

**Mahatma Gandhi University**  
Of  
**Medical Sciences & Technology, Jaipur**

**Syllabus**

**M.Sc. Critical Care Technology**

**(2 Years Degree Course +  
1 Year Internship)**

**Edition 2020-21**

## **Notice**

1. Amendments made by the University in Rules / Regulations of the Courses shall automatically apply.
2. The University reserves the right to make changes in the syllabus/books/ guidelines, feestructure or any other information at any time without prior notice. The decision of the University shall be binding on all.
3. The Jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

# **M.Sc. Critical Care Technology(                    )**

(2 Years Degree Course + 1 Year Internship)

## **Rules & Regulations**

### **1. TITLE OF THE COURSE**

The title of the course shall be “M.Sc. Critical Care Technology”.

### **2. DURATION OF COURSE/TRAINING**

The course shall be of two years duration and one year internship from the date of commencement of academic session.

### **3. MEDIUM OF INSTRUCTION**

English shall be the medium of instruction

### **4. ELIGIBILITY FOR ADMISSION:**

The Minimum qualification for admission into M.Sc. Critical Care Technology will be B.Sc. Critical Care Technology/ B.Sc. Accident and Emergency Care Technology/B.Sc. Cardiac Technology/B.Sc. Cardio Pulmonary Perfusion Care Technology / B.Sc. Dialysis Technology / B.Sc. Operation Theatre and Anesthesia Technology/B.Sc. Nursing / Post-Basic B.Sc. Nursing with the minimum of 50% aggregate mark with 2 Years of Work Experience after B.Sc Degree.

### **5. CRITERIA FOR ADMISSION**

Selection shall be done by an Admission Board of the University strictly on merit. It will consist of two-step process –Written Entrance Examination followed by Counseling/Personal Interview (PI).

### **6. RESERVATION POLICY**

Reservation shall be applicable as per policy of the State Government.

### **7. ENROLMENT**

Every candidate who is admitted to M.Sc. Course in Mahatma Gandhi Medical College & Hospital shall be required to get himself/herself enrolled with the Mahatma Gandhi University of Medical Sciences & Technology after paying the prescribed eligibility and enrolment fees.

A candidate shall deposit enrolment fees along with tuition fees at the time of his/her admission to the course. Such a candidate who fails to submit, through the college Principal, duly filled enrolment form along with original documents including migration certificate required for enrolment within two months of his/her admission or up to November 30 of the year of admission whichever is later, he/she will have to pay late fee prescribed by the University

### **8. MIGRATION RULES**

No student, once admitted to the course and enrolled by the University, will be permitted to migrate to any other Course/ University.

No student will be admitted to the Course on migration from any other Course/ University.

## **9. ATTENDANCE**

Minimum 75% attendance in each year, both for theory and practical classes separately. Student with deficient attendance will not be permitted to appear in University examination.

## **10. TRAINING:**

1. The period of training for M.Sc. shall be of two years from the date of admission.
2. Part – I and Part – II of the course shall be of one-year duration each.
3. The candidate will undertake the post graduate training as a full time post graduate in the department concerned.
4. The students will be required to complete the prescribed period of study and fulfill the requirement of attendance before they are allowed to appear in the University examination.

## **11. EXAMINATION AND ASSESSMENT**

1. The examination of Part I shall consist of three theory papers and internal assessment and practical & viva-voce examination.
2. The examination of Part II shall consist of three theory papers & internal assessment and practical in the opted specialization.
3. A candidate shall be permitted a maximum of 4 years from the year of admission to complete the course and pass the examination failing which, the candidate will have to leave the course.
4. Only those candidates will be allowed to appear at Part II examination, who have passed Part –I examination completely.
5. Degree of M.Sc. Critical Care will be awarded to a candidate only after his successful completion of one year compulsory internship.

## **12. CONDUCTION OF THE UNIVERSITY EXAMINATION:**

University examination shall be conducted twice in a year; that is Main and Supplementary Examination. Supplementary examination shall be conducted after 2-4 months of the main examination.

### 13. SCHEME OF EXAMINATION

The Examination in Part I shall consist of:

I Year - Advance Basic Sciences applicable to Critical Care (Anatomy, Physiology, Biochemistry, Pharmacology, Pathology & Microbiology) General critical care and introduction to research methodology ICU monitoring (basic and advanced), ICU therapy (basic and advanced), biomedical engineering, equipment maintenance, ICU administration, logistics, ethics and communication)

Paper	Marks
<b>Theory</b>	
Paper I -Applied Anatomy, Physiology and Biochemistry related to Critical Care	100 Marks
Paper II -Applied Pharmacology, Pathology and Microbiology related to Critical Care	100 Marks
Paper III -General critical care including ICU Monitoring, equipment Maintenance and Therapy, Biomedical Engineering, ICU Administration, Logistics, Ethics, Communication Research, Management and Statistics	100 Marks
<b>Internal Assessment</b>	100 Marks
<b>Practical &amp; Viva Voce Examination</b>	100 Marks
<b>Total Marks</b>	<b>500 Marks</b>

**Notes:**

1. Each theory paper shall be of 3 hours duration.
2. Each paper will be set by the External Examiner of the subject concerned and will be assessed by the internal examiner of the subject concerned.

Pattern of questions to be set and answered shall be as follows:

Paper	No. of questions to be set	No. of questions to be answered
Paper I	4	4
Paper II	4	4
Paper III	4	4

3. In order to pass the University Examination, the candidate must secure a minimum of 50% marks in each theory paper including internal assessment and 50% marks in practical and viva-voce examination separately.
4. A candidate who has failed in one or more theory paper of Part-I Examination must appear in that theory paper in supplementary examination which will be conducted by university within 2 – 4 months.

**The Examination in of Part II shall consist of:  
I I Year - Advanced Critical care – related to the specialty**

<b>Paper</b>	<b>Marks</b>
<b>Theory</b>	
Paper I - Advanced Respiratory Critical Care Technology	100 Marks
Paper II -Advanced Cardiac Critical Care Technology	100 Marks
Paper III -Advanced Neuro & Nephro Critical Care Technology	100 Marks
<b>Internal Assessment</b>	100 Marks
<b>Practical &amp; Viva Voce Examination</b>	100 Marks
<b>Total Marks</b>	500 Marks

**Notes:**

1. Each theory paper shall be of 3 hours duration.
2. All papers shall be set by the External Examiners.
3. Paper I will be assessed by the External Examiner and Paper II will be assessed by the Internal Examiner viz. Head of the Department of subject concerned. Paper III will be assessed by Professor / Associate professor / Assistant professor

Pattern of questions to be set and answered shall be as follows:

<b>Paper</b>	<b>No. of questions to be set</b>	<b>No. of questions to be answered</b>
Paper I	4	4
Paper II	4	4
Paper III	4	4

4. Practical examination shall be conducted by one Internal, one External Examiner which will be appointed by the university.
5. In order to pass the examination the candidate must secure a minimum of 50% marks in Theory papers including internal assessment and 50% marks in practical and viva-voce examination separately.
6. In case a student passes either in Theory or in Practical only, the student shall be considered to fail in the whole examination and he will have to appear in both the Theory and Practical in the subsequent examination.

**14. APPOINTMENT OF EXAMINER AND PAPER SETTERS**

- a. All the examiners, paper setters, theory examination answer books evaluators, Internal and External Examiners for Practical examinations shall be appointed by the President of the University.
- b. Qualification of the Paper setter / Examiner: Assistant Professor and above.
- c. Paper setter can be an examiner

**15. GRACE MARKS**

No grace marks will be provided in M.Sc. Examination

**16. REVALUATION / SCRUTINY**

No Revaluation of answer books shall be permitted in M.Sc. Examination. However, the candidate can apply for scrutiny of marks as per University Rules.

## Curriculum Outline

### Distribution of Teaching hours

**1<sup>ST</sup> Year Master of Critical Care**

**Advance Basic Sciences applicable to Critical Care & ICU Care**

**Total Hours : 1200**

**Theory : 750**

**Practical : 450**

<b>Course Title</b>	<b>Hours (Theory)</b>	<b>Hours (Practical)</b>
<b>Applied Anatomy</b>	<b>75</b>	<b>50</b>
Introduction to anatomy		
Respiratory system		
Cardiovascular System		
Central Nervous System		
Excretory System		
Abdomen		
<b>Applied Physiology</b>	<b>75</b>	<b>50</b>
Respiratory System		
Cardiovascular System		
Central Nervous System		
<b>Applied Biochemistry</b>	<b>75</b>	<b>50</b>
Carbohydrates		
Proteins		
Lipids		
Enzymes		
Vitamins & Minerals		
Acids Base Balance		
<b>Applied Pharmacology</b>	<b>75</b>	
Introduction to pharmacology		
Medical gases		
Anaesthetic agents		
Drugs Affecting The Autonomic Nervous System		
Mucokinetics agents		
Cough suppressants		
Respiratory stimulants		
Antihistamines		
Steroids		



	Antimicrobial drugs		
<b>Applied Pathology</b>		<b>75</b>	
	General		
	Respiratory system		
	Cardiovascular		
	CNS		
	Hematology		
	GIT, Liver, Pancreas, Renal, Endocrine		
	Miscellaneous		
<b>Applied Microbiology</b>		<b>75</b>	<b>50</b>
	Introduction to microorganisms		
	Major groups of microorganisms		
	Infection control		
	Specific infections		
<b>ICU Care</b>		<b>300</b>	<b>250</b>
	ICU Monitoring I (Basic)		
	ICU Monitoring- II (Advanced) and Equipment Maintenance		
	ICU Therapy		
	Biomedical Engineering		
	Research		
	ICU Administration, Logistics, Ethics, Communications, Management And Statistics		

## 2<sup>nd</sup> Year Master of Critical Care

### ADVANCED CRITICAL CARE – RELATED TO THE SPECIALITY

**Total Hours : 1200**

**Theory : 800**

**Practical : 400**

Course Title	Hours (Theory)	Hours (Practical)
<b>Advanced Respiratory Critical Care Technology</b>	<b>250</b>	<b>100</b>
Introduction		
Epidemiology		
Review of anatomy and physiology of cardio vascular system		
Assessment and Diagnostic Measures		

	Care of a patient with obstructive airway		
	Pharmacology		
	Intensive Coronary Care Unit/intensive cardio thoracic unit		
	Altered pulmonary conditions		
	Vascular disorders management		
	Respiratory emergency interventions		
	Congenital Diseases		
	Care of patient undergoing respiratory surgery		
	Respiratory rehabilitation		
	Intensive Coronary Care Unit/intensive cardio thoracic unit		
<b>Advanced Cardiac Critical Care Technology</b>		<b>250</b>	<b>100</b>
	Introduction		
	Epidemiology		
	Review of anatomy and physiology of cardio vascular system		
	Assessment and Diagnostic Measures		
	Pharmacology		
	Care of patient undergoing cardiac surgery		
	Cardiac rehabilitation		
	Intensive Coronary Care Unit/intensive cardio thoracic unit		
	Cardiac disorders management		
	Altered pulmonary conditions		
	Vascular disorders management		
	Cardiac emergency interventions		
	Congenital Heart Diseases		
<b>Advanced Nephro Critical Care Technology</b>		<b>150</b>	<b>100</b>
	Introduction		
	Epidemiology		
	Review of anatomy and physiology of urinary system		
	Assessment and diagnostic measures		
	Renal immunopathy/ Immunopathology		
	Critical care units- dialysis , KTP unit		
	Urological Disorders Management		
	Glomerular disorders management		

	Management of Renal emergencies		
	Dialysis		
	Kidney transplantation		
	Rehabilitation of patient with nephrological problems		
	Pediatric urinary disorders		
	Quality assurance in nephrological practice		
<b>Advanced Neuro Critical Care Technology</b>		<b>150</b>	<b>100</b>
	Introduction		
	Epidemiology		
	Review of Anatomy and Physiology		
	Assessment and diagnostic measures		
	Diagnostic measures		
	Meeting Nutritional needs of neurological patients		
	Drugs used in neurological and neurosurgical disorders		
	Ethical and legal issues in neuroscience		
	Traumatic conditions		
	Cerebro vascular disorders		
	Degenerating and desalinating disorders		
	Neuro infections		
	Paroxysmal disorders		
	Developmental disorders		
	Neuro muscular disorders		
	Neoplasms – surgical conditions		
	Other disorders		
	Neuro emergencies		
	Rehabilitation		
	Quality Care in Neuroscience		

# SYLLABUS

## M.Sc. Critical Care (Code) (2 Years Degree Course + 1 Year Internship)

### **Assessment:**

The examination to the first/second year shall be open to a student who:

Has remained on the roll of the course concerned for full on academic year preceding the examination and having attended not less than 75% of the full course of lectures and 75% practical separately held for the purpose in each year.

