بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

Bismillahirrahmannirrahiim

In the name of God, the Most Gracious, the Most Merciful

CURRICULUM / STATUTES/ REGULATIONS

MS ANESTHESIOLOGY 4 YEAR PROGRAM

Faisalabad Medical University

Faisalabad

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SECTION A

VISION STATEMENT:

Faisalabad Medical University has been established since 05-05-2017 for the purpose of imparting better medical education and encouraging and arranging extensive research and publications in the field of medical science. The vision of the university is:

"Striving to achieve national and international stature in undergraduate and postgraduate medical education with strong emphasis on professionalism, leadership, community health services, research and bioethics"

MISSION STATEMENT:

The mission of the University is to:

"Educate Healthcare professionals to prevent, diagnose and treat human illnesses to practice evidence-based medicine with focus on lifelong healthcare in order to meet the challenges of community needs and competitive medical profession at the same time"

STATUTES:

Nomenclature:

The name of the degree program shall be MS ANESTHESIOLOGY.

Course Title:

MS Anesthesiology

Training Centers:

The Department of Anesthesia & Intensive Care at Affiliated hospitals of Faisalabad Medical University, Faisalabad.

Duration of Course:

The duration of the course shall be four years with structured training in a recognized department under the guidance of an approved supervisor.

Course structure:

- **Core knowledge**: Competency based learning for the trainees. Core knowledge of the various diseases and techniques of anesthesia shall be provided. Two exams shall be conducted by the university; one after the completion of two years of training and the second after the conclusion of the fourth year of training. Structured internal assessment shall be done throughout the program. Internal assessment score will be included in the final exit exam.
- **Clinical Training in Anesthesia:** Clinical training shall include rotations in various specialties / operation theatres, where trainees shall administer anesthesia under direct supervision of a consultant in early year and can perform under remote supervision in later years. Duties in pre-anesthesia clinic, intensive care unit and pain clinic shall be mandatory for all the residents.

- **Research and Thesis writing:** It shall be prepared in accordance with the guidelines of the institution's research board.
- **Mandatory Workshops:** Throughout the entire training program various workshops shall be conducted. They should be attended by all the trainees and must be evenly distributed throughout the course. These include:

1. Communication skills
2. Research synopsis and thesis writing skills
3. Basic Biostatistics and Research Methodology
4. Information Technology Skills
5. Initial life support (ILS)

At the end of each workshop, assessment shall be done and certificates shall be issued to the pass trainees only. The workshops shall be organized by the Department of Medical Education of the University and the prescribed fee shall be paid by all the postgraduate residents. The trained certified coaches/teachers shall be invited, and they will get renumeration from the university.

Feedback from the facilitators and trainees shall be recorded for the continuous improvement of the process. The Medical education department shall issue yearly planner for these workshops in the light of curriculum document, duly approved by the university.

SECTION B

Admission Criteria:

Central induction Policy as per Government rules

Registration & Enrollment:

The number of PG Trainees/ Students and Beds to trainee ratio at the approved teaching site shall be as per policy of Pakistan Medical & Dental Council.

The University shall approve supervisors for the MS Anesthesiology program.

Candidates selected for the courses after their selection and enrollment shall be registered with FMU as per prescribed Registration Regulation.

Accreditation Related Issues of The Institution:

A. Faculty

Properly qualified teaching staff in accordance with the requirements of Pakistan Medical and Dental Council (PMDC) shall be appointed. Supervisor status shall be awarded by the university according to the set standards and rules.

B. Adequate resources

The university shall provide adequate resources including classrooms (with audiovisual aids), demonstration rooms, computer lab, anesthesia clinic, fully equipped operation theaters, and other necessary equipment etc. for proper training of the residents as per their course outcomes and objectives.

C. Library

A departmental library shall be established with the latest editions of the recommended books, reference books and journals (National and International).

Freezing of Program and leave rules:

Freezing of training, Maternity leave, Ex Pakistan Leave and Extra Ordinary Leave etc. shall be allowed according to the leave rule of the university and should be approved through the Office of the Dean Postgraduate Studies and the competent authority.

Section C

AIMS AND OBJECTIVES OF THE COURSE

AIM:

The aim of four years MS program in anesthesiology is to train residents to acquire the competency of a specialist in the relevant field so that they can become good clinicians, teachers, researchers and community health provider in their specialty after completion of their training according to the global standards.

PROGRAM LEARNING OBJECTIVES AND CONTENT LIST:

General Program Outcome:

On completion of the training program, trainees pursuing an academic pathway shall be expected to demonstrate competence in all the aspects of the published syllabus. The specific training component would be targeted for establishing clearly defined standards of knowledge and skills required to practice Anesthesiology at secondary and tertiary care level setups with proficiency in the Basic and applied clinical sciences, Basic anesthesia care, intensive care units, Emergency (A&E) medicine and Complementary surgical disciplines.

Specific Program Outcomes:

Specific learning objectives include proficiency in:

Anesthetic equipment and safety:

- Physical principles underlying the function ofthe anesthetic machine, pressure regulators,flow meters, vaporizers, and breathing systems.
- Absorption of carbon dioxide
- Principles of lung ventilators, disconnectionmonitors

- Manufacture and storage of oxygen, nitrousoxide, carbon dioxide, and compressed air.
- Pipeline and suction systems, gas cylinders
- Humidification devices
- Minimum monitoring requirements
- Environmental control of the operating theatre including scavenging systems for waste anesthetic gases and vapors
- Pre-use checks of the anesthetic machine, breathing systems, and monitoring apparatus
- Anesthetic records and critical incidents
- Function and use of related anesthetic and resuscitation equipment including that used for regional anesthesia; Airways, tracheal tubes, tracheostomy tubes, laryngeal masks, oxygen therapy equipment, self-inflating bags,spinal and epidural needles, intravenous cannulas and transfusion devices
- Sterilization and cleaning of the equipment

Preoperative assessment

- Implications for anesthesia of more common medical conditions. In particular, respiratory diseases (e.g., asthma, chronic obstructive airway disease), cardiac disease (e.g., angina pectoris, valvular disease, myocardial infarction, pacemakers, arrhythmias), vascular disease (e.g., hypertension), sickle cell disease and anemias, rheumatoid arthritis, renal dysfunction and insufficiency, plasma electrolyte disturbance (e.g., hyper- and hypokalemia), diabetes mellitus, liver disease
- Implications for anesthesia of more common surgical conditions, trauma, intestinal obstruction, and acute abdominal emergencies
- ASA classification and other pre-anesthetic scoring systems such as the Glasgow ComaScale

- Interpretation of relevant preoperative investigations, plasma electrolytes, hematology, disturbances of acid/base status, ECG, X-rays, pulmonary function tests, and clotting abnormalities
- Preoperative assessment of a patient of any age (excluding neonates) for elective or emergency surgery
- Restriction of food and fluid by mouth, cessation of smoking, correction of dehydration
- Assessment of difficulty of tracheal intubation
- Precautions in the management of the infective patient (e.g., hepatitis seropositive orHIV positive)
- Anesthetic implications of current drug therapy such as beta-blockers, antihypertensive drugs, tricyclic antidepressant agents and monoamine oxidase inhibitors, insulin, anti- diabetic drugs, anticoagulants, contraceptives
- Assessment of postoperative analgesic needs

Premedication

- Rationale for premedical drugs.
- Choice of drugs, advantages, anddisadvantages
- Induction
- Intravenous and inhalational anesthetic agents; advantages and disadvantages;techniques
- Recognition and management of anaphylactic and anaphylactoid reactions, including follow-up and patient information
- Indications for tracheal intubation
- Management of difficult intubation and failedintubation
- Recognition of correct placement of trachealtube, esophageal and endobronchial intubation, complications
- Causes of regurgitation and vomiting duringinduction, prevention, and management
- Technique of cricoid pressure; pulmonaryaspiration

- Induction of anesthesia in special circumstances, head injury, full stomach,upper airway obstruction.

Intraoperative assessment

- Ability to deal with emergencies before, during and after anesthesia and the ability to stabilize a patient's condition until senior assistance can be obtained.
- Techniques of maintenance of anesthesia.
- To provide adequate analgesia using opioids and other analgesic drugs.
- Management of appropriate intermittent positive pressure ventilation.
- Intraoperative fluid therapy.
- Diagnosis and management of important critical incidents during anesthesia including cyanosis, hypertension, hypotension, cardiac arrhythmias, bronchospasm, respiratory obstruction, increased peak inspiratory pressure, hyper- and hypocarbia, failed intubation, failed reversal
- Management of massive hemorrhage, volume expansion, blood transfusion (hazards including incompatibility reaction), gas embolism, malignant hyperthermia
- Correct intraoperative positioning on theatre table - complications, prone position
- Diagnosis and treatment of pneumothorax

Postoperative assessment

- Causes and treatment of failure to breathe atend of operation, suxamethonium apnea management
- Care of the unconscious patient

- Recovery room diagnosis and treatment of inadequate pulmonary ventilation, cyanosis, hypo- and hypertension, shivering, and stridor.
- Oxygen therapy, indications, and techniques
- Methods of pain management. Assessment of pain and analgesic techniques
- Prevention, diagnosis and treatment of postoperative pulmonary atelectasis, deepvein thrombosis and pulmonary embolus
- Postoperative fluid therapy
- Causes and treatment of postoperativenausea and vomiting
- Minor and major adverse sequelae to anesthesia and their management

Anesthesia in special circumstances

- Principles of Obstetric Anesthesia
- Principles of the care of children (excluding neonates and infants) undergoing anesthesiafor straightforward surgical procedures, including ENT, eye, and dental operations
- Principles of general anesthesia for simple ophthalmic procedures and a penetrating eyeinjury
- Patients with a pacemaker
- Advantages and problems associated withday surgery, appropriate anesthetic techniques
- Principles of neurosurgical anesthesia asapplied to the management of the head- injured patient
- Problems of anesthesia in the obese patient
- Repeat anesthesia - hepatic injury
- Implications for the anesthetist of viralhepatitis and HIV infections
- Laparoscopic and minimally invasiveprocedures
- Management of patients requiring transfer

Regional anesthesia

- Indications, technique, and, management of the complications of spinal and epidural (including caudal approach) analgesia.
- Techniques including intravenous regional anesthesia, brachial plexus block, femoral nerve block, inguinal field block, ankle block and the dorsal nerve of the penis block.
- Local anesthesia for awake trachealintubation.

Resuscitation

- Immediate care and resuscitation in patientsof all ages. Patient assessment
- The principles and practice of life support
- The principles and practice of recognition and management of life-threatening arrhythmias including defibrillation and drug therapy
- The techniques of venous access and theintraosseous route
- Management of the airway and ventilation in an emergency situation, including care of thecervical spine
- Specific problems in pediatric resuscitation
- Ethical aspects of resuscitation

Trauma

- Pathophysiology of trauma and hypovolemia
- Assessment, immediate care, and management of trauma patients of all ages
- Performance and interpretation of the primaryand secondary survey
- Immediate specific treatment of life- threatening illness or injury, with special reference to thoracic and abdominal trauma
- Care of cervical spine injury
- Emergency airway management and oxygentherapy
- Cannulation of major vessels for resuscitationand monitoring

- Management of hypovolemic shock
- Chest tube insertion and management
- Pain management in trauma victims

Research Experience:

All residents in the categorical program are required to complete an academic outcomes-based research project during their training. This project can consist of original bench top laboratory research, clinical research, or a combination of both. The research work shall be compiled in the form of a thesis, which is to be submitted for evaluation by each resident before the end of the training. The designated faculty shall organize and mentor the residents through the process, as well as conduct journal club meetings to teachcritical appraisal of the literature.

