses of Heparin.
4. Thermodilution method.
5. Describe Flat Panel Detector.
6. Views in Coronary Angiography.
7. Pressure gradient recording.
8. Catheters used in Coronary Angiogram.

III. Short answers on: **(10 x 3 = 30)**

1. Cardiac asystole and management.
2. Advantages of Transradial Access.
3. Routes used for Right heart catheterization.
4. Indications for Electrophysiology study and radiofrequency ablation.
5. Use of Trans thoracic and Transesophageal Echocardiogram in cathlab.
6. Illustrate various positions of Pacemaker leads.
7. Indications of ventricular assist devices.
8. Draw LV pressure curve.
9. What is Zeroing in arterial line and why it is being done?
10. Femoral Artery Pseudoaneurysm.

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THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0423] APRIL 2023 Sub. Code: 1521

B.Sc. CARDIAC TECHNOLOGY

THIRD YEAR – (Regulations 2010-2011, 2014-2015, 2018-2019 & 2020-2021 onwards)

PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code: 801521

Time: Three Hours **Answer ALL Questions** **Maximum: 100 Marks**

I. Elaborate on: **(3 x 10 = 30)**

1. Explain in detail about cardiac output determination in cath lab.
2. Draw and explain LV pressure curve, aortic pressure curve, femoral artery pressure curve. What is peripheral systolic augmentation. Brief note on damping and ventricularisation.
3. Explain in detail the equipments in cardiac cath lab. Mention the procedures done in cath lab.

II. Write notes on: **(8 x 5 = 40)**

1. Drugs used in evaluation of Pulmonary Arterial Hypertension in cath lab.
2. Fluid filled catheters.
3. Coronary angiogram in post coronary artery bypass graft surgery patients.
4. Judkins catheter.
5. Uses of manifold.
6. Fick's Principle.
7. Pressure recording systems.
8. Explain Seldinger's and modified Seldinger's techniques.

III. Short answers on: **(10 x 3 = 30)**

1. Angiographic views for RCA angiogram.
2. Myocardial bridging.
3. Decapolar catheter.
4. Importance of collimation.
5. Views in left ventriculography.
6. Define universal safety precaution.
7. Difference between of Invasive and Non invasive BP monitoring.
8. Steps to prevent pace maker infection.
9. Heparin in Cath lab.
10. Complications of femoral artery cannulation.

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THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 1123] NOVEMBER 2023 Sub. Code: 1521

B.Sc. CARDIAC TECHNOLOGY

THIRD YEAR – (Regulations 2010-2011, 2014-2015, 2018-2019 & 2020-2021 onwards)

PAPER I – CARDIAC CATHETERIZATION LABORATORY BASICS

Q.P. Code: 801521

Time: Three Hours Answer ALL Questions Maximum: 100 Marks

I. Elaborate on: (3 x 10 = 30)

1. Methods of sterilization and their advantages and disadvantages.
2. Explain Indications, various catheters used and complications of diagnostic Cardiac Catheterization.
3. Cardiac Pressure monitoring in Lab.

II. Write notes on: (8 x 5 = 40)

1. Radiation Protection.
2. Oximetry in ASD.
3. How is aortogram taken?
4. Draw a picture of manifold and discuss its uses.
5. Describe the methods of cardiac output calculation.
6. Angiographic views in coronary angiography.
7. Fluid filled catheters.
8. Diagnostic coronary catheters.

III. Short answers on: (10 x 3 = 30)

1. Catheters used in electrophysiology studies.
2. What is the advantage of radial access over femoral access?
3. Indications of Right Heart Catheterization.
4. What is meant by coronary dominance?
5. Table movement.
6. Catheters packing.
7. Pulmonary angiography.
8. Indications for Radiofrequency ablation.
9. Types of Ventricular Assist Devices.
10. How to manage ventricular tachycardia in cath lab?

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