## **FIRST YEAR**

### **Paper I - Applied Anatomy, Physiology and Biochemistry related to Critical Care**

#### **COURSE DESCRIPTION**

This course is designed to assist students in developing an in depth knowledge in the field of Applied Anatomy, Physiology and Biochemistry.

#### **OBJECTIVES**

At the end of the course the students will be able to acquire knowledge and develop proficiency in the Anatomical, Physiological and Biochemical aspects of patients with medical and surgical disorders in various health care settings.

#### **CONTENT OUTLINE**

##### Block I: Applied Anatomy

#### **Unit Course Content**

##### 1 Introduction to anatomy

Section 1: Anatomical terms, planes, and relations etc.

##### 2 Respiratory system

Section 1: Anatomy of thoracic cage bones-

- Ribs, spine*
- Diaphragm, Intercostal Muscles*
- Blood Supply and Nerve Supply*

Section 2: Anatomy of upper respiratory tract (Nose to Larynx)

- Nose, nasopharynx*
- Oral cavity, tongue, oropharynx*
- Laryngopharynx*
- Blood and nerve supply*

### Section 3: Anatomy of the lungs (Trachea to bronchial tree)

- Lungs with bronchopulmonary segments
- Pleural
- Blood and nerve supply

### 3 Cardiovascular System

#### Section 1: Heart, Pericardium, Myocardium, Endocardium, valves

#### Section 2: Major vessels of circulatory system –

- Aorta
- IVC
- Pulmonary vessels and all major branches

#### Section 3: Coronary circulation

### 4 Central Nervous System

#### Section 1: Basic organization of the nervous system

- Central –Brain, Spinal cord
- Peripheral
- Autonomic nervous system
  - o Sympathetic nervous system
  - o Parasympathetic nervous system

#### Section 2: Cerebral circulation

- Circle of Willis
- Blood supply of spinal cord

#### Section 3: Pain pathway

### 5 Excretory System

#### Section 1: Kidney, Ureter, and Bladder, Blood, Nerve supply

### 6 Abdomen

#### Section 1: Liver, pancreas, islet cells

#### Section 2: Thyroid, parathyroid, adrenals

## **Block II: Applied Physiology**

### **Course Content**

#### 1 Respiratory System

##### Section 1: Homeostasis

##### Section 2: Physiology of Breathing

- Regulation of respiration
- Respiratory movements
- Chest wall mechanics pressure, volumes, resistance, compliance
- Lung volume and capacities
- Work of breathing

##### Section 3: Gas Transport

- Oxygen transport
- Carbon dioxide transport
- Factors affecting oxygen transport
- Mechanism of hypoxia
- V/Q mismatch.

##### Section 4: Acid Base Balance

##### Section 5: Artificial airway

- Indications For Artificial Airways
  - o Relieving airway obstruction
  - o Secretion removal

- o Protecting the airway
- o Positive pressure
- o Ventilation
  - Selecting & Establishing An Artificial Airway
- o Nasal airways
- o Pharyngeal airways
- o Tracheal airways
  - Airway Clearance Techniques
- o Airways suctioning
- o Bronchoscope
  - Airway Maintenance
- o Securing the airway & confirming placement
- o Providing adequate humidification
- o Minimizing nosocomial infections
- o Providing cuff care
- o Facilitating clearance of secretion
- o Troubleshooting airway emergencies
  - Extubation
- o Indication
- o Procedure
- o Post Extubation – care and complication

#### Section 6: Oxygen Therapy

- Sources of Oxygen for therapy
- Storage of Oxygen
- Oxygen delivery system
- Hazards of Oxygen

#### Section 7: Chest X-Ray

- Normal Chest X-Ray
- o Normal anatomy
- o Basic physics of X-ray and assessment of film quality
- o Cardiac configuration
- o Lung fields and airway
- o Optimum position of – Endotracheal tubes, Nasogastric tubes, Central lines
  - Abnormal Chest X-Ray
- o Trauma
- o Pneumothorax
- o Hemothorax
- o Lung contusion
- o Pulmonary edema
- o ARDS
- o Pneumonia
- o Bronchopneumonia
- o Lobar pneumonia
- o Aspiration pneumonia

## 2 Cardiovascular System

### Section 1: Cardiac cycle

- Cardiac output - Factors affecting cardiac output
- Preload, after load, stroke volume, contractility
- Cardiac conduction system - Regulation of rate, basic arrhythmias
- Principles of ECG, Normal ECG

### Section 2: O<sub>2</sub> delivery, uptake in tissues

### Section 3: Blood pressure

- Maintenance of normal BP and factors affecting it
- Systolic, diastolic, pulse pressure, mean arterial pressure

### 3 Central Nervous System

Section 1: Cerebral auto regulation, cerebral oxygen consumption, Coma

Section 2: Cerebrospinal fluid, intracranial pressure

Section 3: Cranial nerves

□ III, IV, VI

□ IX, X, Cough reflex, gag reflex

□ Pupils: accommodation reflex, light reflex

Section 4: Sedation and analgesia

Section 5: Brain death

## **Block III: Applied Biochemistry**

### **Course Content**

#### 1 Carbohydrates

Section 1: Glucose & Glycogen metabolism

#### 2 Proteins

Section 1: Classification of Proteins and functions

#### 3 Lipids

Section 1: Classification of Lipids and functions

#### 4 Enzymes

Section 1: Definition, Nomenclature, and Classification

Section 2: Factors affecting enzymes activity

Section 3: Active site, Co-enzyme, enzymes inhibition, units of enzymes, isoenzymes, enzyme pattern in disease

#### 5 Vitamins & Minerals

Section 1: Fats soluble vitamins (A, D, E, K)

Section 2: Water soluble vitamins (B complex vitamin)

Section 3: Principle elements (Calcium, Phosphorus, Magnesium, Sodium, Potassium)

Section 4: Trace elements: Calorific value of foods – Basal Metabolic Rate (BMR) - Respiratory Quotient (RQ), Specific Dynamic Action (SDA), Balanced diet

Section 5 : Nutrition Marasmus, Kwashiorkor

Assessment of nutrition requirements

Normal requirements of calories, proteins, fluid, electrolytes Fluid balance and electrolytes

#### 6 Acids Base Balance

Section 1: Definition, pH values, Henderson – Hasselbach equation, Buffers

Section 2: Indicators, Normality, Molarity, and Molality

### **PRACTICAL:**

- Clinical Evaluation
- Case Study/ Case Book
- Practical Record
- Observational/ Field Visit
- Each student should be given planned healthcare teaching by conducting clinical teachings and case presentations
- Benedict's test
- Heat coagulation tests

## RECOMMENDED BOOKS

1. Cohen, Memmler: Structure & Function of Human Body, Lippincott Williams & Wilkins; Tenth edition (2012).
2. Waugh: Ross & Wilson Anatomy & Physiology in health and illness Penguin Books Ltd (2010)
3. Tortora: Anatomy & Physiology, John Wiley & Sons (2012)
4. Chaurasia: Human Anatomy CBS Publishers (2012)
5. Standing: Gray's Anatomy Penguin Books Ltd (2008)
6. Venkatesh D: Basics of Medical Physiology for Nursing, LWW (2009).
7. Hall J: Guyton Textbook of Medical Physiology. Elsevier (2012)
8. Tandon: Best & Taylor's Physiologic Basis of Medical Practice (2011).
9. U. Sathyanarayana: Essentials of biochemistry. Books & Allied Publications(2013)
10. Ambika Shanmugam: Fundamentals of Biochemistry. Lippincott India (2013)
11. C. Deb: Fundamentals of Biochemistry (2001)
12. Murray: Harper's biochemistry. Mac-Graw Hill (2012)
13. Ferrier: Lippincott's Biochemistry. LWW(2013)

## Paper II - Applied Pharmacology, Pathology and Microbiology related to Critical Care

### COURSE DESCRIPTION

The course is designed to assist students to acquire understanding of fundamentals of drugs and their mode of action. It also provides opportunities for practicing infection control measures in hospital settings. It also helps to assist the students to use knowledge of pharmacology in practice of critical care technology and the basic pathology of the important disease states of respiratory system, cardiovascular system, CNS, hematology, renal and GI system in ICU settings.

### Block I: Applied Pharmacology

### COURSE CONTENT

#### 1 Introduction to pharmacology

Section 1: Pharmacokinetics

Section 2: Pharmacodynamics

Drug dose calculation – Dilution, infusion rate

#### 2 Medical gases: O<sub>2</sub>, N<sub>2</sub>O, compressed Air

#### 3 Anaesthetic agents

Section 1: Sedatives: Barbiturates, Benzodiazepines, Propofol, and Ketamine

Section 2: Analgesics: NSAID's, Aspirin, Opioids

Section 3: Neuromuscular blockers

#### 4 Drugs Affecting The Autonomic Nervous System

Section 1: Adrenergic drugs

Inotropic agents, Chronotropic agents

Vasopressors & Vasodilators

Anti-hypertensive

Bronchodilators

Section 2: Cholinergic drugs



- Atropine, Glycopyrolate
- Ipratropium

#### 5 Mucokinetics agents:

Section 1: Expectorant

Section 2: Mucolytics

Section 3: Mucokinetics

Section 4: Mucoregulatory agents

Section 5: Others e.g. Bromohexine, Ambroxol, Saline, Soda Bicarbonate

#### 6 Cough suppressants 4

Section 1: Peripheral anti tussives

Section 2: Central anti tussives

Section 3: Peripheral and central anti tussives

#### 7 Respiratory stimulants

Section 1: Specific. E.g: Naloxone, Flumazenil

Section 2: Non-specific. E.g. Xanthenes, Nicotine, Doxapram

#### 8 Antihistamines

#### 9 Steroids

#### 10 Antimicrobial drugs

Section 1: Antibacterial, antiviral and anti-fungal agents – basic concepts

Section 2: Antimicrobial Resistance – Basic concepts

Section 3: Antiseptic agents

## Block II: Applied Pathology

### **COURSE CONTENT**

#### 1 General

Section 1: Inflammation and healing

Section 2: Tumors

Section 3: Immune system

#### 2 Respiratory system

Section 1: Respiratory failure

Section 2: Adult respiratory distress syndrome

Section 3: Pneumonia, TB

Section 4: Opportunistic infections

Section 5: Bronchial asthma and COPD

Section 6: Bronchiectasis and Lung abscess

Section 7: Atelectasis, collapse

Section 8: Pleural disease: Pneumothorax, pleural effusion

Section 9: Occupational lung diseases - Smoke inhalation ,Pneumoconiosis

#### 3 Cardiovascular

Section 1: Shock: Hypovolemic, Cardiogenic, Obstructive, Septic

Section 2: Hypertension in ICU

Section 3: Congestive cardiac failure, Acute Left Ventricular Failure, Right Ventricular Failure

Section 4: Pulmonary edema  
Section 5: Pulmonary Hypertension  
Section 6: Pulmonary embolism  
Section 7: Ischemic heart disease