CURRICULUM CONTENT OUTLINE

INTERMEDIATE EXAMINATION:

Basic Principles of Surgery & Medicinerelated to Anesthesia

BASIC SCIENCES

- A.1 Anatomy
- A.2 Physics, Monitoring, and AnesthesiaDelivery Devices
- A.3 Mathematics
- A.4 Pharmacology

CLINICAL SCIENCES:

Anesthesia Procedures, Methods, and Techniques

- B.1 Evaluation of the Patient and PreoperativePreparation.
- B.2 Regional Anesthesia
- B.3 General Anesthesia
- B.4 Monitored Anesthesia Care and Sedation
- B.5 Intravenous Fluid Therapy DuringAnesthesia
- B.6 Complications (Etiology, Prevention,Treatment)
- B.7 Postoperative Management

ORGAN -BASED BASIC and CLINICAL SCIENCES:

- C.1 Central and Peripheral Nervous Systems
- C.2 Respiratory System
- C.3 Cardiovascular System
- C.4 Gastrointestinal / Hepatic Systems

- C.5 Renal and Urinary Systems/ ElectrolyteBalance
- C.6 Hematologic System
- C.7 Endocrine and Metabolic Systems
- C.8 neuromuscular diseases and Disorders

SPECIAL PROBLEMS or ISSUES in ANESTHESIOLOGY

- I.D.1 Physician Impairment or Disability: Substance Abuse, Fatigue, Aging, Visual andAuditory Impairment
- I.D.2 Ethics, Practice Management, andMedicolegal Issues

FINAL EXAMINATION:

Advanced Topics in Anesthesia

BASIC SCIENCES

- II.A.1 Physics, Monitoring, and AnesthesiaDelivery Devices
- II.A.2 Pharmacology

CLINICAL SCIENCES: ANESTHESIA PROCEDUSRE, METHODS, and TECHNIQUES

- II.B.1 Regional Anesthesia
- II.B.2 Special Techniques

ORGAN-BASED BASIC AND CLINICALSCIENCES.

- II.C.1 Central and Peripheral Nervous Systems
- II.C.2 Respiratory System
- II.C.3 Cardiovascular System

- II.C.4 Gastrointestinal / Hepatic Systems
- II.C.5 Renal and Urinary Systems / ElectrolyteBalance: Clinical Science
- II.C.6 Hematologic System
- II.C.7 Endocrine and Metabolic Systems: ClinicalScience
- II.C.8 neuromuscular diseases and Disorders:Clinical Science

CLINICAL SUBSPECIALTIES.

- II.D.1 Painful Disease States
- II.D.2 Pediatric Anesthesia
- II.D.3 Obstetric Anesthesia
- II.D.4 Otorhinolaryngology (ENT) Anesthesia: Airway Endoscopy; Micro laryngeal Surgery; Laser Surgery, Hazards, Complications (AirwayFires, Etc.)
- II.D.5 Anesthesia for Plastic Surgery, Liposuction
- II.D.6 Anesthesia for Laparoscopic Surgery; Cholecystectomy; Gynecologic Surgery; GastricStapling; Hiatus Hernia Repair; Anesthetic Management; Complications
- II.D.7 Ophthalmologic Anesthesia, Retrobulbarand Peribulbar Blocks; Open Eye Injuries
- II.D.8 Orthopedic Anesthesia; Tourniquet Management, Complications, Regional vsGeneral Anesthesia
- II.D.9 Trauma Anesthesia
- II.D.10 Anesthesia for Ambulatory Surgery
- II.D.11 Geriatric Anesthesia/Aging
- II.D.12 Critical Care

SPECIAL PROBLEMS OR ISSUES INANESTHESIOLOGY

- II.E.1 Electroconvulsive Therapy.
- II.E.2 Organ Donors: Pathophysiology and Clinical Management.
- II.E.3 Radiologic Procedures; CT scan; MRI- Anesthetic; Implications/Management, Anesthesia in Locations Outside the OperatingRooms.
- II.E.4 Ethics, Practice Management, andMedicolegal Issues

TOPICS IN ANESTHESIOLOGY

A. BASIC SCIENCES

ANATOMY

Topographical Anatomy as Landmarks

- Neck: Cricothyroid Membrane, Internal, andExternal Jugular Veins, Thoracic Duct, Carotid, and Vertebral Arteries, Stellate Ganglion, Cervical Spine Landmarks (Vertebra Prominins, Chassagne's Tubercle)
- Chest: Pulmonary Lobes, Cardiac Landmarks,Subclavian Vein
- Pelvis and Back: Vertebral Level of Topographical Landmarks, Caudal Space
- Extremities: Relationship of Bones, Nerves,and Arteries
- Dermatome Anatomy: Sensory and Motor

Radiological Anatomy

- Chest (Including CT and MRI)
- Brain and Skull (Including CT and MRI)
- Spine (Cervical, Thoracic, Lumbar), IncludingCT and MRI
- Neck (Including Doppler Ultrasound forCentral Venous Access)

Clinical Anatomy

- Upper Extremity
- Bones
- Vasculature

- Innervation
- Lower Extremity
- Bones
- Vasculature
- Innervation

PHYSICS, MONITORING and ANESTHESIA DELIVERY DEVICES

a. Mechanics

- Pressure Measurement of Gases, Liquids
- Transducers, Regulators, Medical GasCylinders
- Principles of Ultrasound: Obtaining an Image, Resolution, Depth, Frequency, Resonance

b. flow Velocity

- Viscosity-Density; Laminar-Turbulent Flow
- Flowmeters: Rotameter
- Principles of Doppler Ultrasound

c. Properties of Liquids, Gases, and Vapors

- Diffusion of Gases
- Solubility Coefficients
- Relative and Absolute Humidity
- Critical Temperature, Critical Pressure

d.Gas Laws

e.Vaporizers

- Vapor Pressure and Calculation of AnestheticConcentrations
- Vaporizer Types and Safety Features

f.Uptake and Distribution of Inhalation Agents

- Uptake and Elimination Curves; Effect of Ventilation, Circulation, Anesthetic Systems
- Concentration Effect
- Second Gas Effect
- Nitrous Oxide and Closed Spaces

g.Physics of Anesthesia Machine/ BreathingSystem

- Principles: Resistance, Turbulent Flow, Mechanical Dead space, Rebreathing, Dilution, Leaks, Gas Mixtures, Humidity, Heat
- Components: Connectors, Adaptors, Mask, Endotracheal Tube, Reservoir
- Bag Unidirectional Valves, Corrugated Breathing Tubes, Laryngeal Mask Airways, Airway Pressure Relief Valve characteristics
- Circle Systems: Closed and Semi-Closed;
- Adult; Pediatric
- Non-Circle Systems: Insufflation; Open; Semi-Open
- Portable Ventilation Devices (Self-Reinflating,Non-Self-Reinflating), Non-Rebreathing Valves
- CO2 Absorption: Principles, Canisters, Efficiency.Toxicity: Compound A, Carbon Monoxide
- Oxygen Supply Systems: FiO2
- Waste Gas Evacuation Systems

- Safety Features (Proportioning Devices, Rotameter Configuration, Pressure Fail-Safe)

h. Physics of Anesthesia Machine/ Breathing System

- Principles: Resistance, Turbulent Flow, Mechanical Dead space, Rebreathing, Dilution,Leaks, Gas Mixtures, Humidity, Heat

i. Monitoring Methods

- Neuromuscular Function: Nerve Stimulators, Electromyography (EMG)
- Ventilation: Respirometers, Inspiratory Force, Spirometry, Flow-Volume Loops
- Gas Concentrations: O2, CO2, Nitrogen, Anesthetic Gases and Vapors
- Temperature
- Oxygen: Oximetry, Co-Oximetry, PulseOximetry
- Blood Pressure - Noninvasive, Invasive
- Heart Function: Heart Tones,Electrocardiogram

j.Instrument/ equipment

- Arterial and Venous Blood Gases: Electrodes for pH, PO2, PCO2, Calibration, TemperatureCorrections, Errors
- Gas Concentrations: Infrared Absorption, Mass Spectrometry, Raman Scatter Analysis
- Pressure Transducers: Resonance, Damping
- Non-In vasive Blood Pressure (BP) Measurement: Doppler, Oscillometry, Korotkoff Sounds, Palpation
- Blood Warmers, Autotransfusion Devices
- Body Warming Devices: Forced Air, Heating Lamps, Insulation Devices, Warming Blankets, Water-Flow “Second Skin” Devices

- Ventilators
- Classifications: Flow Generation vs. PressureGeneration
- Principles of Action: Assistors, Controllers, Assist-Control; Pressure Limited, Volume- Limited; FiO2 Control; Periodic Sigh, Inverse Ratio, High Frequency Ventilation, Intermittent Mandatory Ventilation (IMV), Synchronized IMV, Pressure Support, Airway Pressure Release Ventilation (APRV), Pediatric Adaptation, Non-Invasive Techniques: Biphasic Positive Airway Pressure (BIPAP), Others
- Monitors; Pressure (Plateau, Peak), Oxygen, Apnea, Inspiratory/Expiratory Ratio, Dynamic Compliance, Static Compliance. Alarms and Safety Features: Operating Room, Electrical, Anesthesia Machine, Ventilators, Capnometer, Oxygen, Hemodynamic Monitors.
- Defibrillators: Automatic Internal, External, Implantable; Energy, Cardioversion, Types of Waveforms (Monophasic, Biphasic); Paddle Size and Position; Automated External Defibrillators (AEDs)

k. Electrical; Fire and Explosion Hazards;Basic Electronics

- Source of Ignition; Static
- Prevention: Grounding, Isolation Transformers
- Macro and Micro Current Hazards
- Safety Regulations; National Fire Protection Association (NFPA) Standards
- Risk Factors for Intraoperative Fire

l. Mathematics

- Simple Math: Logarithms; Graph of Simple Equations; Exponential Function, Analysis ofBiologic Curves
- Statistics: Sample and Population; Probability; Mean, Median, and Mode; Standard Deviation and Error; T-Test; Chi- Square; Regression

Analysis/Correlation; Analysis of Variance, Power Analysis, Meta-Analysis, Confidence Intervals, Odds Ratio, Risk Ratio, Bland-Altman Plot.