#### 4 CNS

Section 1: Cerebro Vascular Disease (Stroke)  
Section 2: Coma

#### Section 3: Delirium in ICU

Section 4: Neuromuscular disease Myasthenia gravis Critical Illness Polyneuropathy Diaphragmatic paralysis

Section 5: Guillian Barre syndrome

Section 6: Brain death, Persistent vegetative state

Section 7: Trauma Head injury Unstable spine and protection

#### 5 Hematology

Section 1: Anemia in ICU

Section 2: Neutropenia

Section 3: Bleeding disorders

Section 4: Clotting disorders

#### 6 GIT, Liver, Pancreas, Renal, Endocrine

Section 1: Upper GI bleed

Section 2: Hepatic coma

Section 3: Pancreatitis

Section 4: Renal failure in ICU

Section 5: Hypoglycemia

Section 6: Hyperglycemia

Section 7: Disorders Sodium, Potassium and Fluid balance

Section 8: Stress response role of Adrenal

#### 7 Miscellaneous

Section 1: Envenomation – snake bite, scorpion sting

Section 2: Poisoning – general supportive care, common poisons

### Block III: Applied Microbiology

## COURSE CONTENT

### 1 Introduction to microorganisms

Section 1: Microbiological terms

Section 2: History of microbiology

### 2 Major groups of microorganisms

Section 1: Structure and classification of microbes

Section 2: Identification methods of microorganisms

### 3 Infection control

Section 1: Introduction to infection, spread and transmission of infection

Section 2: Sterilization and disinfection

Section 3: Cleaning and sterilizing equipment

Section 4: Disposal of waste

Section 5: Surveillance, quality control  
Section 6: Control of organisms with antibiotics  
Section 7: Vaccines, Toxoids – bacterial, viral, immunization schedule  
Section 8: Barrier nursing, universal precautions

#### 4 Specific infections

Section 1: Nosocomial infections – VAP, CRBSI, UTI  
Section 2: Bacterial - Tb  
Section 3: Viral – HIV, Hep B  
Section 4: Fungal  
Section 5: Parasitic  
Section 6: Tropical infections - TB, Malaria, Leptospirosis, Dengue, Rickettsia, Amoebiasis  
Section 7: Sepsis

### **PRACTICALS**

- Collection and handling of clinical specimens-urine, sputum, blood and pus
- Demonstration and handling of microscope
- Staining-gram staining, Zeihl Neelsen
- Common examination: stained smears, Fungus-Yeasts and Molds
- Sterilization-incineration and Autoclaving
- Each student will practice aseptic procedures in the wards and maintain personal and Environmental hygiene.
- Observation visit to incinerator, posting in CSSD and infection control department

### **RECOMMENDED BOOKS**

1. Tripathi K. D: Essentials of Medical Pharmacology. JPB, (2013)
2. Smeltzer – Brunner & Siddhartha Textbook of Medical Surgical Nursing, 2010,LWW
3. Black – Medical Surgical Nursing, 2009, Elsevier
4. Nettina – Lippincott manual of Nursing Practice, 2009. LWW
5. Lewis – medical Surgical Nursing, 2008, Elsevier
6. Smeltzer – Brunner & Suddharth- Textbook of Medical Surgical Nursing, 2010,LWW
7. Black – Medical Surgical Nursing, 2009, Elsevier
8. Nettina – Lippincott manual of Nursing Practice, 2009. LWW
9. Lewis – medical Surgical Nursing, 2008, Elsevier
10. Davidson’s Principles &Practice of Medicine, 2010, Elsevier
11. Bailey & Love Short Practice of Surgery, 2008, Hodder Arnold
12. Timby – Introductory Medical Surgical Nursing, 2009, WK
13. Das – textbook of Surgery, SD Publishers
14. Woods – Cardiac Nursing, 2010, LWW
15. Hickey – Neurologic & Neurosurgical Nursing, 2009, LWW
16. Morton – Critical Care Nursing, 2009, LWW
17. Thelan’s Critical Care Nursing, 2008, Elsevier
18. Spring House – Medical Surgical Nursing Made Incredibly Easy, 2008, LWW
19. Webber – Health assessment in Nursing, 2010, WK
20. Ananthnarayan R: Textbook of Microbiology. Orient Blackswan (2013)
21. Pommerville J. C: Fundamentals of Microbiology. Jones and Bartlett learning (2013)

**Paper III - General critical care including ICU Monitoring, equipment Maintenance  
and Therapy, Biomedical Engineering, ICU Administration, Logistics, Ethics,  
Communication Research, Management and Statistics**

Part -1

**COURSE DESCRIPTION**

This course is designed to enable students to understand the principles of monitoring of respiratory, cardiovascular and other systems of the patients in ICU.

**COURSE CONTENT**

1 General monitoring

Section 1: Temperature monitoring

- Principles of temperature monitoring
- Hypothermia and hyperthermia

Section 2: Pulse

Section 3: Positioning of patient

Section 4: Monitoring for pressure sores

2 Respiratory System

Section 1: Airway monitoring

- Securing ET tube
- Cuff pressure

Section 2: Monitoring Gas Exchange

1: Oxygenation

- ABG
- Pulse Oximetry
- Oxygen delivery and consumption

2: Ventilation

- ABG
- Capnography

3: Calculations

- Oxygen consumption
- Alveolar gas equations
- Dead space

Section 3: Monitoring muscle strength, work of breathing

Section 4: PFT - Recognize the methods & significance of measuring the following lung volume and flow in the ICU.

- Tidal volume
- Vital capacity
- Peak flow rate
- Negative inspiratory pressure

3 Cardiovascular System

Section 1: ECG

Section 2: NIBP

Section 3: Invasive arterial blood pressure

Section 4: CVP monitoring

Section 5: Zeroing, calibration, trouble shooting of pressure transducers.

#### 4 Nervous system

Section 1: Neurological history and examination, pupils, Muscle strength

Section 2: Glasgow Coma Scale

Section 3: ICP Monitoring

#### 5 Abdomen / Renal

Section 1: Intra-abdominal pressure monitoring

Section 2: Monitoring renal function:

- Clinical – Urine output
- Laboratory- Creatinine, creatinine clearance

### **PRACTICALS**

- Assignments

### **RECOMMENDED BOOKS**

1. Egan's Fundamentals of Respiratory Care – Robert L. Wikins, James K Stoller, Craig L Scalan(Mosby)
2. The ICU Book – Paul L Marino (Lippincott, Williams & Wilkins)
3. Practical Methods for Respiratory Care – Raymond Sibberson (Mosby)
4. Respiratory Physiology – The Essentials I John B West (Williams & Wilkins)
5. Ventilation / Blood Flow & Gas Exchange – John B West (Blackwell Scientific Publications)
6. Techniques in Bedside haemodynamic Monitoring – Elaine Kiess Daily & Johnspeer Schroeder(Mosby)
7. All you really need to know to interpret arterial blood gases – Lawrence Martin (Lea & Febiger)
8. Mechanical Ventilation – Susan P Pilbeam & J M Cairo (Elsevier)
9. Critical Care Secrets: Parsons, Wiener – Kronish, Jaypee Brothers
10. Washington Manual of Critical Care

#### Part-2

### **COURSE DESCRIPTION**

This course is designed to enable students to understand in detail the principles of monitoring of respiratory, cardiovascular and other systems of the patients in ICU. It is designed to assist students in understanding the details of the techniques and equipment used for monitoring the patient in ICU and their troubleshooting.

#### 1 Respiratory system

Section 1: Monitoring lung and chest wall mechanics

- Compliance
- Resistance
- Pressures
- Auto PEEP
- Volumes

Section 2: Monitoring muscle strength, work of breathing, Maximum inspiratory and expiratory pressures

Section 3: Monitoring patient ventilator system, Graphics monitoring

Section 4: Bedside PFT

#### 2Cardiovascular System

Section 1: Assessment of Preload responsiveness static and dynamic parameters  
Section 2: Basic Echocardiography in ICU  
Section 3: Defibrillator and Cardioversion  
Section 4: PICCO  
Section 5: Monitoring tissue perfusion  
Section 6: Pulmonary artery catheters  
Section 7: Temporary pacemaker

### 3 CNS

Section 1: Monitoring brain stem function  
Section 2: Sedation and analgesia scoring

### 4 Nutritional monitoring

Section 1: Functional nutritional assessment (history and physical examination)  
Section 2: Metabolic assessment  
Section 3: Estimating nutritional requirements

### 5 Care & maintenance of ICU equipment & Troubleshooting (Includes quality checks and calibrations of all the equipment)

Section 1: Mechanical Ventilators & Non-invasive ventilators  
Section 2: Pumps: Infusion, syringe  
Section 3: Monitors: Stand-alone & multi-parameter, Cardiac Output monitors.  
Section 4: ECG machine  
Section 5: ABG machine  
Section 6: Defibrillator  
Section 7: Ultrasound machine  
Section 8: Bronchoscope

### **PRACTICALS**

- Log book and project completion for internal assessment
- Should know the workings of all ICU equipment
- Should know care and maintenance of all ICU equipment
- Should be able to monitor ventilator parameters
- Should be able to assess fluid responsiveness in a patient

### **RECOMMENDED BOOKS**

1. Egan's Fundamentals of Respiratory Care – Robert L. Wikins, James K Stoller,
2. The ICU Book – Paul L Marino (Lippincott, Williams & Wilkins)
3. Practical Methods for Respiratory Care – Raymond Sibberson (Mosby)
4. Respiratory Physiology – The Essentials | John B West (Williams & Wilkins)
5. Ventilation / Blood Flow & Gas Exchange – John B West (Blackwell Scientific Publications)
6. Techniques in Bedside haemodynamic Monitoring – Elaine Kiess Daily & John Speer Schroeder (Mosby)
7. All you really need to know to interpret arterial blood gases – Lawrence Martin (Lea & Febiger)
8. Text book of Advanced Cardiac Life Support. American Heart Association
9. Mechanical Ventilation – Susan P Pilbeam & J M Cairo (Elsevier)
10. Critical Care Secrets: Parsons, Wiener – Kronish, Jaypee Brothers
11. Washington Manual of Critical Care

### **Part-3**

### **COURSE DESCRIPTION**

This course is designed to assist students in developing expertise and in depth knowledge in the field of critical care technology. It will help students to appreciate the patient as a holistic individual and develop skill to function as a specialized critical care technologist.