PHARMACOLOGY

- General Concepts
- Pharmacokinetics and Pharmacodynamics, Protein Binding; Partition Coefficients; PKA; Ionization; Tissue Uptake; Compartmentalization and Exponential Models
- Pharmacokinetics of Neuraxial Drug Administration: Epidural and Subarachnoid
- Tolerance and Tachyphylaxis
- Termination of Action
- Elimination; Biotransformation; Context-Sensitive Half-Time
- Impact of Renal Disease
- Impact of Hepatic Disease
- Drug Interactions
- Enzyme Induction and Inhibition
- Hepatic Blood Flow
- Drug-Drug Binding
- Alternative and Herbal Medicines: Perioperative Implications
- Drug Reactions (Anaphylactoid, Anaphylaxis,Idiosyncratic)
- Anesthetics-Gases and Vapors
- Physical Properties
- Mechanism of Action
- Effects on Central Nervous System (CNS)
- Effects on Cardiovascular System
- Effects on Respiration

- Effects on Neuromuscular Function
- Effects on Renal Function
- Effects on Hepatic Function
- Effects on Hematologic and Immune Systems
- Biotransformation and Toxicity
- Minimum Alveolar Concentration (MAC),Factors Affecting Mac
- Trace Concentrations, OR Pollution,Personnel Hazards
- Comparative Pharmacodynamics
- Anesthetics-Intravenous (Opioid and Non-Opioid Induction and Anesthetic Agents)

Opioids

- Mechanism of Action: Pharmacokinetics andPharmacodynamics
- Intravenous
- Epidural and Intrathecal
- Metabolism and Excretion
- Effect on Circulation
- Effect on Respiration
- Effect on Other Organs
- Side Effects and Toxicity
- Indications and Contraindications

Barbiturates

- Mechanism of Action
- Pharmacokinetics and Pharmacodynamics
- Metabolism and Excretion
- Effect on Circulation
- Effect on Respiration
- Effect on Other Organs
- Side Effects and Toxicity
- Indications and Contraindications

Propofol

- Mechanism of Action
- Pharmacokinetics and Pharmacodynamics
- Metabolism and Excretion
- Effect on Circulation
- Effect on Respiration
- Effect on Other Organs
- Side Effects and Toxicity
- Indications and Contraindications

Etomidate

- Mechanism of Action
- Pharmacokinetics and Pharmacodynamics
- Metabolism and Excretion
- Effect on Circulation
- Effect on Respiration
- Effect on Other Organs
- Side Effects and Toxicity
- Indications and Contraindications

Benzodiazepines

- Mechanism of Action
- Pharmacokinetics and Pharmacodynamics
- Metabolism and Excretion
- Effect on Circulation
- Effect on Respiration
- Effect on Other Organs
- Side Effects and Toxicity
- Indications and Contraindications
- Antagonism

Ketamine

- Mechanism of Action
- Pharmacokinetics and Pharmacodynamics
- Metabolism and Excretion
- Effect on Circulation
- Effect on Respiration
- Effect on Other Organs
- Side Effects and Toxicity
- Indications and Contraindications

Dexmedetomidine

- Mechanism of Action
- Pharmacokinetics and Pharmacodynamics
- Metabolism and Excretion
- Effect on Circulation
- Effect on Respiration
- Effect on Other Organs
- Side Effects and Toxicity
- Indications and Contraindications

Local Anesthetic Agents

- Uptake, Mechanism of Action
- Biotransformation and Excretion
- Comparison of Drugs and Chemical Groups
- Prolongation of Action
- Side Effects
- CNS: Seizures, Cauda Equina Syndrome, Transient Neurological Symptom
- Cardiac
- Allergy
- Preservatives/Additives

- Methemoglobinemia
- Local Anesthetic Systemic Toxicity
- American Society for Regional Anesthesia Checklist for Local Anesthetic Systemic
- Intravenous Lipid Emulsion for Local Anesthetic Systemic Toxicity

Muscle Relaxants (Depolarizing, Non-Depolarizing)

- Mechanism of Action
- Pharmacokinetics and Pharmacodynamics,Abnormal Responses
- Prolongation of Action; Synergism
- Metabolism and Excretion
- Side Effects and Toxicity
- Indications and Contraindications
- Antagonism of Blockade
- Drug Interactions (Antibiotics, Antiepileptics, Lithium, Magnesium, Inhalational Anesthetics)

B. CLINICAL SCIENCES:

Anesthesia Procedures, Methods, and Techniques

PRE-OPERATIVE EVALUATION & PREPERATION

- Physical Examination Including AirwayEvaluation
- Laboratory Evaluation
- American Society of Anesthesiologists (ASA) Preoperative Testing Guidelines
- American College of Cardiology/American Heart Association Guidelines for PerioperativeCardiovascular Evaluation
- ASA Physical Status Classification
- Preparation for Anesthesia/Premedication
- Interaction with Chronic Drug Therapy; Interaction with Anesthetic Agents
- Adverse Reactions to Premedication; Patient Variability, Dose-Response Curves, Side Effects
- Specific Problems in Disease States: Hyperthyroidism and Hypothyroidism, Drug Abuse, Glaucoma, Uremia, Increased CSF Pressure, Chronic Steroid Ingestion, Obesity, Obstructive Sleep Apnea, Depression, COPD,Hypertension
- Pediatric and Geriatric Doses, Routes ofAdministration
- Role in Patients with Allergies
- NPO and Full Stomach Status; Implications for Airway Management, Choice of Anesthesia Technique and Induction of Anesthesia; Gastric Emptying Time; Preoperative; Full Stomach and Induction of Anesthesia; Practice Guidelines for Preoperative Fasting
- Alteration of Gastric Fluid Volume and pH,Sphincter Tone

- Continuation vs. Discontinuation of Chronic Medications: Antihypertensives, Anti-Anginal,Antihyperglycemics, Antidepressants, PlateletInhibitors, Etc.
- Prophylactic Cardiac Risk Reduction: Beta- Adrenergic Blockers, Etc.
- Prophylactic Antibiotics
- Indications
- Risks of Administration
- Drug Interactions

REGIONAL ANESTHESIA

- General Topics: Premedication, Patient Position, Equipment, Monitoring and Sedation
- Spinal, Epidural, Caudal, CombinedSpinal/Epidural
- Indications, Contraindications
- Sites of Actions
- Factors Influencing Onset, Duration, andTermination of Action
- Systemic Toxicity, Test Dose
- Complications; Precipitating Factors, Prevention, Therapy, Implications of Anticoagulants and Platelet Inhibitors: American Society of Regional Anesthesia andPain Medicine (ASRA) Guidelines
- Physiologic Effects (GI, Pulmonary, Cardiac,Renal)
- Mechanism, Agents, Indications, Contraindications, Techniques, Complications
- Transversus Abdominis Plane Blocks: Indications, Risks, Side Effects

GENERAL ANESTHESIA

- Stages and Signs of Anesthesia; AwarenessUnder Anesthesia
- Techniques: Inhalational, Total Intravenous, Combined Inhalational/Intravenous
- Airway Management

- Assessment/Identification of Difficult Airway: Anatomic Correlates, Mallampati Classification, Range of Motion
- Techniques for Managing Airway: Awake vs. Asleep, Avoidance of Muscle Relaxants, Drug Selection, Retrograde Intubation Techniques, ASA Difficult Airway Algorithm
- Devices: Flexible Fiberoptic, Rigid Fiberoptic, Transillumination, Laryngoscope Blades, Alternative Intubating Devices, Video Laryngoscopes
- Alternatives and Adjuncts: Laryngeal Mask Airway (Traditional and Modified), Esophageal Obturator Airways, Occlusive Pharyngeal Airways
- Transcutaneous Or Surgical Airway: Tracheostomy, Cricothyroidotomy, Trans laryngeal or Transtracheal Jet Ventilation
- Endobronchial Intubation: Double-Lumen Endobronchial Tubes; Bronchial Blockers, Placement and Positioning Considerations, Postoperative Considerations
- Intubation and Tube Change Adjuncts: Bougies, Jet Stylites, Soft and Rigid TubeChange Devices; Complications
- Endotracheal Tube Types: Tube Material (Polyvinyl Chloride, Silicone, Laser-Resistant, Silver Impregnated, Other), Tube Tip Design (Murphy Eyes, Flexible Tip, Moveable Tip, Short- Bevel), Cuff Design (High vs. Low Volume/Pressure, Cuffed Vs Uncuffed, Cuff Shape), Cuff Pressure Management (Lanz Valves, Active Management, Pilot Balloon, Inflation Valve), Specific Tube Types (Wire- Reinforced, Nasal, and Oral Rae®, Micro laryngeal, Supraglottic Secretion Suctioning, Other), Micro laryngoscopy; Laser Safe
- ASA Monitoring Standards 7

MONITORED ANESTHESIA CARE

- Techniques
- Risks and Complications
- ASA Guidelines for Sedation, SedationGuidelines for No Anesthesiologists
- Indications/Contraindications

INTRAVENOUS FLUID THERAPY

- Water, Electrolyte, Glucose Requirements
- Crystalloid vs. Colloid
- Fluid Requirements and Fluid DeficitCalculations
- Normal Saline vs. Lactated Ringers' vs.Plasmalyte vs. D5W
- Enhanced Recovery After Surgery Protocol forFluid Therapy
- Complications (Etiology, Prevention,Treatment)

COMPLICATIONS/ RISKS

- Upper Airway, Epistaxis
- Larynx, Trachea, and Esophagus
- Eyes: Corneal Abrasions, Blindness, Post-opvisual loss
- Vascular; Arterial and Venous Thrombosis;Thrombophlebitis; Sheared Catheter, Intra-Arterial Injections, Air Embolism, Cardiac/Vascular Perforations, Pulmonary Artery Rupture
- Neurological: Pressure Injuries of Mask,Tourniquet, Body Position, Intraneural Injections, Retractors, Peripheral Neuropathies
- Burns
- Chronic Environmental Exposure; Fertility, Teratogenicity, Carcinogenicity,Scavenging

- Temperature
    - Hypothermia: Etiology, Prevention,Treatment, Complications (Shivering,O2 Consumption), Prognosis
    - Nonmalignant Hyperthermia; Complications, Treatment
- Bronchospasm
- Anaphylaxis
- Latex Allergy
- Laryngospasm
    - Post-obstructive Pulmonary Edema
    - Aspiration of Gastric Contents
    - Malignant Hyperthermia
- Genetics
- Pathophysiology

POST OPERATIVE PERIOD

Pain Relief

- Pharmacological
- Drugs: Opioids, Agonist-Antagonists, Local Anesthetics, Alpha-2 Agonists, Nonsteroidal Anti-Inflammatory Drugs (NSAIDs), N-Methyl-D-Aspartate (NMDA) Receptor Blockers, tricyclic antidepressants (TCA), selectiveserotonin reuptake inhibitor (SSRI)
- Routes: Oral, Subcutaneous (SC), Transcutaneous, Transmucosal, Intramuscular (IM), Intravenous (IV), Including Patient-Controlled Analgesia (PCA), Epidural, Spinal, Interpleural, Other Regional Techniques
- Other Techniques; Transcutaneous Electrical Nerve Stimulation (TENS); Cryotherapy, Acupuncture, Hypnosis

RESPIRATORY EFFECTS of ANESTHESIA & SURGICAL INCISIONS:

Differential diagnosis and treatment of intra and post-operative respiratory complications.

Post operative ventilation, optimization, lung recruiting strategies, physiotherapy.

CARDIOVASCULAR EFFECTS of GENERAL & REGIONAL ANESTHESIA:

Differential Diagnosis and Treatment of Postoperative Hypertension& Hypotension.

NAUSEA & VOMITING

- Physiology; Etiology; Risk Factors, PreventiveStrategies
- Use of Antacids, Histamine-2 (H2) Blockers, Metoclopramide, Transdermal Scopolamine, Droperidol, Serotonin Antagonists, Proton Pump Inhibitors, Dexamethasone, Multimodal Therapy, Acupressure/Acupuncture

Neuromuscular Consequences: Residual Paralysis, Muscle Soreness, Recovery of Airway Reflexes

NEUROLOGICAL EFFECTS of ANESTHESIA: Confusion, Delirium, Cognitive Dysfunction,emergence from anesthesia

C. ORGAN BASED BASIC & CLINICAL SCIENCES

CENTRAL & PERIPHERAL NERVOUS SYSTEM

Brain

- Cerebral Cortex; Functional Organization
- Subcortical Areas: Basal Ganglia, Hippocampus, Internal Capsule, Cerebellum, Brain Stem, Reticular Activating System
- Cerebral Blood Flow
- Effect of Perfusion Pressure, Ph, PaCO2, PaO2, and Cerebral Metabolic Rate for O2 (CMRO2); Inverse Steal; Gray vs. White Matter
- Autoregulation: Normal, Altered, andAbolished
- Pathophysiology of Ischemia/Hypoxia: Global vs. Focal, Glucose Effects, Effects of Brain Trauma or Tumors
- Cerebrospinal Fluid
- Formation, Volume, Composition, Flow, andPressure
- Blood-Brain Barrier, Active and Passive Molecular Transport Across, Causes ofDisruption
- Relation to Blood Chemistry and Acid-BaseBalance
- Cerebral Protection
- Hypothermia
- Anesthetic and Adjuvant Drugs

Spinal Cord

- General Organization
- Spinal Reflexes
- Spinal Cord Tracts
- Evoked Potentials

Neuromuscular and Synaptic Transmission

- Morphology; Receptors, Receptor Density
- Membrane Potential; Mechanism
- Action Potential; Characteristics, Ion Flux
- Synapse; Transmitters, Precursors, Ions,Termination of Action,
- Transmission Characteristics, Presynaptic andPostsynaptic Functions
- Skeletal Muscle Contractions; Depolarization, Role of Calcium, Actin/Myosin; Energy Sourceand Release

Pain Mechanisms and Pathways

- Nociceptors and Nociceptive Afferent Neurons, Wind-Up Phenomenon
- Dorsal Horn Transmission and Modulation
- Spinal and Supraspinal Neurotransmission and Modulation; Opioid Receptors
- Autonomic Contributions to Pain; Visceral Pain Perception and Transmission
- Social, Vocational, and Psychological Influences on Pain Perception
- Gender and Age Differences in PainPerception

Autonomic Nervous System

- Sympathetic: Receptors; Transmitters, Synthesis; Storage; Release, Responses; Termination of Action
- Parasympathetic: Receptors; Transmitters; Synthesis; Release; Responses; Termination of Action
- Ganglionic Transmission
- Reflexes: Afferent and Efferent Limbs

Temperature Regulation

- Temperature Sensing; Central, Peripheral

- Temperature Regulating Centers; Concept ofSet Point
- Heat Production and Conservation
- Heat Loss; Mechanisms
- Body Temperature Measurement; Sites; Gradients
- Effect of Drugs/Anesthesia on TemperatureRegulation

Brain Anatomy

- Cerebral Cortex
- Cerebellum, Basal Ganglia, Major Nuclei, andPathways
- Brain Stem
- Respiratory Centers
- Reticular Activating System
- Cerebral Circulation; Circle of Willis, VenousSinuses, and Drainage

Spinal Cord and Spine Anatomy

- Variations in Vertebral Configuration
- Spinal Nerves (Level of Exit, Covering,Sensory Distribution)
- Blood Supply
- Sacral Nerves: Innervation of PelvicStructures
- Meninges: Epidural, Subdural, and Subarachnoid Spaces
- Parasympathetic Nervous System: Location of Ganglia, Vagal Reflex Pathways
- Sympathetic Nervous System: Ganglia, Rami Communicants, Sympathetic Chain
- Cranial Nerves
- Carotid and Aortic Bodies, Carotid Sinus
- Ganglia, Rami Communicants, SympatheticChain
- Nociception
- Peripheral Nociceptors: Transduction

- Afferent Pathways: Neurons, Dorsal Horn,CNS Pathways

RESPIRATORY SYSTEM

Physiology: Lung Functions and CellularProcesses

Lung Volumes & Mechanics

- Definitions; Methods of Measurement; Normal Values; Time Constants
- Spirometry; Static and Dynamic Volumes; Dead space; Nitrogen Washout, O2 Uptake,CO2 Production, Exercise Testing
- Static and Dynamic Compliance, Pleural Pressure Gradient, Flow-Volume Loops andHysteresis, Surfactant, Laplace Law
- Resistances; Principles of Gas FlowMeasurement
- Methods of Measurement
- Work of Breathing
- Regulation of Airway Caliber

Ventilation & Perfusion

- Distribution of Ventilation
- Distribution, Perfusion, ones, HypoxicPulmonary Vasoconstriction
- Alveolar Gas Equation

Diffusion

- Definition, Pulmonary Diffusion Capacity
- Apneic Oxygenation, Diffusion Hypoxia

Blood Gas

- O2 Transport; O2 Physical Solubility; Oxyhemoglobin (Hb-O2) Saturation, Hb-O2 Dissociation Curve; 2,3-Diphosphoglycerate (2,3-DPG), P50, Respiratory Enzymes; Hemoglobin (Hb) As A Buffer

- CO2 Transport; Blood CO2 Content; Carbonic Anhydrase; CO2 Dissociation Curve; Bohr Effect, Haldane Effect
- Systemic Effects of Hypercarbia andHypocarbia
- Systemic Effects of Hyperoxia and Hypoxemia
- Basic Interpretation of Arterial Blood Gas

Control of Ventilation

- Respiratory Center
- Central and Peripheral Chemoreceptors; Proprioceptive Receptors; Respiratory Muscles and Reflexes; Innervation
- CO2 and O2 Response Curves

Non-Respiratory Functions of Lungs:Metabolic, Immune

Perioperative Smoking

- Physiologic effects
- Cessation of smoking

Anatomy

- Nose
- Pharynx: Subdivisions; Innervation
- Larynx
- Innervation; Muscles; Blood Supply; Cartilages
- Vocal Cords, Positions with Paralysis
- Differences Between Infant and Adult
- Trachea
- Structure and Relationships in Neck andChest
- Muscles of Respiration, Accessory Muscles

Pharmacology

- Bronchodilators
- β-agonists

- Anticholinergics
- Anti-inflammatory medications
- Steroids
- Leukotriene modifier drugs
- Mast cell stabilizers
- Immunoglobulin E (Ig E) blockers

CARDIOVASCULAR SYSTEM

Physiology

- Cardiac Cycle
- Control of Heart Rate
- Synchronicity of Pressure, Flow, ECG, Heart Sounds, Valve Action
- Impulse Propagation
- Normal ECG
- Electrophysiology; Ion Channels and Currents
- Ventricular Function
- Frank-Starling Law; Preload and Afterload,

Intracardiac Pressures

- Force, Velocity, Length, Rate of Shortening
- Myocardial Contractility, MeasurementLimitations
- Cardiac Output: Determinants and Regulation
- Myocardial Oxygen Utilization
- Systolic and Diastolic FunctionCardiac Output: Fick Principle

Venous Return

- Vascular Compliance/Venous Capacitance;
- Muscle Action; Intrathoracic Pressure; BodyPosition
- Blood Volume and Distribution

Blood Pressure

- Systolic, Diastolic, Mean, and PerfusionPressures
- Intracardiac, Pulmonary, Venous
- Systemic and Pulmonary VascularResistance, Viscosity
- Baroreceptor Function

Microcirculation

- Capillary Diffusion; Osmotic Pressure, Starling's Law
- Pre-Post Capillary Sphincter Control
- Viscosity; Rheology

Regional Blood Flow and Its Regulation

- Cerebral and Spinal Cord
- Coronary
- Pulmonary
- Renal
- Splanchnic – Hepatic
- Muscle and Skin
- Uterine and Placental

Regulation of Circulation and Blood Volume

- Central: Vasomotor Center, Hypothalamic-Pituitary-Adrenal Axis
- Peripheral: Receptors and Reflexes
- Hormonal Control
- Mixed Venous Oxygen Tension andSaturation
- Basics of Cardiopulmonary Resuscitation; Medications, Defibrillators, Advanced CardiacLife Support (ACLS) Algorithms

Anatomy

- Normal Anatomy of Heart and Major Vessels
- Coronary Circulation
- Heart Conduction System
- Pharmacology
- Digitalis; Actions and Toxicity
- Inotropes
- Phosphodiesterase III Inhibitors (Ino dilators)Milrinone, Others
- Antiarrhythmics

- Antianginal Drugs
- Vasodilators: Nitroprusside, Nitroglycerin, Hydralazine, Nesiratide, Calcium Channel Blockers, Others
- Angiotensin Converting Enzyme Inhibitors andAngiotensin Blockers
- Electrolytes (Potassium, Magnesium,Phosphorus, Calcium):
- Non-Adrenergic Vasoconstrictors:Vasopressin and Congeners

GASTROINTESTINAL & HEPATOBILIARY SYSTEM

Physiology: Hepatic Function

- Dual Blood Supply and Its Regulation
- Metabolic and Synthetic Functions
- Excretory Functions
- Mechanisms of Drug Metabolism andExcretion, Cytochrome P450
- Hepatitis
- Coagulation System & Disorders
- Anesthesia for Colorectal Surgery, Hepatobiliary Surgery

RENAL & URINARY SYSTEMS/ ELECTROLYTE BALANCE

Physiology

- Blood Flow, Glomerular Filtration, TubularReabsorption and Secretion
- Renal Function Tests
- Hormonal Regulation of Extracellular Fluid
- Hormonal Regulation of Osmolality

- Regulation of Acid-Base Balance
- Drug Excretion
- Fluid & Electrolytes: Distribution andBalance; Compartments
- Renin-Angiotensin-Aldosterone System

Pharmacology

- Diuretics
- Mechanism of Action
- Comparison of Drugs
- Effect on Electrolytes and Acid-Base Balance
- Adverse Effects
- Dopaminergic Drugs

HEMATOLOGIC SYSTEM

Pharmacology

- Anticoagulants, Antithrombotic, and Anti-PlateletDrugs
- Mechanism of Action
- Comparison of Drugs
- Drug Interaction
- Monitoring of Effects
- Side Effects and Toxicity
- Alternatives to Transfusion: Hemodilution, Sequestration, Autotransfusion, Blood Substitutes, Erythropoietin
- Immunosuppressive and Anti-Rejection Drugs

Transfusions

- Indications
- Blood Preservation, Storage

- Blood Filters and Pumps
- Effects of Cooling and Heating; BloodWarmers
- Blood Components, Volume Expanders
- Preparation for Transfusion: Type and Cross, Type and Screen, Uncross-matched Blood, Autologous Blood, Designated Donors
- Synthetic and Recombinant Hemoglobin
- Transfusions Reactions
- Febrile
- Allergic
- Hemolytic: Acute and Delayed
- Complications of Transfusions
- Infections: Hepatitis, Human Immunodeficiency Virus (HIV), Cytomegalovirus (CMV), and Others
- Citrate Intoxication
- Electrolyte and Acid-Base Abnormalities
- Massive Transfusion: Coagulopathies,Hypothermia
- Pulmonary
- Transfusion-Related Acute Lung Injury
- Transfusion-Related Circulatory Overload
- Immunosuppression