## **COURSE CONTENT**

### **1 Mechanical ventilation/ventilator dependence/difficult weaning**

#### **Section 1: Basic Concepts**

- Mechanics of ventilation
- Mechanics of exhalation
- Work of breathing
- Distribution of ventilation
- Efficiency and effectiveness of ventilation
- Indications
- Mechanical Ventilators
- How ventilators work
- Operator interface
- Types of ventilators

#### **Section 2: Modes of Mechanical Ventilation**

- Basic and newer modes
- Ventilator initiation
- Initial ventilator settings
- Adjusting ventilatory settings
- Oxygenation
- Ventilation
- Timing – Inspiratory of gas / Expiratory, inspiratory hold
- Flow
- Tidal volume
- Pressure- Peak /Plateau
- PEEP
- POP – OFF
- Pressure support
- Proximal airway (VS) distal
- FiO<sub>2</sub>

#### **Section 3: Humidification**

- Humidifier types
- Advantages & disadvantages

#### **Section 4: Non-Invasive Ventilation**

- Types of NIV (CPAP, BIPAP)
- Goals of & indications of NIV
- Patient selection and exclusion criteria for NIV
- Equipment used in the application of NIV
- Instituting and managing NIV
- Complications of NIV
- Time & cost associated with NIV

#### **Section 5: Trouble shooting and alarms**

#### **Section 6: Weaning and Extubation**

- Weaning
- Definitions
- Reasons for ventilator dependence
- Patient evaluation
- Preparing the patient
- Methods
- Newer techniques for facilitating ventilator discontinuance
- Selecting an approach
- Monitoring the patient during weaning

- Chronically ventilator dependent patients & difficulty in weaning
- Terminal weaning
- Extubation
- Indications
- Procedure
- Post extubation care

#### Section 7: Nebulization and MDI

- Inhaled drug therapy
- Nebulization
- Different types
- Advantages & disadvantages
- MDI with spacer
- Characteristics of therapeutic aerosols
- Hazards of aerosols therapy
- Aerosol drug delivery system
- Assessment based bronchodilator therapy protocols
- Special considerations
- Controlling environmental and contamination

#### Section 8: Suctioning and chest physiotherapy

#### Section 9: Incentive Spirometry

#### Section 10: Inspiratory resistance exercises

#### Section 11: Care of Patient on Ventilator

- Ensuring proper placement
- Cuff pressure
- Tracheo bronchial hygiene & suctioning
- Humidification, chest physiotherapy
- Ventilator settings
- Monitoring ventilatory parameters

#### Section 12: Care of the chest tube

- Drainage systems of pleural with fluid

#### Section 13: Extubation failure

### 2 Airway Assistance

#### Section 1: Tracheal intubation (oral, nasal)

#### Section 2: Cricothyrotomy

#### Section 3: Open/percutaneous tracheostomy

#### Section 4: Fiberoptic bronchoscopy

- FOB Intubation
- Therapeutic BAL

#### Section 5: Decanulation of tracheostomy

### 3 Cardiovascular system

#### Section 1: Fluid resuscitation and inotropes

#### Section 2: Basic of IABP /ECMO

#### Section 3: Pericardiocentesis

### 4 Life support

#### Section 1: Basic life support

- AED, Mask ventilation, Chest compression

#### Section 2: Advanced cardiac life support

- Drugs, defibrillation

#### Section 3: Trauma life support

- A –Airway and cervical spine stabilization
- B – Breathing
- C-Circulation and hemorrhage control



- D –Disability
- E -Exposure
- Manual in line stabilization
- Basic care of surgical wounds and fractures

#### Section 4: Burns Assessment

- History and physical assessment
- Assessment of burns and fluid and electrolyte loss
- Etiology, classification, Pathophysiology, clinical manifestations, Diagnosis, treatment modalities

#### 5 Renal / Abdomen

##### Section 1: Basics of Renal Replacement Therapy, modes of dialysis

##### Section 2: Intra-abdominal pressure, abdominal compartment syndrome

#### 6 Central Nervous system

##### Section 1: Care of Unconscious Patient, Comfort

- Skin integrity assessment and care
- Physiotherapy – chest & limbs
- Nutritional needs & supply

##### Section 2: Pain Control, Care of epidural, Patient controlled analgesia

#### 7 Infection Control

##### Section 1: Hand hygiene

##### Section 2: Universal precautions

### **PRACTICAL**

1. Clinical rotations in selected Medical and Surgical areas
2. Patient assignments for patient centered comprehensive care
3. Case presentations,
4. Drug study discussion

### **RECOMMENDED BOOKS**

1. Egan's Fundamentals of Respiratory Care – Robert L. Wikins, James K Stoller,
2. The ICU Book – Paul L Marino (Lippincott, Williams & Wilkins)
3. Practical Methods for Respiratory Care – Raymond Sibberson (Mosby)
4. Respiratory Physiology – The Essentials l John B West (Williams & Wilkins)
5. Ventilation / Blood Flow & Gas Exchange – John B West (Blackwell Scientific Publications)
6. Techniques in Bedside haemodynamic Monitoring – Elaine Kiess Daily & Johnspeer Schroeder (Mosby)
7. All you really need to know to interpret arterial blood gases – Lawrence Martin (Lea & Febiger)
8. Text book of Advanced Cardiac Life Support. American Heart Association
9. Mechanical Ventilation – Susan P Pilbeam & J M Cairo (Elsevier)
10. Critical Care Secrets: Parsons, Wiener – Kronish, Jaypee Brothers
11. Washington Manual of Critical Care
12. Smeltzer – Brunner & Suddharth Textbook of Medical Surgical Nursing, 2010,LWW
13. Black – Medical Surgical Nursing, 2009, Elsevier
14. Nettina – Lippincott manual of Nursing Practice, 2013. LWW
15. Lewis – medical Surgical Nursing, 2008, Elsevier
16. Davidson's Principles &Practice of Medicine, 2010, Elsevier
17. Bailey & Love Short Practice of Surgery, 2013, Hodder Arnold
18. Timby – Introductory Medical Surgical Nursing, 2013, WK

19. Das – textbook of Surgery, SD Publishers
20. Woods – Cardiac Nursing, 2010, LWW
21. Hickey – Neurologic & Neurosurgical Nursing, 2009, LWW
22. Morton – Critical Care Nursing, 2009, LWW
23. Thelan’s Critical Care Nursing, 2013, Elsevier
24. Spring House – Medical Surgical Nursing Made Incredibly Easy, 2008, LWW
25. Webber – Health assessment in Nursing, 2010, WK

## **Part-4**

### **COURSE DESCRIPTION**

The course is designed to assist students to acquire the knowledge of basics of electricity and electronics. It is also designed to assist students in understanding the basics of the equipment used in the ICU.

### **COURSE CONTENT**

1 Fundamentals of Electricity & electronics

Section 1: Resistance

Section 2: Capacitance

Section 3: Inductance and transformers

Section 4: Parameters of electricity – voltage, current, power

Section 5: Difference between AC and DC current, phase, neutral, earth,color coding

Section 6: Ohm’s law, Kirchhoff’s law – electrical circuits

Section 7: Classification of medical equipment

- According to type of protection: B, C, and F etc.
- According to mode of protection: Class I – III

## **Part-5**

### **Course Description:**

The course is designed to assist the students to acquire an understanding of the research methodology and statistical methods as a basis for identifying research problem, planning and implementing a research plan. It will further enable the students to evaluate research studies and utilize research findings to improve quality of critical care practice, education and management.

### **CONTENT OUTLINE**

1 Introduction:

- Research – Definition, characteristics and purposes
- Basic research terms
- Ethics in research
- Overview of Research process

2 Review of Literature

- Importance, purposes, sources, criteria for selection of resources and steps in reviewing literature

3 Research Approaches and designs

- Type: Quantitative and Qualitative

- Experimental and Non Experimental research design characteristics, Advantages and disadvantages
- Qualitative: Phenomenology, grounded theory,
- Ethnography

#### 4 Research problem:

- Identification of research problem
- Formulation of problem statement and research objectives
- Assumptions and delimitations
- Identification of variables
- Hypothesis

#### 5 Developing theoretical/conceptual framework.

- Theories: Nature, characteristics, Purpose and uses
- Using, testing and developing conceptual framework, models and theories.

#### 6 Sampling

- Population and sample
- Factors influencing sampling
- Sampling techniques
- Sample size
- Probability and sampling error
- Problems of sampling

#### 7 Tools and methods of Data collection:

- Concepts of data collection
- Data sources, methods/techniques quantitative and qualitative
- Tools for data collection – types, characteristics and their development
- Validity and reliability of tools
- Procedure for data collection

#### 8 Implementing research plan

- Pilot Study
- Review research plan (design)
- Planning for data collection
- Administration of tool/interventions
- Collection of data

#### 9 Analysis and interpretation of data

- Preparing data for computer analysis and presentation
- Statistical analysis
- Interpretation of data
- Conclusion and generalizations
- Summary and discussion

#### 10 Reporting and utilizing research findings

#### 11 Critical analysis of case reports

#### 12 Developing and presenting a research proposal

#### **Activities**

- Review of literature of selected topic and reporting
- Formulation of problem statement, objective and hypothesis

- Developing theoretical/conceptual framework
- Preparation of a sample research tool
- Analysis and interpretation of given data
- Developing and presenting research proposal
- Critical evaluation of selected research studies
- Writing a scientific paper.

## **Part-6**

### **COURSE DESCRIPTION**

This course is designed to enable students to understand in the principles of ICU administration, patient safety and transport. It is designed to assist students in understanding the principles of medical ethics and communication.

### **COURSE CONTENT**

#### **1 Basic administration**

Section 1: Economic issues in ICU

Section 2: Raising purchase orders for equipment

Section 3: Maintaining consumable stock

Section 4: Equipment repair

#### **2 CSSD Procedures**

Section 1: Waste disposal collection of used items from user area, reception protective clothing and disinfection safe guards.

Section 2: Disinfection in ICU –

- Surfaces
- Reusable equipment and accessories

Section 3: Wrapping & packing

Section 4: General principles of sterilization

- Moist heat sterilization
- Dry Heat Sterilization
- Chemical sterilization
- EO gas sterilization
- H<sub>2</sub>O<sub>2</sub> gas plasma vap sterilization

#### **3 Medical ethics**

Section 1: Medical ethics – Definition – Goal – Scope

Section 2: Code of conduct

- Introduction
- Basic principles of medical ethics
- Confidentiality
- Autonomy and Informed consent – Right of patients

Section 3: Care of the terminally ill – Euthanasia, withdrawal, withholding support

Section 4: Organ transplantation

Section 5: Medico legal aspects of medical records

Section 6: Medico-legal case and type – Records and document related to MLC

Section 7: Ownership of medical records

Section 8: Confidentiality Privilege communication

- Release of medical information
- Unauthorized disclosure – retention of medical records – other various aspects.

#### **4 Communication and counseling**

Section 1: Basic principles

## 5 Basics of statistics

### Section 1: Basic concepts in measurement

- Scales of measurements
- Validity, reliability, variation, measurement system, conversion.

### Section 2: Basic descriptive statistics

- Central tendency, mean, mode, median.
- Dispersion range, variance, standard deviation

### Section 3: Concept of normal and abnormal

## 6 Patient safety and transport

### Section 1: Electrical safety

### Section 2: Fire safety

### Section 3: Intra-hospital Patient transport

### Section 4: Inter-hospital Patient transport

## 7 Principles of management

### Section 1: Basic principles of Management – functions, types, importance, motivation etc.

### Section 2: Personnel management – staffing, orientation, disciplining, complaints etc

### Section 3: Financial management – short and long term

## 8 Communication

### Role

### Definition

### Communication

### Classification of

### communication

### Purpose

### Major difficulties

### Barriers

### Characteristics – Theseven Cs

### Communication at the work place

### Human needs and communication “Mind mapping”

### Information communication

## 2<sup>nd</sup> Year

# ADVANCED CRITICAL CARE – RELATED TO THE SPECIALITY

## Paper -1

### Advanced Respiratory Critical Care Technology

#### Part -1

#### **Course Description**

This course is designed to assist students in developing expertise and in- depth understanding in the field of respiratory critical care technology. It will help students to develop advanced skills for nursing intervention in various respiratory medical and surgical conditions. It will enable the student to function as a respiratory critical care specialist. It will further enable the student to function as an educator, manager and researcher in the field of respiratory critical care technology.

#### **Course Contents**

##### 1 Introduction

- Historical development, trends and issues in the field of respiratory.
- Respiratory conditions – major health problem.
- Concepts, principles and perspectives
- Ethical and legal issues
- Evidence based nursing and its application in respiratory critical care technology  
( to be incorporated in all the units)

##### 2 Epidemiology

- Risk factors: hereditary, psycho social factors, hypertension, smoking, obesity, diabetes mellitus etc
- Health promotion, disease prevention, Life style modification
- National health programs related to cardio vascular conditions
- Alternate system of medicine
- Complementary therapies

##### 3 Review of anatomy and physiology of cardio vascular system

- Review of anatomy and physiology of respiratory system
- Embryology of lungs.
- Bio-chemistry of blood in relation to cardio pulmonary function.