ENDOCRINE & METABOLIC SYSTEMS

Physiology

- Hypothalamus, Pituitary; Thyroid; Parathyroid, Adrenal Medulla, Adrenal Cortex, and Pancreas
- Biochemistry of Normal Body Metabolism
- Carbohydrates
- Aerobic and Anaerobic Utilization; ChemicalProcesses, Enzymes
- Relationship to Hormones; Insulin; HumanGrowth Hormone,

- Glucocorticoids; Glucagon, Epinephrine
- Effect of Stress
- Proteins
- Functions, Hormones, Antibodies
- Cyclic Adenosine Monophosphate (CAMP); Cyclic Guanosine Monophosphate (CGMP)
- Lipids: Triglycerides, Lipoproteins, Cholesterol
- Specific Organ Metabolism (Brain, Heart,Liver, Muscles)

Neuromuscular diseases & disorders

- Physiology of Neuromuscular Transmission
- Prejunctional Events: Acetylcholine Synthesis and Release, Modulation by Nicotinic and Muscarinic Prejunctional Receptors
- Postjunctional Events: Acetylcholine Binding to Acetylcholine Receptors, Ion Flow ThroughAcetylcholine Receptor

ENHANCED RECOVERY AFTER SURGERY

ANESTHESIA FOR PAEDIATRIC & NEONATES

Respiratory

- Development, Anatomy, Surfactant
- Pulmonary Oxygen Toxicity
- Pulmonary Function
- Lung Volumes vs. Adult
- Airway Differences, Infant vs. Adult

Cardiovascular

- Transition, Fetal to Adult
- Persistent Fetal Circulation
- Retinopathy of Prematurity: Anesthetic Implications

- Metabolism, Fluid Distribution and Renal Function
- Thermal Regulation (Neutral Temperature, Nonshivering Thermogenesis)
- Fetal Hemoglobin
- Prematurity, Apnea of Prematurity
- Bronchopulmonary Dysplasia
- Congenital Heart and Major Vascular Disease
- Cyanotic Defects
- A cyanotic Defects
- Primary Pulmonary Hypertension
- Major Vascular Malformations: Coarctation, Persistent Patent Ductus Arteriosus, Vascular Rings.
- Altered Uptake/Distribution of IV and Inhalation Anesthetics
- Anesthetic Considerations
- Cardiac Surgery; Corrective and Palliative
- Noncardiac Surgery
- Chronic Congenital Heart Disease, Corrected,
- Uncorrected, and Palliated
- In Childhood Beyond the Newborn and Infant Periods
- In Adulthood
- Emergencies in the Newborn
- Diaphragmatic Hernia
- Tracheoesophageal Fistula and Esophageal Atresia
- Neonatal Lobar Emphysema
- Pyloric Stenosis
- Necrotizing Enterocolitis
- Omphalocele/Gastroschisis
- Respiratory Distress Syndrome: Etiology, Management, Ventilation Techniques

- Myelomeningocele
- Pediatric Medical Problems with Anesthetic Implications
- Respiratory: Upper Respiratory Infections (Colds, Epiglottitis, Laryngotracheobronchitis), Bronchopulmonary Dysplasia, Cystic Fibrosis
- Musculoskeletal: Muscular Dystrophies, Myotonias, Etc.
- Developmental Delay, Cerebral Palsy, Autism
- Childhood Obesity
- Endocrine Diseases: Childhood Diabetes, Congenital Adrenal Hyperplasia, Etc.
- Skeletal Abnormalities with or without Systemic Implications: Klippel-Feil, Achondroplasia, Marfan's, Morquio's, Osteogenesis Imperfect
- Trisomy 21 and Other Chromosomal Abnormalities
- Juvenile Rheumatoid Arthritis
- Anemias: Congenital and Acquired: Iron Deficiency, Physiologic Anemia, Sickle Cell, Thalassemia, Etc.
- Malignant Hyperthermia in Children; Susceptibility, Associated Diseases, Anesthetic Management of MH Susceptibility,
- Intraoperative Diagnosis, Treatment
- Anesthetic Implications for Common Non-neonatal Pediatric Subspecialty surgery

OBSTETRICS & GYNECOLOGY ANESTHESIA

- Obstetric Anesthesia
- Maternal Physiology
- Effects of Pregnancy on Uptake and Distribution
- Respiratory (Anatomy, Lung Volumes and Capacities, Oxygen Consumption, Ventilation, Blood Gases, Acid Base)
- Cardiovascular (Aorto-Caval Compression, Regulation of Uterine

Blood Flow)

- Renal
- Liver (Albumin/Globulin Ratio, Protein Binding of Drugs)
- Gastrointestinal (Gastric Acid, Motility, Anatomic Position, Gastroesophageal Sphincter Function)
- Hematology (Blood Volume, Plasma Proteins, Coagulation)
- Placenta
    - Placental Exchange - O2, CO2
    - Placental Blood Flow
    - Barrier Function
    - Maternal-Fetal Considerations
- Pharmacology
- Anesthetic Drugs and Adjuvants
- Oxytocic Drugs (Indications, Adverse Effects)
- Tocolytic Drugs (Indications, Adverse Effects)
- Antiseizure Drugs; Interactions (Magnesium Sulfate)
- Mechanisms of Placental Transfer, Placental Transfer of Specific Drugs
- Fetal Disposition of Drugs
- Drug Effects on Newborn
- Amniotic Fluid (Amniocentesis, Oligohydramnios, Polyhydramnios)
- Antepartum Fetal Assessment and Therapy (Ultrasonography, FHR Monitoring, Nonstress Test, Stress Test, Biophysical Profile)
- Anesthetic Techniques and Risks (Elective vs. Emergency, General vs. Regional)
- Systemic Medications: Opioids, Sedatives, Inhalational Agents
- Regional Techniques
- Epidural, Spinal, Combined Spinal/Epidural
- Paracervical Block, Lumbar Sympathetic Block, Pudendal Block

- Complications (Aspiration, Nerve Palsies)
- Physiology of Labor (Metabolism, Respiration, Cardiovascular, Thermoregulation)
- Influence of Anesthetic Technique on Labor
- Cesarean Delivery: Indications, Urgent/Emergent, Anesthetic Techniques and Complications
- Difficult Airway, Aspiration Prophylaxis
    - Pathophysiology of Complicated Pregnancy
- Anesthesia for Cervical Cerclage or Non-Obstetric Surgery
- Ectopic Pregnancy
- Spontaneous Abortion
- Gestational Trophoblastic Disease (Hydatid Mole)
- Autoimmune disorders (Lupus, Antiphospholipid Syndrome)
- Endocrine (Thyroid, Diabetes, Pheochromocytoma)
- Problems of Term and Delivery
- Intrapartum Fetal Assessment (Fetal Heart Rate Monitoring, Fetal Scalp Blood Gases, Fetal Pulse Oximetry)
- Preeclampsia and Eclampsia
- Supine Hypotensive Syndrome
- Aspiration of Gastric Contents
- Embolic Disorders (Amniotic Fluid Embolism, Pulmonary Thromboembolism)
- Antepartum Hemorrhage (Placenta Previa, Abruptio Placenta, Uterine Rupture)
- Postpartum Hemorrhage (Uterine Atony, Placenta Accreta)
- Hypertensive Disorders of Pregnancy
- Cord Prolapse
- Retained Placenta

- Dystocia, Malposition, and Malpresentation (Breech, Transverse Lie)
- Maternal Cardiopulmonary Resuscitation
- Fever and Infection
- Preterm Labor
- Vaginal Birth After Cesarean Section (VBAC)
- Multiple Gestation
- Resuscitation of Newborn
- Apgar Scoring
- Umbilical Cord Blood Gas Measurements
- Techniques and Pharmacology of Resuscitation
- Intrauterine Surgery (Maternal and Fetal Considerations, Intrauterine Fetal Resuscitation

- **SPECIAL PROBLEMS/ ISSUES IN ANESTHESIOLOGY**
- Physician Impairment or Disability: Substance Abuse, Fatigue, Aging, Visual and Auditory Impairment.
- Ethics, Practice Management, andMedicolegal Issues
- Professionalism and Licensure
- Ethics, Advance Directives / Do Not Resuscitate (DNR) Orders; Suspended DNR,Patient Privacy Issues.
- Informed consent (principles, components)
- Patient Safety
- Medication Errors: Assessment and Prevention
- Disclosure of Errors to Patients
- Core Competencies

ADVANCED TOPICS IN ANESTHESIOLOGY

A. Basic Sciences

- Physics, Monitoring, and Anesthesia DeliveryDevices

- Monitoring Methods
- Vascular Pressures: Arterial (Invasive/Noninvasive Differences), Central Venous (CVP), Pulmonary Arterial (PAP), Pulmonary Artery Occlusion (PAOP), Left Atrial (LAP), Left Ventricular End-Diastolic (LVEDP)
- Heart Function: Heart Tones, Electrocardiogram (ECG), Echocardiography,Doppler, Cardiac Output
- Brain and Spinal Cord Function: Electroencephalogram (EEG) (Raw and Processed), Depth of Anesthesia Monitors (Bi Spectral index, Other), Evoked Potentials, Wake- Up Test, Intracranial Pressure (ICP), Jugular Venous Oxygen Saturation, Near Infrared Spectroscopy (Cerebral Oximetry), Transcranial Doppler
- Mixed Venous Oxygen Saturation (SvO2)
- Awareness Monitors
- Instruments/ Equipment
- Cardiac Output: Fick, Dye Dilution, Thermodilution, Doppler, Impedance, PulseWave Analysis, Stoke Volume Assessment
- Echocardiography: Technical Aspects,Complications
- Coagulation Monitors
- Ultrasound-Guided Placement of Invasive Catheters (Arterial, Central Venous) and Nerve Blocks
- Ventilators
- Continuous Positive Airway Pressure (CPAP) and Positive End-Expiratory Pressure (PEEP);Nasal CPAP
- Nebulizers, Humidifiers, Drug Delivery Systems (Nitric Oxide, Others)
- Pacemakers
- Temporary Transvenous; Permanent (Epicardial, Endocardial), Transcutaneous

- Types: Fixed Rate, Biventricular Synchronized, Ventricular, Atrial,Atrioventricular (A-V) Sequential
- Standard Nomenclature
- Reasons for Failure or Malfunction
- Electrical; Fire and Explosion Hazards
- Basic Electronics
- Lasers, Laser Safety, Laser-Safe EndotrachealTubes
- Drug Delivery Devices: Patient-Controlled Intravenous and Epidural Analgesia, Epidural and Subarachnoid Continuous Drug Delivery Devices
- Pharmacology
- General Concepts
- Pharmacogenetics