##### 4 Assessment and Diagnostic Measures:

- History taking
- Physical assessment
- Respiratory rate variability: Mechanisms , measurements, pattern, factors, impact of interventions on HRV
- Blood gases and its significance, oxygen supply and demand
- Radiologic examination of the chest: interpretation, chest film findings.
- Magnetic Resonance Imaging.

- Cardio electro physiology procedures:
- Diagnostic studies, interventional and catheter ablation, nursing care
- Exercise testing: indications and objectives,
- Cardiac catheterization: indications, contraindications, patient preparation, procedure, interpretation of data
- Pulmonary function test: Bronchoscopy and graphics
- Interpretation of diagnostic measures
- Role in diagnostic tests
- Laboratory tests using blood: Blood specimen collection
- Arterial blood gases, Blood Chemistries, cardiac enzyme studies, Serum
- Concentration of Selected drugs.
- Interpretation and role of nurse

#### 5 Care of a patient with obstructive airway

- Assessment
- Use of artificial airway
- Endotracheal intubation, tracheostomy and its care
- Complication, minimum cuff leak, securing tubes Oxygen delivery systems.
- Nasal Cannula Oxygen mask, Venturi mask Partial rebreathing bag
- Bi-PAP and C-PAP masks
- Uses, advantages, disadvantages, nursing implications of each.
- Mechanical Ventilation, Principles of mechanical ventilation, Types of mechanical ventilation and ventilators.
- Modes of ventilation, advantage, disadvantage, complications.
- PEEP therapy, indications, physiology, and complications. Weaning off the ventilator.
- Assessment and interventions of ventilated patient.

#### 6 Pharmacology

- Review
- Forms of drugs
- Pharmacokinetics
- Analgesics/Anti inflammatory agents
- Antibiotics, antiseptics
- Drug reaction & toxicity
- Drugs used in cardiac emergencies
- Blood and blood components
- Inotropic agents
- Beta-blocking agents
- Vaso constrictors
- Bronchodilators
- Broncho constrictors
- Mucolytic agents
- Immunotrophic agents
- Leukotriene agents
- Vaso dilators
- Sedatives and tranquilizers.
- Principles of drug administration, role and responsibilities in taking care of drugs

#### 7 Intensive Coronary Care Unit/intensive cardio thoracic unit:

- Quality assurance
- Standards, Protocols, Policies, Procedures
- Infection control; Standard safety measures
- Nursing audit
- Design of ICCU/ICTU
- Staffing; cardiac team

- Burn out syndrome
- Role in the management of I.C.C.U and ICTU.
- Mobile coronary care unit.
- Planning in service educational programme and teaching

#### **Dept/ Unit**

- 1 Cardiac –Medical & Surgical
- OTs (Cardiac and thoracic)
- Casualty
- Diagnostic labs including cath lab
- ICCU
- ICU
- CCU
- Pediatric Intensive
- OPD

#### **Essential Nursing Skills**

##### **Procedures Observed**

- Echo cardiogram
- Ultrasound
- Monitoring JVP , CVP
- CT SCAN
- MRI
- TMT
- X- RAY
- Pet SCAN
- Angiography
- Various Surgeries
- Any other

##### **Procedures Assisted**

- Arterial blood gas analysis
- Thoracentesis
- Lung biopsy
- Computer assisted tomography (CAT Scan)
- M.R.I.
- Pulmonary angiography
- Bronchoscopy
- Pulmonary function test
- ET tube insertion
- Tracheostomy tube insertion
- Treadmill test
- Echo cardiography
- Doppler ultrasound
- Insertion of chest tube
- CVP Monitoring
- Measuring pulmonary artery pressure by Swan-Ganz Catheter

##### **Procedures Performed**



- Preparation of assessment tool for CT client (Cardiac, thoracic and vascular).
- ECG – Recording, Reading, Identification of abnormalities
- Oxygen therapy – Cylinder, central supply, Catheter, nasal cannula, mask, tent Through ET and Tracheostomy tube Manual resuscitation bag
- Mechanical ventilation
- Spirometer
- Tuberculin skin test
- Aerosol therapy
- Nebulizer therapy
- Water seal drainage
- Chest physiotherapy including – Breathing Exercises Coughing Exercises Percussion & Vibration
- Suctioning – Oropharyngeal, nasotracheal, Endotracheal Through tracheostomy tube
- Artificial airway cuff maintenance
- CPR
- Care of client on ventilator
- Identification of different – Arrhythmias Abnormal pulses, respirations B.P. Variation Heart sounds Breath sounds
- Pulse oxymetry
- Introduction of intracath
- Bolus I.V. Injection
- Life line
- Maintenance of “Heplock”
- Subcutaneous of Heparin
- Obtaining leg measurements to detect early swelling in thrombophlebitis
- Identification of Homans signs
- Buerger – Allen exercises

## **Part-2**

# Advanced Respiratory Critical Care Technology

### **Course Description**

This course is designed to assist students in developing expertise and in-depth understanding in the field of respiratory critical care technology. It will help students to develop advanced skills for nursing intervention in various respiratory medical and surgical conditions. It will enable the student to function as respiratory critical care specialist. It will further enable the student to function as educator, manager and researcher in the field of respiratory critical care technology.

### **Course Contents**

#### **1 Altered pulmonary conditions**

Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, treatment modalities and management of:

- Bronchitis
- Bronchial asthma
- Bronchiectasis
- Pneumonias
- Lung abscess, lung tumour
- Pulmonary tuberculosis, fibrosis, pneumonias etc
- Pleuritis, effusion
- Pneumothorax, haemothorax and pyothorax
- Interstitial Lung Disease
- Cystic Fibrosis
- Acute and Chronic Obstructive Pulmonary Disease (conditions leading to) Cor pulmonale
- Acute Respiratory Failure
- Adult Respiratory Distress Syndrome
- Pulmonary Embolism
- Pulmonary Hypertension

## **2 Vascular disorders management**

Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, treatment modalities and management of:

- Disorders of arteries
- Disorders of the aorta
- Aortic Aneurysms
- Aortic dissection
- Raynaud's phenomenon
- Peripheral arterial disease of the lower extremities
- Venous thrombosis
- Varicose veins
- Chronic venous insufficiency and venous leg ulcers
- Pulmonary embolism

## **3 Respiratory emergency interventions**

- CPR- BLS and ALS
- Use of ventilator, defibrillator, pacemaker
- Post Resuscitation Care
- Care of the critically ill patients
- Psychosocial and spiritual aspects of care
- Stress management; ICU psychosis

## **4 Congenital Diseases,**

Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, treatment modalities and management of:

- Embryological development of heart.
- Tracheo Oesophageal Fistula
- Pulmonary atresia
- Hypoplastic lung
- Broncho Pulmonary Dysplasia

## **5 Care of patient undergoing respiratory surgery**

- Indications, selection of patient
- Preoperative assessment and preparation; counseling.
- Intraoperative care: Principles of surgery, equipment, anaesthesia,
- Thoracic surgery: lobectomy, pneumonectomy, tumour excision etc
- Immediate postoperative care : assessment, post operative problems and interventions

Bleeding, Cardiac tamponade, Low cardiac output, Infarction, Pericardial effusion, Pleural effusion, Pneumothorax, Haemothorax, Coagulopathy, Thermal imbalance, Inadequate ventilation/perfusion, Neurological problems, renal problems, Psychological problems.

Chest physiotherapy

Nursing interventions- life style modification, complementary therapy/alternative systems of medicine.

Intermediate and late post operative care after CABG, valve surgery, others.

Follow up care

### **6 Respiratory rehabilitation**

Process

Physical evaluation

Life style modification

Physical conditioning for respiratory efficiency through exercise

Counseling

Follow up care

### **7 Intensive Coronary Care Unit/intensive cardio thoracic unit:**

Quality assurance

Standards, Protocols, Policies, Procedures

Infection control; Standard safety measures

Nursing audit

Design of ICCU/ICTU

Staffing; cardiac team

Burn out syndrome

Role in the management of I.C.C.U and ICTU

Mobile coronary care unit

Planning in service educational programme and teaching

### **Dept/ Unit**

1 Cardiac –Medical & Surgical

OTs (Cardiac and thoracic)

Casualty

Diagnostic labs including cath lab

ICCU

ICU

CCU

Pediatric Intensive

OPD

### **Essential Nursing Skills**

#### **Procedures Observed**

Echo cardiogram

Ultrasound

Monitoring JVP , CVP

CT SCAN

MRI

TMT

X- RAY

Pet SCAN

Angiography

- Various Surgeries
- Any other

**Procedures Assisted**

- Arterial blood gas analysis
- Thoracentesis
- Lung biopsy
- Computer assisted tomography (CAT Scan)
- M.R.I.
- Pulmonary angiography
- Bronchoscopy
- Pulmonary function test
- ET tube insertion
- Tracheostomy tube insertion
- Treadmill test
- Echo cardiography
- Doppler ultrasound
- Insertion of chest tube
- CVP Monitoring
- Measuring pulmonary artery pressure by Swan-Ganz Catheter

**Procedures Performed**

- Preparation of assessment tool for CT client (Cardiac, thoracic and vascular).
- ECG – Recording, Reading, Identification of abnormalities
- Oxygen therapy – Cylinder, central supply, Catheter, nasal canula, mask, tent ThroughET and Tracheostomy tube Manual resuscitation bag
- Mechanical ventilation
- Spirometer
- Tuberculin skin test
- Aerosol therapy
- Nebulizer therapy
- Water seal drainage
- Chest physiotherapy including – Breathing Exercises Coughing Exercises Percussion & Vibration
- Suctioning – Oropharyngeal, nasotracheal, Endotracheal Through tracheostomy tube
- Artificial airway cuff maintenance
- CPR
- Care of client on ventilator
- Identification of different – Arrhythmias Abnormal pulses, respirations B.P. Variation Heart sounds Breath sounds
- Pulse oxymetry
- Introduction of intracath
- Bolus I.V. Injection
- Life line
- Maintenance of “Heplock”
- Subcutaneous of Heparin
- Obtaining leg measurements to detect early swelling in thrombophlebitis
- Identification of Homans signs
- Buerger – Allen exercises

## Paper II - Advanced Cardiac Critical Care Technology

### Part-1

#### **Course Description**

This course is designed to assist students in developing expertise and in- depth understanding in the field of cardiac critical care technology. It will help students to develop advanced skills intervention in various cardiac medical and surgical conditions. It will enable the student to function as Cardiac critical care specialist. It will further enable the student to function as educator, manager and researcher in the field of cardiac critical care technology.

#### **Course Contents**

##### **1 Introduction**

- Historical development, trends and issues in the field of cardiology.
- Cardio vascular conditions – major health problem.
- Concepts, principles and nursing perspectives
- Ethical and legal issues
- Evidence based nursing and its application in cardiac critical care technology  
( to be incorporated in all the units)

##### **2 Epidemiology**

- Risk factors: hereditary, psycho social factors, hypertension, smoking, obesity, diabetes mellitus etc
- Health promotion, disease prevention, Life style modification
- National health programs related to cardio vascular conditions
- Alternate system of medicine
- Complementary therapies

##### **3 Review of anatomy and physiology of cardio vascular system**

- Review of anatomy and physiology of heart and blood vessels.
- Embryology of heart.
- Coronary circulation
- Hemodynamics and electro physiology of heart.
- Bio-chemistry of blood in relation to cardio pulmonary function

##### **4 Assessment and Diagnostic Measures:**

- History taking
- Physical assessment
- Heart rate variability: Mechanisms , measurements, pattern,factors, impact of interventions on HRV
- Diagnostic tests
  - o Hemodynamic monitoring: Technical aspects, monitoring, functionalhemodynamic indices, ventricular output measurements (Arterial andswan Ganz monitoring).
  - Blood gases and its significance, oxygen supply and demand
  - o Magnetic Resonance Imaging.
  - o Cardio Electro Physiology procedures:
    - Diagnostic studies, interventional and catheter ablation, nursing care
    - Exercise testing: indications and objectives,
    - Cardiac catheterization: indications, contraindications, patientpreparation, procedure, interpretation of data
    - Pulmonary function test: Bronchoscopy and graphics
    - Interpretation of diagnostic measures
    - Nurse's role in diagnostic tests

- Laboratory tests using blood: Blood specimen collection, Cardiac markers,
- Blood lipids, Hematologic studies, Blood cultures, Coagulation studies,
- Arterial blood gases, Blood Chemistries, cardiac enzyme studies, Serum
- Concentration of Selected drugs.
- Interpretation and findings

## **5 Pharmacology**

- Review
- Pharmacokinetics
- Analgesics/Anti inflammatory agents
- Antibiotics, antiseptics
- Drug reaction & toxicity
- Drugs used in cardiac emergencies
- Blood and blood components
- Antithrombolytic agents
- Inotropic agents
- Beta-blocking agents
- Calcium channel blockers.
- Vaso constrictors
- Vaso dilators
- ACE inhibitors.
- Anticoagulants
- Anti arrhythmic drugs.
- Anti hypertensives
- Diuretics
- Sedatives and tranquilizers.
- Digitalis
- Antilipemics
- Principles of drug administration and care to be taken in drugadministration.

## **6 Care of patient undergoing cardiac surgery**

- Indications, selection of patient
- Preoperative assessment and preparation; counseling.
- Intraoperative care: Principles of open heart surgery, equipment, anaesthesia,
- cardiopulmonary bypass
- Surgical procedures for Coronary Artery Bypass Grafting, recent advances and types of grafts, Valve replacement or reconstruction, cardiac transplant, Palliative surgery and different Stents, vascular surgery, other recent advances.
- Immediate postoperative care : assessment, post operative problems and interventions
- Bleeding, Cardiac tamponade, Low cardiac output, Infarction, Pericardial effusion, Pleural effusion, Pneumothorax, Haemothorax, Coagulopathy, Thermal imbalance, Inadequate., ventilation/perfusion, Neurological problems, renal problems, Psychological problems.
- Chest physiotherapy
- Life style modification, complementary therapy/alternative systems of medicine.
- Intermediate and late post operative care after CABG, valve surgery, others.
- Follow up care

## **7 Cardiac rehabilitation 5**

- Process
- Physical evaluation
- Life style modification
- Physical conditioning for cardiovascular efficiency through exercise
- Counseling
- Follow up care

### **8 Intensive Coronary Care Unit/intensive cardio thoracic unit:**

- Quality assurance
- Standards, Protocols, Policies, Procedures
- Infection control; Standard safety measures
- Nursing audit
- Design of ICCU/ICTU
- Staffing; cardiac team
- Burn out syndrome
- Role in the management of I.C.C.U and ICTU.
- Mobile coronary care unit.
- Planning in service educational programme and teaching

### **Essential Nursing Skills**

#### **Procedures Observed**

- Echo cardiogram
- Ultrasound
- Monitoring JVP, CVP
- CT SCAN
- MRI
- Pet scan
- Angiography
- Cardiac catheterization
- Angioplasty
- Various Surgeries
- Any other

#### **Procedures Assisted**

- Arterial blood gas analysis
- Thoracentesis
- Lung biopsy
- Computer Assisted Tomography (CAT scan)
- M.R.I
- Pulmonary angiography
- Bronchoscopy
- Pulmonary function test
- ET tube insertion
- Tracheostomy tube insertion
- Cardiac catheterization
- Angiogram
- Defibrillation
- Treadmill test
- Echo cardiography
- Doppler ultrasound
- Cardiac surgery
- Insertion of chest tube
- CVP Monitoring
- Measuring pulmonary artery pressure by Swan-Ganz Catheter
- Cardiac Pacing

### **Procedures Performed**

- Preparation of assessment tool for CT client (Cardiac, thoracic and vascular)
- ECG – Recording, Reading, Identification of abnormalities
- Oxygen therapy – Cylinder, central supply, Catheter, nasal cannula, mask, tent
- Through ET and Tracheostomy tube Manual resuscitation bag
- Mechanical ventilation
- Spirometer
- Tuberculin skin test
- Aerosol therapy
- Nebulizer therapy
- Water seal drainage
- Chest physiotherapy including – Breathing Exercises Coughing Exercises Percussion & Vibration
- Suctioning – Oropharyngeal, nasotracheal, Endotracheal Through tracheostomy tube
- Artificial airway cuff maintenance
- CPR
- Care of client on ventilator
- Identification of different – Arrhythmias Abnormal pulses, respirations B.P. Variation
- Heart sounds Breath sounds
- Introduction of intracath
- Bolus I.V. Injection
- Life line
- Maintenance of “Heplock”
- Subcutaneous of Heparin
- Obtaining leg measurements to detect early swelling in thrombophlebitis
- Identification of Humans signs
- Buerger – Allen exercises

### **Part-2**

#### **Course Description**

This course is designed to assist students in developing expertise and in- depth understanding in the field of cardiac critical care technology. It will help students to develop advanced skills intervention in various cardiac medical and surgical conditions. It will enable the student to function as Cardiac critical care specialist. It will further enable the student to function as educator, manager and researcher in the field of cardiac critical care technology.

#### **Course Contents**

##### **1 Cardiac disorders management:**

Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, treatment modalities and management of:

- Hypertension
- Coronary Artery Disease.
- Angina of various types.
- Cardiomegaly
- Myocardial Infarction, Congestive cardiac failure
- Heart Failure, Pulmonary Edema, Shock.



- Rheumatic heart disease and other Valvular Diseases
- Inflammatory Heart Diseases, Infective Endocarditis, Myocarditis, Pericarditis.
- Cardiomyopathy, dilated, restrictive, hypertrophic.
- Arrhythmias, heart block
- Associated illnesses

## **2 Altered pulmonary conditions**

Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, treatment modalities and management of:

- Bronchitis
- Bronchial asthma
- Bronchiectasis
- Pneumonias
- Lung abscess, lung tumour
- Pulmonary tuberculosis, fibrosis, pneumonias etc
- Pleuritis, effusion
- Pneumothorax, haemothorax and pyothorax
- Interstitial Lung Disease
- Cystic fibrosis
- Acute and Chronic obstructive pulmonary disease (conditions leading to) Cor pulmonale
- Acute respiratory failure
- Adult respiratory distress syndrome
- Pulmonary embolism
- Pulmonary Hypertension

## **3 Vascular disorders management**

Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, treatment modalities and management of:

- Disorders of arteries
- Disorders of the aorta
- Aortic Aneurysms,
- Aortic dissection
- Raynaud's phenomenon
- Peripheral arterial disease of the lower extremities
- Venous thrombosis
- Varicose veins
- Chronic venous insufficiency and venous leg ulcers
- Pulmonary embolism

## **4 Cardiac emergency interventions**

- CPR- BLS and ALS
- Use of ventilator, defibrillator, pacemaker
- Post resuscitation care.
- Care of the critically ill patients
- Psychosocial and spiritual aspects of care
- Stress management; ICU psychosis

## **5 Congenital Heart Diseases,**

Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, treatment modalities and management of:

- Embryological development of heart.
- Classification – cyanotic and acyanotic heart disease.
- Tetralogy of Fallot.
- Atrial Septal Defect, Ventricular Septal Defect., Eisenmenger's complex.
- Patent ductus arteriosus, AP window

- Truncus Arteriosus.
- Transposition of great arteries.
- Total Anomaly of Pulmonary Venous Connection.
- Pulmonary stenosis, atresia.
- Coarctation of aorta.
- Ebstein's anomaly
- Double outlet right ventricle, Single ventricle, Hypo-plastic left heart syndrome.

#### Essential Nursing Skills

##### **Procedures Observed**

- Echo cardiogram
- Ultrasound
- Monitoring JVP, CVP
- CT SCAN
- MRI
- Pet scan
- Angiography
- Cardiac catheterization
- Angioplasty
- Various Surgeries
- Any other

##### **Procedures Assisted**

- Arterial blood gas analysis
- Thoracentesis
- Lung biopsy
- Computer assisted tomography (CAT scan)
- M.R.I
- Pulmonary angiography
- Bronchoscopy
- Pulmonary function test
- ET tube insertion
- Tracheostomy tube insertion
- Cardiac catheterization
- Angiogram
- Defibrillation
- Treadmill test
- Echo cardiography
- Doppler ultrasound
- Cardiac surgery
- Insertion of chest tube
- CVP Monitoring
- Measuring pulmonary artery pressure by Swan-Ganz Catheter
- Cardiac Pacing

##### **Procedures Performed**

- Preparation of assessment tool for CT client (Cardiac, thoracic and vascular)
- ECG – Recording, Reading, Identification of abnormalities

- Oxygen therapy – Cylinder, central supply, Catheter, nasal cannula, mask, tent
- Through ET and Tracheostomy tube Manual resuscitation bag
- Mechanical ventilation
- Spirometer
- Tuberculin skin test
- Aerosol therapy
- Nebulizer therapy
- Water seal drainage
- Chest physiotherapy including – Breathing Exercises Coughing Exercises Percussion & Vibration
- Suctioning – Oropharyngeal, nasotracheal, Endotracheal Through tracheostomy tube
- Artificial airway cuff maintenance
- CPR
- Care of client on ventilator
- Identification of different – Arrhythmias Abnormal pulses, respirations B.P. Variation
- Heart sounds Breath sounds
- Pulse oxymetry
- Introduction of intracath
- Bolus I.V. Injection
- Life line
- Maintenance of “Heplock”
- Subcutaneous of Heparin
- Obtaining leg measurements to detect early swelling in thrombophlebitis
- Identification of Homans signs
- Buerger – Allen exercises

### **Paper III -**

## **Advanced Neuro & Nephro Critical Care Technology**

### Advanced Nephro Critical Care Technology

#### **Part-1**

#### **Course Description**

This course is designed to assist students in developing expertise and in- depth understanding in the field of nephro critical care technology. It will help students to develop advanced skills for nursing intervention in various nephro conditions. It will enable the student to function as nephro critical care specialist and provide quality care. It will further enable the student to function as educator, manager, and researcher in the field of nephro critical care technology.