B.Clinical Sciences

- Malignant Hyperthermia (Including Diagnosisand Therapy)
- Butyrylcholinesterase (Pseudocholinesterase)Deficiency
- Prolonged Qt Syndrome
- Genetic Factors in Drug Dose-ResponseRelationships
- Addiction: Physiology and Pharmacology, Patient Addiction: Anesthetic Implications, Addiction vs. Tolerance
- Clinical Sciences: Anesthesia Procedures, Methods, and Techniques
- Regional Anesthesia. Peripheral and Autonomic Nerve Blocks: Indications, Contraindications, Techniques,Clinical Assessment, Complications, Use ofNerve Stimulators, Use of Ultrasound, Head and Neck, Upper Extremity/Brachial Plexus, Trunk and Perineum, Lower Extremity
- Special Techniques

- Controlled Hypotension; Choice of Drugs, Useof Posture, Ventilation
- Controlled Hypothermia; Techniques, Systemic Effects, Shivering, Rewarming,
- Complications
- Hyperbaric Oxygen and Anesthesia Care
- High Altitude Anesthesia
- Organ-Based Advanced ClinicalSciences
- Central and Peripheral Nervous Systems
- Physiology
- Metabolism: Substrates, Aerobic andAnaerobic
- Intracranial Pressure
- Brain Volume, Elastance, and Compliance
- Increased ICP, Herniation
- Electroencephalography (EEG)
- Wave Patterns, Frequency, and Amplitude,
- Raw and Processed, Spectral Edge
- Sleep, Convulsions; O2 and CO2;
- Hypothermia; Brain Death
- Depth of Anesthesia; Burst Suppression, Electrical Silence, Specific Anesthetic andDrug Effects
- Evoked Responses
- Morphology, Effects of Ischemia andAnesthetics
- Sensory: Somatosensory, Visual, BrainstemAuditory Motor
- Anatomy
- 1) Regional Anesthesia; Main Nerve Blocks (Includes Techniques and Comparisons ofTechniques)
- Autonomic: Stellate, Celiac, LumbarSympathetic
- Head and Neck: Retrobulbar/Peribulbar, Facial, Trigeminal Nerve and Branches, Cervical Plexus, Glossopharyngeal, Superior Laryngeal, Transtracheal, Occipital

- Extremities: Brachial Plexus (Interscalene, Supraclavicular, Infraclavicular, Axillary), Ulnar, Radial, Median, Musculocutaneous, Sciatic, Femoral, Lateral Femoral Cutaneous,Obturator, Lumbar Plexus (PSOAS Block),
- Popliteal Fossa, Ankle Block
- Trunk: Intercostal, Paravertebral Somatic, Ilio-
- Inguinal, Genito-Femoral
- Spine: Epidural (Cervical, Thoracic, Lumbar,Caudal, Transforaminal), Spinal (Subarachnoid), Combined Spinal-Epidural
- Pharmacology
- CNS Drugs for Non-Anesthetic Use (MajorActions, Comparison of Drugs; Effect on Respiration; Circulation, Adverse Effects)
- Pre- and Postanesthetic Medications
- Opioids
- Opioid Antagonists, Agonist-Antagonists
- Alpha-2 Agonists: Clonidine,Dexmedetomidine
- Tranquilizers: Butyrophenones;
- Benzodiazepines
- Anticonvulsants: Phenytoin, Carbamazepine,
- Gabapentin, Barbiturates, Others
- Antidepressants, Anti-Parkinson Drugs
- Reversal Agents: Physostigmine,
- Benzodiazepine Antagonists
- Antiemetics and Aspiration Prophylaxis: Phenothiazines; Butyrophenones; Metoclopramide; Anticholinergics; Serotonin Antagonists, Antihistamines (H1 Blockers, H2Blockers, Mixed Blockers), Antacids, Proton Pump Inhibitors
- Substance Abuse and Addiction; Dependence
- Chronic Opioid Dependence and Therapy
- Pharmacologically-Assisted Opioidwithdrawal

- Autonomic Drugs
- Sympathetic
- Transmitters and Types of Receptors
- Target Organ Effects; Metabolic Effects
- Agonists: Peripheral and Central Actions, Direct and Indirect Actions, Alpha vs. Beta vs.Mixed Agonists, Alpha and Beta-Receptor Subtype Selective Agonists
- Antagonists: Alpha and Beta Blockers,
- Selective Blockers, Ganglionic Blockers
- Tocolytic Applications
- Parasympathetic
- Transmitters
- Muscarinic Effects
- Nicotinic Effects
- Agonists: Cholinergic and Anticholinesterases
- Antagonist
- Seizures
- Coma: Traumatic, Infectious, Toxic-Metabolic,Cerebrovascular Accident (CVA), Cerebral Hypoxia
- Glasgow Coma Scale, Management ofTraumatic Brain Injury
- Therapeutic Barbiturate Coma
- Drug Intoxication (CNS Drugs, CarbonMonoxide, Insecticides, Nerve Gases
- Paraplegia, Quadriplegia, Spinal Shock,
- Autonomic Hyperreflexia
- Airway Management in the Patient withCervical Spine Disease
- Tetanus
- **Special Problems of Anesthesia forNeurosurgery**
- Increased Intracranial Pressure: Tumors,

- Hematomas, Hydrocephalus
- Positioning: Prone, Sitting, Other, HeadStabilization in Tongs
- Air Embolism
- Cerebral Protection from Hypoxia, Ischemia,and Glucose Effects
- Aneurysms and A-V Malformations, CerebralVasospasm
- Interventional Neuroradiology; Coils andEmbolization
- Pituitary Adenomas, Trans-SphenoidalHypophysectomy
- Anesthetic and Ventilatory Effects on CerebralBlood Flow and Metabolism
- Fluid Management: Hypertonic Vs IsotonicSaline vs. Balanced Salt Solutions
- Spinal Fluid Drainage
- Stereotactic and Gamma-Knife Techniques,Deep Brain Stimulator Placement, Intra-
- Operative Wake-Up Techniques
- Ventriculostomy
- Awake Craniotomy
- **Respiratory System**
- Physiology: Lung Functions and CellularProcesses
- Measurement of Ventilation/Perfusion (V/Q) Ratio, Implications of Alveolar-Arterial O2 Gradient (A-aDO2), Arterial-Alveolar CO2 Gradient (AaDCO2), Dead Space to Tidal Volume Ratio (Vd/Vt), Shunt Fraction (Qs/Qt),
- Lung Scan
- Anatomy: Lungs, Divisions and Bronchoscopy Anatomy, Bronchial and Pulmonary Circulations,
- Biochemistry
- Normal Acid-Base Regulation: Buffer Systems; Compensatory Mechanisms;
- Effects of Imbalance on Electrolytes andOrgan Perfusion;

- Strong Ionic Difference (SID)
- ABG interpretation
- Anion Gap;
- Temperature Effect on Blood Gases: Alpha-Stat vs. pH-Status
- Upper Airway Obstruction: Congenital, Infectious, Neoplastic, Traumatic, Foreign Body,
- Obstructive Sleep Apnea
- Tracheobronchial Diseases: Congenital, Infectious,
- Parenchymal Diseases: Asthma, Bronchitis, Emphysema, COPD, Lung Abscess, Bronchiectasis, Cystic Fibrosis, Mediastinal Masses,
- Restrictive Lung Disease
- Neurologic: CNS Depression, Spinal CordDysfunction, Peripheral Nervous System
- Musculoskeletal: Muscular, Skeletal, Obesity,
- Chest Trauma
- Parenchymal: Pleural and Mediastinal: Pneumo-, Haemo-, and Chylothorax, Pleural Effusion, Empyema, Atelectasis, Pneumonia, Interstitial Pneumonitis, Pulmonary Fibrosis, Respiratory Distress Syndrome (ARDS), Bronchopulmonary Dysplasia
- Bronchopleural Fistula
- Other: Pain, Abdominal Distention
- **Management of the Patient with RespiratoryDisease**
- Evaluation: History and Physical Examination,Chest X-Ray, Arterial
- Blood Gases (ABGs), Pulmonary Function Tests (PFTs);
- Assessment of Perioperative Risk
- Anesthetic Management
- Preoperative Preparation: Respiratory Therapy, Drug Therapy
- (Antibiotics, Bronchodilators, Mucolytics, Steroids), Tobacco
- Smoking Cessation (Techniques toAssist Patients, Benefits)

- Intraoperative Management
- Monitoring
- Choice of Anesthesia
- Anesthetic Techniques: Non-pulmonary Surgery, Thoracic and
- Pulmonary Surgery,One-Lung Ventilation, Thoracoscopic
- Techniques, Lung Transplantation,
- Mediastinoscopy
- Postoperative Care: Pain Management,
- Respiratory Therapy, Ventilator Support,
- Extubation Criteria
- Management of Respiratory Failure,
- Non-ventilatory Respiratory Management: O2Therapy and Toxicity,
- Tracheobronchial Toilet, Positive AirwayPressure,
- Respiratory Drugs

Ventilatory Management

- Criteria for Ventilatory Commitment andWeaning
- Mode of Ventilation: Conventional Mechanical Ventilation, Peep, CPAP, IMV, SIMV, Pressure Support, Pressure Control, High-Frequency Ventilation (Positive Pressure, Jet, Oscillation), Prone Ventilation, BIPAP, AirwayPressure-Release Ventilation
- Complications and Side Effects of MechanicalVentilation: Volu trauma, Barotrauma,
- Biotrauma
- Management of Bronchospasm: Bronchodilator Drugs, Anti-InflammatoryDrugs, Acute, and Chronic Management,
- Perioperative Management
- Other Management Adjuncts: Nitric Oxide,
- Lung Transplantation: Anesthetic Implications
- **Cardiovascular System**
- Normal Anatomy of Heart and Major Vessels

- Echocardiographic Heart Anatomy:Chambers, Valves, Great Vessels,
- Pericardium, Basic TransesophagealEchocardiography (TEE) Views
- Radiographic: Roentgenograms, CT, MRI
- Ischemic Heart Disease
- Risk Factors; Predictors of Perioperative Risk,Modification of Perioperative Risk (e.g., Prophylactic Beta-Blockers)
- Manifestations
- Diagnosis of Myocardial Infarction and Acute Coronary Syndrome; Clinical, ECG, Enzymes,Echocardiography, Nuclear Techniques,
- Classification of types of MI (STEMI vs.demand)
- Pharmacological Treatment of Angina, Thoracic Epidural for Angina, InterventionalCardiologic Techniques
- Determinants of Myocardial Oxygen Requirements and Delivery, Silent Ischemia,
- Postoperative Ischemia
- Perioperative Diagnosis and Treatment ofIschemia; ECG, TEE
- Coronary Artery Bypass Procedures;Cardiopulmonary Bypass; of F-PumpTechniques
- Valvular Heart Disease
- Classification
- Diagnosis (Including Echocardiography),
- Natural History, Surgical Management
- Anesthetic Considerations
- Subacute Bacterial Endocarditis Prophylaxis
- Rhythm Disorders and Conduction Defects
- Chronic Abnormalities: Etiology, Diagnosis, Therapy
- Automated Implantable Cardioverter/Defibrillator (AICD) Implantation