## **Course Content**

### **1 Introduction**

- Historical development: trends and issues in the field of nephro critical care nursing , nephro and urological problems
- Concepts, principles and nursing perspectives
- Ethical and legal issues
- Evidence based nursing and its application in nephro and urological nursing (to be incorporated in all the units)

### **2 Epidemiology**

- Major health problems- urinary dysfunction, urinary tract infections, Glomerular disorders, obstructive disorders and other urinary disorders
- Risk factors associated with nephro and urological conditions conditions- Hereditary, Psychosocial factors, smoking, alcoholism, dietary habits, cultural and ethnic considerations
- Health promotion, disease prevention, life style modification and its implications to nursing
- Alternate system of medicine/complementary therapies

### **3 Review of anatomy and physiology of urinary system**

- Embryology
- Structure and functions
- Renal circulation
- Physiology of urine formation
- Fluid and electrolyte balance
- Acid base balance
- Immunology specific to kidney

### **4 Assessment and diagnostic measures**

- History taking
- Physical assessment, psychosocial assessment
- Common assessment abnormalities-dysurea, frequency, enuresis, urgency, hesitancy, hematuria, pain, retention, burning on urination, pneumaturia, incontinence, nocturia, polyurea, anuria, oliguria.
- Diagnostic tests-urine studies, blood chemistry, radiological procedures-KUB, IVP, nephrotomogram, retrograde pyelogram, renal arteriogram, renal ultrasound, CT scan, MRI, cystogram, renal scan, biopsy, endoscopy-cystoscopy, urodynamics studies - cystometrogram, urinary flow study - sphincter electromyography, voiding pressure flow study- videourodynamics, Whitaker study - Interpretation of diagnostic measures
- Nurse's role in diagnostic tests

### **5 Renal immunopathy/ Immunopathology**

- General Concept of immunopathology
- Immune mechanism of glomerular vascular disease
- Role of mediator systems in glomerular vascular disease

### **6 Critical care units-dialysis , KTP unit**

- Philosophy, aims and objectives
- Policies, staffing pattern, design and physical plan of Dialysis and KTP units
- Team approach, functions Psychosocial aspects in relation to staff and clients of ICU, dialysis unit
- In-service education
- Ethical and legal issues

**Procedures Observed**

- CT Scan
- MRI
- Radiographic studies
- Urodynamics
- Hemodialysis
- Renal Surgeries

**Procedures Assisted**

- Blood transfusion
- IV cannulation therapy
- Arterial Catheterization
- Insertion of central line/cvp line
- Connecting lines for dialysis
- Peritoneal dialysis
- Renal biopsy
- Endoscopies- Bladder, urethra

**Procedure Performed**

- Health assessment
- Insertion of urethral and supra pubic catheters
- Urine analysis
- Catheterization
- Peritoneal dialysis
- Bladder irrigation
- Care of ostomies
- Care of urinary drainage
- Bladder training
- Care of vascular access
- Setting up dialysis machine and starting, monitoring and closing dialysis
- Procedures for prevention of infections:
  - Hand washing, disinfection & sterilization surveillance, and fumigation universal precautions.
  - Collection of specimen
  - Administration of drugs: IM, IV injection, IV cannulation & fixation of infusion pump, calculation of dosages, blood administration. monitoring -fluid therapy, electrolyte imbalance.
  - Nutritional needs , diet therapy & patient education.
  - Counseling

**Part-2**

This course is designed to assist students in developing expertise and in- depth understanding in the field of nephro critical care technology. It will help students to develop advanced skills for nursing intervention in various nephro conditions. It will enable the student to function as nephro critical care specialist and provide quality care. It will further enable the student to function as educator, manager, and researcher in the field of nephro critical care technology.

## **Course Contents**

### **1 Urological Disorders Management**

Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, medical , surgical management of

- Urinary tract infections- pyelonephritis, lower urinary
- Disorders for ureters, bladder and urethra
- Urinary tract infections-
- Urinary dysfunctions- urinary retention, urinary incontinence, urinary reflux
- Bladder disorders- neoplasms, calculi, neurogenic bladder, trauma, congenital abnormalities.
- Benign prostrate hypertrophy(BPH)
- Ureteral disorders: ureteritis, ureteral trauma, congenital anomalies of ureters
- Urethral disorders- tumours, trauma, congenial anomalies of ureters.

### **2 Glomerular disorders management**

Etiology, clinical manifestations, diagnosis, prognosis, related pathophysiology, medical , surgical management of

- Glomerular nephritis- chronic, acute , nephritic syndrome
- Acute Renal failure and chronic renal failure.
- Renal calculi
- Renal tumours-benign and malignant
- Renal trauma
- Renal abscess
- Diabetic nephropathy
- Vascular disorders
- Renal tuberculosis
- Polycystic
- Congenital disorders
- Hereditary renal disorders

### **3 Management of Renal emergencies**

- Anuria
- Acute Renal failure
- Poisoning
- Trauma
- Urine retention
- Acute graft rejection
- Hematuria

### **4 Dialysis**

- Dialysis- Historical, types, Principles, goals
- Hemodialysis- vascular access sites- temporary and permanent
- Peritoneal dialysis
- Dialysis Procedures- steps, equipments, maintenance,
- Role of nurse- pre dialysis, intra and post dialysis
- Complications-
- Counseling
- patient education
- Records and reports

### **5 Kidney transplantation**

- Management of a patient with Kidney transplantation
- Kidney transplantations- a historical review
- Immunology of graft rejections

- The recipient of a renal transplant
- Renal preservations
- Human Leucocytic Antigen(HLA) typing matching and cross matching in renal transplantation
- Surgical techniques of renal transplantations
- Chronic renal transplant rejection
- Complication after KTP: Vascular and lymphatic, Uroloical, cardiovascular, liverand neurological, infectious complication
- KTP in children and management of pediatric patient with KTP
- KTP in developing countries
- Results of KTP
- Work up of donor and recipient for renal transplant
- Psychological aspect of KTP and organ donations
- Ethics in transplants
- Cadaveric transplantation

### **6 Rehabilitation of patient with nephrological problems**

- Risk factors and prevention
- Rehabilitation of patients on dialysis and after kidney transplant
- Rehabilitation of patients after urinary diversions
- Family and patient teaching

### **7 Pediatric urinary disorders**

Etiology, clinical manifestastions, diagnosis, prognosis, of children with

- Renal Diseases -UTI, ureteral reflux, glomerulo
- Nephritis, nephrotic syndrome infantile nephrosis, cystic kidneys, familial factorsin renal diseases in childhood, Haemolytic uraemic Syndrome
- Benign recurrent haematuria, nephropathy, tumour

### **8 Quality assurance in nephrological practice**

- Role of advance practioner in nephrological nursing
- Professional practice standards
- Quality control in nephrological nursing
- Nursing audit

### **Procedures Observed**

- CT Scan
- MRI
- Radiographic studies
- Urodynamics
- Hemodialysis
- Renal Surgeries

### **Procedures Assisted**

- Blood transfusion
- IV cannulation therapy
- Arterial Catheterization
- Insertion of central line/CVP line
- Connecting lines for dialysis
- Peritoneal dialysis
- Renal biopsy
- Endoscopies- Bladder, urethra

**Procedure Performed**

- Health assessment
- Insertion of urethral and supra pubic catheters
- Urine analysis
- Catheterization
- Peritoneal dialysis
- Bladder irrigation
- Care of ostomies
- Care of urinary drainage
- Bladder training
- Care of vascular access
- Setting up dialysis machine and starting, monitoring and closing dialysis
- Procedures for prevention of infections:
  - Hand washing, disinfection & sterilization surveillance, and fumigation universalprecautions.
  - Collection of specimen.
- Administration of drugs: IM, IV injection, IV cannulation & fixation of infusion pump,alculation of dosages, blood administration. Monitoring -fluid therapy, electrolyteimbalance.
- Nutritional needs diet therapy & patient education.
- Counseling

**Advanced Neuro Critical Care Technology****Part-3****Course Description**

This course is designed to assist students in developing expertise and in- depth knowledge in the field of neurology and neurosurgical Nursing. It will help students to develop advanced skills for nursing intervention in caring for patients with neurological and neurosurgical disorders. It will enable the student to function as neuroscience nurse practitioner/ specialist. It will further enable the student to function as educator, manager and researcher in the field of neurology and neurosurgical Nursing.

**Course Contents****1 Introduction**

Introduction to neuroscience(neurological and neurosurgical)

- History-Development in neurological and neurosurgical, Service &education
- Emerging trends and issues in neurology and neuro surgery and itsimplication to critical care practice.
- neurological and neurosurgical problems
- Concepts, principles and perspectives
- Ethical and legal issues



- Evidence based practice and its application in neurological and neurosurgical practice

## **2 Epidemiology**

- Major health problems-
- Risk factors associated with neurological conditions- Hereditary, Psychosocial factors, smoking, alcoholism, dietary habits, cultural and ethnic considerations, occupational and infections.
- Health promotion, disease prevention, life style modification
- Alternate system of medicine/complementary therapies

## **3 Review of Anatomy and Physiology**

- Embryology
- Structure and functions of Nervous system- CNS, ANS, Cerebral Circulation, Cranial and Spinal Nerves and Reflexes, Motor and Sensory Functions
- Sensory organs

## **4 Assessment and diagnostic measures**

### Assessment

- History taking
- Physical assessment, psychosocial assessment
- Neurological assessments, Glasgow coma scale interpretation & its relevance
- Common assessment abnormalities

### Diagnostic measures

- Cerebro spinal fluid analysis
- Radiological studies-Skull and Spine X-ray, Cerebral Angiography, CT Scan, Single Photon emission Computer Tomography (SPECT), MRI (Magnetic Resonance Imaging), MRA, MRS, Functional MRI, Myelography, PET (Positron Emission Test), Interventional radiology.
- Electrographic studies- Electroencephalography, MEG, EMG, videoEEG.
- Nerve conduction studies-Evoked potentials, visual evoked potentials.
- Ultrasound studies-Carotid duplex, transcranial Doppler sonography.
- Immunological studies
- Biopsies – muscle, nerve and Brain.

## **5 Meeting Nutritional needs of neurological patients**

- Basic nutritional requirements
- Metabolic changes following injury and starvation
- Nutritional assessment
- Common neurological problems that interfere with nutrition and strategies for meeting their nutritional needs
- Special metabolic and electrolyte imbalances
- Chronic fatigue syndrome

## **6 Drugs used in neurological and neurosurgical disorders**

- Classification
- Indications, contraindications, actions and effects, toxic effects

## **7 Ethical and legal issues in neuroscience**

- Brain death and organ transplantation
- Euthanasia
- Negligence and malpractice
- Nosocomial infections

**Procedures Observed**

- CT scan
- MRI
- PET
- EEG
- EMG
- Sleep pattern studies/Therapy
- Radiographical studies
- Neuro surgeries
- Nerve conduction studies
- Ultrasound studies
- Any other

**Procedures Assisted**

- Advanced Cardiac life support
- Lumbar Puncture
- Biopsies – muscle, nerve and Brain
- Arterial Blood Gas
- ECG Recording
- Blood transfusion
- IV cannulation – open method
- Endotracheal intubation
- Ventilation
- Tracheostomy
- ICP monitoring
- Gama Knife
- Cerebral angiography
- Myelography
- Neuro surgeries

**Procedures Performed:**

- Airway management
- Application of OroPharyngeal Airway
- Care of Tracheostomy
- Conduct Endotracheal Intubation
- use of AMBU bag, artificial respirators
- Setting of Ventilators and Care of patients on ventilators
- Cardio Pulmonary Resuscitation -Defibrillation
- Neurological assessment -Glasgow coma scale
- Gastric Lavage
- IV Cannulation
- Administration of emergency IV Drugs, fluid
- Care of patients with incontinence, bladder training Catheterization
- Care of patients on traction related to the neurological conditions
- Blood Administration.
- Muscle strengthening exercises
- Guidance and counselling
- Monitoring – management and care of monitors.

**Part-4****Course Description**

This course is designed to assist students in developing expertise and in- depth knowledge in the field of neurology and neurosurgical Nursing. It will help students to develop advanced skills for nursing intervention in caring for patients with neurological and neurosurgical disorders. It will enable the student to function as neuroscience nurse practitioner/ specialist. It will further enable the student to function as educator, manager and researcher in the field of neurology and neurosurgical Nursing.