- Pacemakers: Permanent, Temporary, Transvenous, Transcutaneous; VentricularSynchronization
- Ablations, Cryotherapy, Maze Procedure
- Perioperative Dysrhythmia: Etiology, Diagnosis, Therapy
- Perioperative Implications of Pacemaker andAICD
- Heart Failure and Cardiomyopathy (Ischemic,Viral, Hypertrophic)
- Definition and Functional Classification,
- Perioperative Diagnosis and Treatment
- Compensatory Responses
- Right or Left Ventricular Dysfunction
- Etiology
- Signs and Symptoms
- Diagnostic Tests
- Systolic vs. Diastolic Dysfunction
- Treatment
- Pulmonary Edema
- Pulmonary Hypertension
- Cardiogenic Shock
- Cardiac Transplantation
- Cardiac Tamponade and ConstrictivePericarditis
- Etiology
- Diagnosis; TEE, PA Catheter
- Anesthetic Management
- Circulatory Assist
- Cardiopulmonary Bypass
- Components (Pump, Oxygenator, HeatExchanger, Filters)
- Cardiopulmonary Bypass Techniques
- Mechanisms of Gas Exchange
- Priming Solutions, Hemodilution

- Anticoagulation and Antagonism; Activated Clotting Time (ACT) and Other Clotting Times, Heparin Assays, Antithrombin III, Protamine Reactions, Heparin and Protamine Alternatives
- Prophylaxis with Aminocaproic Acid,
- Tranexamic Acid
- Anesthetic Considerations During Bypass
- Extracorporeal Membrane Oxygenation(ECMO)
- Cooling and Warming, Deep HypothermicCirculatory Arrest
- Monitoring, Blood Pressure Management
- Minimally Invasive Bypass Techniques
- Myocardial Preservation: Physiology,
- Techniques, Complications
- Preconditioning
- Minimal Invasive Cardiac Surgery
- Off-pump coronary artery bypass (OPCAB)
- Minimally invasive direct coronary arterybypass (MIDCAB)
- Percutaneous valve repair/replacement
- Intraortic Balloon: Rationale, Indications,
- Limitations
- Ventricular Assist Devices and Artificial Heart:Internal and External
- Pulmonary Embolism
- Etiology: Blood, Air, Fat, Amniotic Fluid
- Diagnosis, TEE Findings
- Treatment; Acute, Preventive
- Hypertension
- Etiology, Pathophysiology, Course of Disease
- Drug Treatment, Interactions with Anesthetics,
- Risk of Anesthesia
- Intra or Postoperative Hypertension;Differential Diagnosis and Treatment

- Shock States: Anesthetic Management of Patientin Shock
- Vascular Diseases
- Cerebral Circulation; Luxury Perfusion, Steals,
- Infarcts, Intracranial Hemorrhage
- Carotid Endarterectomy: Anesthetic Management, Monitoring of CerebralPerfusion, Complications
- Abdominal Aneurysm Resection: AnestheticManagement
- Peripheral Arteriosclerotic Disease
- Aneurysms of Ascending, Descending and Arch of Aorta, Thoracoabdominal Aneurysms,Including Endovascular Repair Techniques
- **Cardiopulmonary Resuscitation**
- Recognition
- Management - Drugs, Defibrillators, Monitors, Advanced Cardiac Life Support (ACLS)
- Algorithms
- Complications and Outcomes of Therapy
- Pediatric/Adult Differences
- **Gastrointestinal/Hepatic Systems**
- Biochemistry: Nutrition
- Parenteral: Peripheral or Central Vein, Hyperalimentation, Solutions Used andComplications, Anesthetic Implications
- Enteral: GI Elemental Diets, Routes ofDelivery, Complications, Anesthetic Implications
- Clinical Science
- Morbid Obesity/Anesthesia for Bariatric Surgery
- Pre-Anesthetic Evaluation and Management
- Pharmacologic Considerations
- Anesthetic Management (Airway, Ventilation,Monitoring, Venous Access)

- Postoperative Management (Ventilation,Analgesia)
- Hepatic Disease
- Preoperative Laboratory Assessment
- Anesthesia Choice (Hepatocellular Disease,Ascites, Portal Hypertension)
- Postoperative Hepatic Dysfunction, HepaticFailure, Hepatorenal Syndrome
- Hepatic Transplantation
- Intestinal Obstruction
- Causes; Paralytic Ileus; Mechanical; Vascular
- Physiological Changes; Fluid and Electrolyte;
- Respiratory
- Anesthesia Management: Full Stomach; FluidTherapy; Nitrous Oxide
- **Renal and Urinary Systems/ ElectrolyteBalance:** Clinical Science
- Renal disease
- Pathophysiology of Renal Disease; RiskFactors for Acute Renal Failure
- Anesthetic Choice in Reduced Renal Function
- Anesthetic Management in Renal Failure,Arteriovenous (A-V) Shunts
- Anesthetic Management in RenalTransplantation
- Perioperative Oliguria and Anuria
- Dialysis and Hemofiltration: Hemodialysis, Peritoneal Dialysis, Continuous Hemofiltration (Arteriovenous, Veno venous)
- Pharmacologic Prevention and Treatment of Renal Failure
- Urologic Surgery - Lithotripsy, TransurethralResection of Prostate (TURP)/Irrigating Fluids/Hyponatremia
- Perioperative Electrolyte Abnormalities
- **Hematologic System & Disorders**

- Anemias; Compensatory Mechanisms
- Polycythemias; Primary vs. Secondary
- Coagulopathies
- Thrombocytopenia and Thrombocytopathy
- Congenital and Acquired Factor Deficiencies
- Disseminated Intravascular Coagulation
- Fibrinolysis
- Pharmacologic: Anticoagulants andAntagonists
- Coagulopathy in Trauma Patients
- Hemoglobinopathies, Porphyrias
- **Massive Transfusion Protocol**
- **Endocrine and Metabolic Systems**: ClinicalScience
- Pituitary Disease
- Hypopituitarism, Pituitary Removal -
- Substitution Therapy
- Panhypopituitarism
- Diabetes Insipidus
- Hyperpituitarism
- Acromegaly, Including Airway Management
- Inappropriate ADH Secretion
- **Thyroid Disease**
- Hyperthyroidism
- Metabolic and Circulatory Effects
- Anesthetic Management
- Thyroid Storm
- Hypothyroidism
- Metabolic and Circulatory Effects, MyxedemaComa
- Substitution Therapy
- Anesthetic Implications

- Complications of Surgery: Hypocalcemia, Recurrent Laryngeal Nerve Injury, Diagnosis andTreatment
- **Parathyroid Disease**
- Hyperparathyroidism; Physiological Effects
- Hypoparathyroidism; PostoperativeManifestations and Treatment
- **Adrenal Disease**
- Cushing's Syndrome
- Primary Aldosteronism
- Addison's Disease
- Pheochromocytoma
- Circulatory and Metabolic Manifestations
- Diagnosis
- Anesthetic Management
- **Carcinoid Syndrome**
- **Diabetes Mellitus**
- Pathophysiology
- Control of Blood Glucose - Hypoglycemia;Hyperglycemia and Ketoacidosis
- Elective Anesthesia - PerioperativeManagement
- Emergency Anesthesia
- Hyperosmolar Coma
- Pancreas Transplantation
- **Neuromuscular diseases and Disorders**: Clinical Science
- Demyelinating Diseases
- Multiple Sclerosis
- Motor Neuron Diseases: Amyotrophic LateralSclerosis, Spinobulbar Muscular Atrophy, Hereditary Spastic Paraplegia
- Guillain-Barre Syndrome
- Charcot-Marie-Tooth Disease

- Primary Muscle Diseases
- Muscular Dystrophies: Duchenne's, Becker's,Limb-Girdle, Congenital, Myotonic
- Mitochondrial Myopathies
- Channelopathies
- Myasthenic Syndromes
- Myasthenia Gravis
- Lambert-Eaton Myasthenic Syndrome
- Congenital Myasthenic Syndromes
- Ion Channel Myotonias
- Acquired Neuromyotonia
- Myotonia Congenita
- Hyperkalemic Periodic Paralysis, Para myotonia Congenita, Potassium-Aggravated Myotonia
- Hypokalemic Periodic Paralysis

Clinical Subspecialties

- **Painful Disease States**
- Pathophysiology
- Acute Pain
- Cancer-Related Pain
- Chronic Pain States
- Acute and Chronic Neck and Low Back Pain
- Neuropathic Pain States
- Complex Regional Pain Syndrome, Types Iand II
- Postherpetic Neuralgia
- Phantom Limb, Post-Stroke
- Peripheral Neuropathies (e.g., DiabeticNeuropathy)
- Somatic Pain Conditions: Myofascial Pain,Facet Arthropathy, etc.
- **Treatment**
- Acute Postoperative and Posttraumatic Pain

- Postoperative Epidural Analgesia
- Neuraxial Opioids
- Peripheral Nerve Blockade and Catheters
- Patient-Controlled Analgesia
- Other Modalities, Multimodal Analgesia (Nonsteroidal Analgesics, Electrical Stimulation, Acupuncture, Ketamine, etc.)
- Cancer-Related Pain
- Systemic Medications, Tolerance andAddiction
- Continuous Spinal and Epidural Analgesia
- Neurolytic and Non-Neurolytic Blocks
- World Health Organization Analgesic Ladder
- Chronic Pain (Non-Cancer-Related)
- Systemic Medications: Nonsteroidal Anti- Inflammatory Drugs (NSAIDs), Opioid Analgesics, Anticonvulsants, Antidepressants
- Spinal and Epidural Analgesia
- Peripheral Nerve Blocks
- Sympathetic Nerve Blocks
- Other Techniques: TENS, Spinal Cord Stimulation, Neurulations (Surgical andChemical Neurolysis
- **Otolaryngology:** Cleft Lip and Palate, Tonsillectomy and Adenoidectomy, CommonEar Procedures, Peritonsillar Abscess, Flexible and Rigid Bronchoscopy, Diagnosticand Therapeutic Laryngoscopy Techniques (Jet Ventilation, Laser Implications), Airway Foreign Bodies
- Otorhinolaryngology (ENT) Anesthesia: Airway Endoscopy; Micro laryngeal Surgery; Laser Surgery, Hazards, Complications (Airway Fires, Etc.)
- **Neurosurgery:** Craniotomies for Tumor orVascular Malformations, Hydrocephalus, Ventriculoperitoneal Shunts,

CraniofacialProcedures, Tethered Spinal Cord, Halo Placement Implications

- **Thoracic Surgery:** Anterior Mediastinal Mass, Lung Isolation Techniques, Pectus Excavatumand Carinatum
- **General and Urologic Surgery**: Laparotomy vsLaparoscopy, Bowel Surgery, Urologic Surgery (Wilms Tumor, Ureteral Reimplantation, Bladder and UrethralMalformations, Neuroblastoma)
- **Orthopedic Surgery**: Fractures and Dislocations, Congenital Hip Dysplasia, Footand Hand Malformations; Scoliosis Implications and Repair
- Orthopedic Anesthesia; Tourniquet Management, Complications, Regional Vs. General Anesthesia
- **Ophthalmologic**: Strabismus, Cataract,Glaucoma Procedures, Etc.
- Ophthalmologic Anesthesia, Retrobulbar and Peribulbar Blocks; Open Eye Injuries
- **Outpatient Pediatric Anesthesia**
- Indications and Contraindications
- Anesthetic Considerations: Premedication,Induction, Maintenance, Monitoring
- Postoperative Considerations: Recovery Period, Discharge Criteria, Post-DischargeMonitoring/Follow-Up
- Postoperative Analgesia
- Systemic Medications and Routes ofAdministration, Multimodal Therapy
- Regional Techniques: Caudal, Epidural, NerveBlocks
- Postoperative Nausea and Vomiting: RiskFactors, Prophylaxis, Treatment
- Pediatric Sedation: Guidelines, Pharmacology,Credentialing, Indications, Monitoring, Complications