## **Course Contents**

### **1 Traumatic conditions.**

Causes, pathophysiology, Clinical types, Clinical features, diagnosis, Prognosis, Management: medical, surgical management of

- Cranio cerebral injuries.
- Spinal & Spinal cord injuries.
- Peripheral nerve injuries.
- Unconsciousness

### **2 Cerebro vascular disorders.**

pathophysiology, Clinical types, Clinical features, diagnosis, Prognosis ,Management: medical, surgical management of

- Stroke & Arterio Venous Thrombosis
- Haemorrhagic embolus
- Cerebro vascular accidents
- Intracranial aneurysm
- Subarachnoid Haemorrhage
- Arterio Venous Fistula
- Brain Tumors

Diseases of cranial nerves; Trigeminal neuralgia, Facial palsy, Bulbar palsy

### **3 Degenerating and desalinating disorders**

Causes, pathophysiology, Clinical types, Clinical features, diagnostic, Prognosis, Management: medical, surgical management of

- Motor neuron diseases.
- Movement disorders- Tics, dystopia, chorea, Wilson's disease,
- Essential tremors
- Dementia
- Parkinson's disease
- Multiple sclerosis
- Alzheimer's

### **4 Neuro infections**

Causes, pathophysiology, Clinical types, Clinical features, diagnostic, Prognosis, Management: medical, surgical management of Neuro infections

- Meningitis-types
- Encephalitis
- Poliomyelitis
- Parasitic infections
- Bacterial infections
- Neurosyphilis
- HIV & AIDS
- Brain abscess

### **5 Paroxysmal disorders.**

Causes, pathophysiology, Clinical types, Clinical features, diagnosis, Prognosis, Management: medical, surgical and management of

- Epilepsy and seizures

- Status epilepticus
- Syncope
- Menier's syndrome
- Cephalgia

### **6 Developmental disorders.**

Causes, pathophysiology, Clinical types, Clinical features, diagnostic, Prognosis, Management: medical, surgical management of

- Hydrocephalus.
- Craniosynostosis.
- spina bifida- Meningocele, Meningomyelocele encephalocele
- syringomyelia.
- Cerebro vascular system anomalies.
- Cerebral palsies.
- Down's syndrome

### **7 Neuro muscular disorders.**

Causes, pathophysiology, Clinical types, Clinical features, diagnostic, Prognosis, Management: medical, surgical management of

- Polyneuritis – G B Syndrome
- Muscular dystrophy.
- Myasthenia gravis.
- Trigeminal neuralgia.
- Bell's palsy.
- Menier's disease
- Carpal tunnel syndrome
- Peripheral neuropathies

### **8 Neoplasms – surgical conditions.**

Causes, pathophysiology, Clinical types, Clinical features, diagnostic, Prognosis, management of

- Space occupying lesions -types
- Common tumors of CNS,

### **9 Other disorders**

Causes, pathophysiology, Clinical types, Clinical features, diagnostic, Prognosis, Management: medical, surgical management of

- Metabolic disorders- diabetes, insipidus, metabolic encephalopathy
- Sleep disorders
- Auto immune disorders – multiple sclerosis inflammatory myopathies

### **10 Neuro emergencies**

Causes, pathophysiology, Clinical types, Clinical features, diagnostic, Prognosis, Management: medical, surgical management of

- Increased intra cranial pressure
- Unconscious
- Herniation syndrome
- Seizures
- Severe head injuries
- Spinal injuries
- Cerebro vascular accidents

### **11 Rehabilitation.**

- Concept and Principles of Rehabilitation.
- Factors affecting quality of life and coping

Rehabilitation in acute care setting, and following stroke, head injury and degenerative disorders of brain

Physiotherapy.

Counselling

Care giver's role

Speech & Language.- Neurogenic communication disorders, Speech therapy

## **12 Quality Care in Neuroscience**

Quality assurance in neurological practice

Role of advance practitioner in neurological condition

Quality control in neurologic problems

Nursing audit

## **Neuro ICU**

Philosophy, aims and objectives

Policies, staffing pattern, design and physical plan of neuro ICU

Team approach, functions

Psychosocial aspects in relation to staff and clients of neuro ICU,

In-service education

## **Procedures Observed**

CT scan

MRI

PET

EEG

EMG

Sleep pattern studies/Therapy

Radiographical studies

Neuro surgeries

Nerve conduction studies

Ultrasound studies

Any other

## **Procedures Assisted**

Advanced Cardiac life support

Lumbar Puncture

Biopsies – muscle, nerve and Brain

Arterial Blood Gas

ECG Recording

Blood transfusion

IV cannulation – open method

Endotracheal intubation

Ventilation

Tracheostomy

ICP monitoring

Gama Knife

Cerebral angiography

Myelography

Neuro surgeries

## **Procedures Performed:**

Airway management

Application of Oropharyngeal Airway

Care of Tracheostomy

- Conduct Endotracheal Intubation
- use of AMBU bag, artificial respirators
- Setting of Ventilators and Care of patients on ventilators
- Cardio Pulmonary Resuscitation -Defibrillation
- Neurological assessment -Glasgow coma scale
- Gastric Lavage
- IV Cannulation
- Administration of emergency IV Drugs, fluid
- Care of patients with incontinence, bladder training Catheterization
- Care of patients on traction related to the neurological conditions
- Blood Administration.
- Muscle strengthening exercises
- Guidance and counselling
- Monitoring – management and care of monitors.

## MODEL PAPER

M.Sc. CCT Part-I

M.Sc. Critical Care Technology  
Part-I (Main) Examination Month & Year

### Paper-I

#### Applied Anatomy, Physiology and Biochemistry related to Critical Care

**Time: Three Hours**

Maximum Marks - 100

Attempt All Questions.

Student cell be allowed to take one supplementary copy along with one main answer book

All the parts of the one question should be answered at one place in sequential order.

Illustrate your answer with suitable diagrams, wherever necessary.

- |                                                                           |                   |
|---------------------------------------------------------------------------|-------------------|
| Q.1 Describe Heart anatomy and its blood supply.                          | 25                |
| Q.2 Describe control of Respiration elaborate Lung volume and capacities. | 25                |
| Q.3 1. Oxygen Transport                                                   | 12 <sub>1/2</sub> |
| 2. Assessment of Nutrition requirements.                                  | 12 <sub>1/2</sub> |
| Q.4 Short Notes (Any 5 out of 7)                                          | 5x5=25            |
| 1. Fat-soluble Vitamins and Clinical Significance                         |                   |
| 2. Respiratory Quotient                                                   |                   |
| 3. Cardiac Output - Factor affecting Cardiac Output                       |                   |
| 4. Brain Death                                                            |                   |
| 5. Diaphragm & Intercostal Muscle                                         |                   |
| 6. Circle of Willis                                                       |                   |
| 7 ABG.                                                                    |                   |

## MODEL PAPER

M.Sc. CCT Part-I

M.Sc. Critical Care Technology  
Part-I (Main) Examination Month Year

### Paper-II

#### Applied Pharmacology, Pathology and Microbiology related to Critical Care

**Time: Three Hours**

Maximum Marks - 100

Attempt All Questions.

Student cell be allowed to take one supplementary copy along with one main answer book

All the parts of the one question should be answered at one place in sequential order.

Illustrate your answer with suitable diagrams, wherever necessary.

- |                                                                                                                  |        |
|------------------------------------------------------------------------------------------------------------------|--------|
| Q.1 Describe ARDS and it's Pathophysiology                                                                       | 25     |
| Q.2 Classification of sympathetic drugs and its effects including PK/PD.                                         | 25     |
| Q.3 Nosocomial infection and its effect on Healthcare system. Describe measures to control Nosocomial Infection. | 25     |
| Q.4 Short Notes (Any 5 out of 7)                                                                                 | 5x5=25 |
| 1. Snake Bite                                                                                                    |        |
| 2. Shock                                                                                                         |        |
| 3. Tetra cyclins                                                                                                 |        |
| 4. Respiratory Failures                                                                                          |        |
| 5. Steroids                                                                                                      |        |
| 6. Classification of Antihypertensive drugs                                                                      |        |
| 7 Biomedical Waste disposal                                                                                      |        |



## MODEL PAPER

M.Sc. CCT Part-I

M.Sc. Critical Care Technology  
Part-I (Main) Examination Month Year

### Paper-III

**General Critical Care including ICU Monitoring, equipment Maintenance and therapy,  
Biomedical Engineering, ICU Administration, Logistics, Ethics, Communication  
Research, Management and Statistics**

**Time: Three Hours**

Maximum Marks - 100

Attempt All Questions.

Student cell be allowed to take one supplementary copy along with one main answer book

All the parts of the one question should be answered at one place in sequential order.

Illustrate your answer with suitable diagrams, wherever necessary.

- Q.1 Describe CVP monitoring and its principals. How to do Zeroing/Calibration and its effect on CVP monitoring. 25
- Q.2 Describe Modes, Alarm, indications and complications of mechanical Ventilation. 25
- Q.3 1. Oxygen delivery and consumption 12<sub>1/2</sub>  
2. Monitoring of pressue Sore 12<sub>1/2</sub>
- Q.4 Short Notes (Any 5 out of 7) 5x5=25
1. Indication of NIV
  2. Weaning from Ventilator
  3. Capnography and its importance
  4. Tracheobronchial hygiene & Suctioning
  5. Algorithm of BLS
  6. ABCDE (Trauma life support)
  - 7 Basic of IABP

## MODEL PAPER

M.Sc. CCT Part-II

M.Sc. Critical Care Technology Part-II (Main) Examination Month Year

### Paper-I

#### Advanced Respiratory Critical Care Technology

**Time: Three Hours**

Maximum Marks - 100

Attempt All Questions.

Student can be allowed to take one supplementary copy along with one main answer book

All the parts of the one question should be answered at one place in sequential order.

Illustrate your answer with suitable diagrams, wherever necessary.

- |                                                                                 |                  |
|---------------------------------------------------------------------------------|------------------|
| Q.1 Describe Mechanical ventilation, principles, Type and modes of ventilators. | 25               |
| Q.2 Blood Gas Analysis (ABG) its Techniques and Interpretation.                 | 25               |
| Q.3 1. Principles of drug administrations.                                      | 12 $\frac{1}{2}$ |
| 2. Quality indicators of intensive care units.                                  | 12 $\frac{1}{2}$ |
| Q.4 Short Notes (Any 5 out of 7)                                                | 5x5=25           |
| 1. Burn out Syndrome                                                            |                  |
| 2. Bronchodilator                                                               |                  |
| 3. BIPAP and CP AP                                                              |                  |
| 4. Smoking and its effect on Health                                             |                  |
| 5. Pulmonary artery Catheterization -Indication & Complications                 |                  |
| 6. Bronchopulmonary Segment                                                     |                  |
| 7 PFT                                                                           |                  |

## MODEL PAPER

M.Sc. CCT Part-II

M.Sc. Critical Care Technology Part-II (Main) Examination Month Year

### Paper-II

#### Advanced Cardiac Critical Care Technology

**Time: Three Hours**

Maximum Marks - 100

Attempt All Questions.

Student can be allowed to take one supplementary copy along with one main answer book

All the parts of the one question should be answered at one place in sequential order.

Illustrate your answer with suitable diagrams, wherever necessary.

- Q.1 Describe Methods of Hemodynamics monitoring with its principles. 25
- Q.2 Preoperative assessment, preparation and counselling of patient for cardiac surgery. 25
- Q.3 1. 2D Echo and its Techniques 12 $\frac{1}{2}$   
2. Cardiac Catheterization- indication, and Contraindication  
12 $\frac{1}{2}$
- Q.4 Short Notes (Any 5 out of 7) 5x5=25
1. Inotropic agents
  2. ACE Inhibitors
  3. ECG
  4. Coronary circulation
  5. Embryology of Heart
  6. CPR
  - 7 Cardiac Tamponade

## MODEL PAPER

M.Sc. CCT Part-II

M.Sc Critical Care Technology Part-II (Main) Examination Month Year

### Paper-III

#### Advanced Neuro & Nephro Critical Care Technology

**Time: Three Hours**

Maximum Marks - 100

Attempt All Questions.

Student cell be allowed to take one supplementary copy along with one main answer book

All the parts of the one question should be answered at one place in sequential order.

Illustrate your answer with suitable diagrams, wherever necessary.

Q.1 Describe risk factors associated with Neurological Conditions.	25
Q.2 Dialysis Procedure - Principle, Steps, Equipment and Maintenance.	25
Q.3 1. Acute and Chronic Renal Failure	12 <sup>1/2</sup>
2. Meningitis and Management	12 <sup>1/2</sup>
Q.4 Short Notes (Any 5 out of 7)	5x5=25
1. UTI	
2. Brain Death	
3. Peritoneal Dialysis	
4. Acute Graft Rejection	
5. EEG.	
6. Sedation Score	
7 ICP Monitoring	