- Pediatric Anesthesia Outside the Operating Rooms: Diagnostic and Interventional RadiologicProcedures, Gastroenterology Laboratory, MRIs,Radiation Therapy
- Anesthesia for Plastic Surgery, Liposuction
- Anesthesia for Laparoscopic Surgery; Cholecystectomy; Gynecologic Surgery; GastricStapling; Hiatus Hernia Repair; Anesthetic Management; Complications
- **Trauma Anesthesia**
- Massive Trauma
- Evaluation of the Trauma Patient
- Hemorrhagic Shock
- Burn Management
- Mass Casualty
- Crisis Management and Teamwork
- Biological Warfare
- **Anesthesia for Ambulatory Surgery**
- Patient Selection and PreoperativeManagement
- Anesthetic Management
- Discharge Criteria and Postoperative Follow-
- Up, Including Continuous Nerve Blocks
- **Office-Based Anesthesia:** Equipment, Safety,Organization, Patient Management
- **Geriatric Anesthesia:**
- Pharmacological Implications, MAC Changes
- Physiological Implications: CNS, Circulatory,Respiratory, Renal, Hepatic
- **Critical Care**
- Shock Types
- Etiology, Classification, Pathophysiology
- Septic Shock and Life-Threatening Infection

- Systemic Inflammatory Response Syndrome
- Multiple Organ Dysfunction Syndrome
- Poisoning and Drug Overdose
- Near-Drowning
- Infection Control
- **General and Universal Precautions**
- Needle Stick Injury
- Catheter Sepsis
- **Nosocomial Infections**
- Antibiotics: Antibacterial, Antifungal, Antiviral,Antiparasitic; Antimicrobial Resistance e.
- **Ventilator Management**
- Volume Controlled; Pressure Controlled; PEEP, Inspired Oxygen Concentration; TidalVolume
- Pressure Support; Weaning
- **Special Problems or Issues inAnesthesiology**
- Electroconvulsive Therapy
- Organ Donors: Pathophysiology and ClinicalManagement
- Radiologic Procedures; CT-Scan; MRI-Anesthetic Implications/Management, Anesthesia in Locations Outside the Operating Rooms
- Ethics, Practice Management, andMedicolegal Issues
- Professionalism and Credentialing, Licensure
- Ethics, Advance Directives/Do Not Resuscitate (DNR) Orders; Patient PrivacyIssues
- Malpractice: Definition, Legal Actions and Consequences, National Practitioner Database, Closed Claims Findings, AnestheticAccidents, Professional Liability Insurance
- Practice Management; Medicare/MedicaidRequirements

- Primary Certification, Recertification, Maintenance of Certification and RelatedIssues (Professional Standing, Lifelong Learning, Cognitive Knowledge, Clinical Practice Assessment, Systems-BasedPractice)
- Costs of Medical/Anesthesia Care, OperatingRoom Management
- Patient Safety
- Definitions: Medical Error, Adverse Event,Sentinel Event
- Medication Errors: Assessment andPrevention
- Reporting: Mandatory and Voluntary Systems,Legal Requirements
- Disclosure of Errors to Patients
- Safety Practices: Process-Based, Evidence-Based
- Root Cause Analysis
- Quality Improvement
- Quality Improvement Basics: Design, Analysis, Implementation of Quality Improvement Project Anesthesia Quality Institute; Data Entry; Information
- Lean Six Sigma; Assessing QI Methods;
- Approach
- Physician Quality Reporting System:
- Significance and Role in Practice
- Barriers to Quality Improvement

SECTION D
PROGRAM FORMAT

SCHEME OF THE COURSE OF MS PROGRAMME

4-year plan as in the curriculum

Year I

Outcomes	Contents Covered	T&L method
ClinicalSkills	ASA I-II elective and emergency minor, moderate and major surgeries	• History taking, • physical examination, interpretation of investigation, including radiology,CXR, X-ray cervical spine, CT , MRI sacns • Management of concurrent illness&medications for pre-op. assessment with relevance to anesthesia, advice on pre-opmedications, & preparation • Decision making on referral/consult

		• Risk assessment, Plan & Anesthesia administration, Recovery andPost-op care • Crisis Management & Resuscitation • Documentation of • Records
Communication & Counseling Skills	ASA I -II, Elective & Emergency inMinor, Moderate andMajor Surgeries	• Counsel all patients and their relatives about the anesthetic interventions in minor & moderatesurgeries • Communicate with colleagues of related disciplines about the techniques, risks and intervention • in major and

		complicated surgeries • Obtain Informedconsent • Counsel on crisis, managementof complications • Presentation Skills
Pain Management	Acute Pain Management	• Post-operative Systemic Epidural / Caudal Patient Controlled Analgesic Nerve

		Blocks / Ultrasound guided • Epidural for Labour Analgesia
Procedural Skills	Intra - Vascular Access and Interpretation of Graphs	• Peripheral I/V cannulation • Central I/V cannulation • Arterial cannulation

	• Airway Management	• Mask, GuedelAirway, Nasal airways • Supra glotticDevices • EndotrachealIntubation • (Mallampati I, II, III& IV) • CricothyroidotomyPercutaneous Dilatational Tracheostomy Video Assisted Intubation Bronchoscopy Thoracostomy
	• Regional Techniques	• Sub-arachnoidBlock • Epidural /Caudal • Combined Spinal Epidural

	Peripheral nerve Blocks	• Brachial PlexusBlocks • Wrist Block • Intercostal Block • TAP Block • Sciatic Block • Three in OneBlock • Popliteal Block • Biers Block • Ankle Block
	Use of Anesthesia Equipment& Sundries	Use of Monitors & interpretation of information Oximetry, Capnography, NIBP, ECG, Temperature, Peripheral Nerve Stimulator

Year II

Outcomes	Contents covered	T&L method
ClinicalSkills	ASA I-II elective and emergency in minor, moderate and major surgeries	• History taking, physical examination, interpretation of investigation, including radiology for CXR& X-ray cervical spine • Management of concurrent illness and medications for pre-op. assessment with relevance to anaesthesia, advice on pre-op medications, & preparation • Decision making on referral/consult
		• Risk assessment, Anaesthesia Plan & administration of Anaesthesia • Recovery andPost-op care • Crisis Management & Resuscitation • Documentation of • Records
Communication & CounselingSkills	ASA I -II, Elective & Emergency in Minor, Moderate andMajor Surgeries	• Counsel all patients and their relatives about the anesthetic interventions in minor & moderate surgeries • Communicate with colleagues of related disciplines about the techniques, risks and

		• intervention inmajor and complicated surgeries • Obtain Informedconsent • Counsel on crisisand management of complications • Presentation Skills
Pain Management	Acute Pain Management	• Post-operative Systemic Epidural Caudal Patient Controlled Analgesia, Ultrasound guided nerve blocks • Epidural for Labour Analgesia

ProceduralSkills	• Intra - Vascular Access and graphs interpretation • Airway Management	• Peripheral I/V cannulation • Central I/V cannulation • Arterial cannulation • Mask, GuedelAirway, Nasal airways • Supra glotticDevices • Endotracheal Intubation(Mallampati I, II, III & IV) • Cricothyroidotomy ,Percutaneous Dilatational • Tracheostomy, Video Assisted Intubation, Bronchoscopy Thoracostomy

	Regional Techniques Peripheral Nerve Blocks IVRA	• Sub- arachnoidBlock • Epidural /Caudal • CombinedSpinal Epidural • Brachial Plexus Blocks • Wrist Block • IntercostalBlock • TAP Block • Sciatic Block • Three in OneBlock • Popliteal Block, Ankle block • Biers Block

	Use of Anesthesia Equipment & Sundries	Use of Monitors& interpretationof information Oximetry, Capnography, NIBP, ECG, Temperature,Peripheral Nerve Stimulator

- Up to the end of 2nd year synopsis should be submitted.

Year III

Outcomes	Contents covered	T&L method
Clinical skills	• ASA I-V, • Elective & Emergency in Minor, Moderate and Major Surgeries	• History taking, Physical Examination, Interpretation of Investigations, including Radiology for CXR and X-ray Cervical Spine, CT Scan , MRI scan
		• Management of Concurrent illness and medications for Pre-op. assessment with relevance to anesthesia advice on Pre-op medications, & preparation • Decisions making on referral / consultation • Risk assessment, Anesthesia Plan & Administration of Anesthesia • Recovery andPost-op Care • Crisis Management & Resuscitation • Documentation ofRecords
Communication& Counseling Skills	ASA I-V Elective & Emergencyin Minor, Moderate and Major Surgeries	• techniques, risks and intervention inmajor and complicated surgeries • Obtain Informedconsent • Counsel on crisisand managementof complications • Presentation Skills

Pain Management	• Acute Pain Management • Chronic Pain Management • Fluoroscopy	• post-operative • Systemic • Epidural / Caudal • Nerve Blocks / Ultra sound guided • Epidural for Labor analgesia • Blocks underimaging • TENS • Radiofrequency
Procedural Skills	Intra-Vascular Access & Interpretation of graphs	• Central I/V • Cannulation • Arterial cannulation, Pulmonary Artery Catheterization

Procedural Skills	Airway Management of ASA I-V,Elective / Emergency in all major /complicated surgeries.	• Endotracehal Intubation (Mallampati I & IV) • Cricothyroidotomy Percutaneous Dilatational Tracheostomy Video Assisted Intubation Bronchoscopy Thoracostomy
	Regional Techniques	• Sub-arachnoid Block Epidural / Caudal Combined Spinal Epidural
	Peripheral Nerve Blocks	• Brachial Plexus,Wrist Block Intercostal Block, TAP Block, Sciatic Block Three in One Block • Biers BlockAnkle Block

Use of Anesthesia Equipment andSundries	Use of Monitors and interpretation of information	• CNS monitoring Evoked Potentials, BIS,CFAM (Cerebral Function AnalysisMonitor) • PNS monitoring, Nerve Stimulator /Locator • Oximetry,Capnography, Flow-Volume loops, Compliance graphs, Airway Pressure, Arterial Blood Gases. Pulmonary Function Tests • Cardio- Vascular Monitoring Blood Pressure - Non- Invasive / InvasiveECG Echocardiography, TEE Cardio Output & Derived Indices • Haematologic, Hepatic, Renal Systems and AcidBase Balance Ability to order correct battery of investigations andcorrect interpretation of the obtainedinformation • Ability to order correct battery of investigations, and interpretation of the obtained information,

ICU Skills	Ventilatory support Cardio-Vascular Support Renal Support Hematologic support	• Assembly ofventilator • Choice of correct respiratory support by choosing correct variables and modes • Choice ofSedation & Analgesia • Ability to providecardio vascular support with correct choice of drugs and infusiondevices • Drugs • Dialysis • Fluids, Blood, Blood Products

	Nutritional support	• Delivery Devices • Choice ofEnteral / Parenteral Nutrition • Calculation ofNutritional requirements
	Infection treatment/ control	• Choice of antibiotics • Making protocols • Monitoring of infection control
	General Patient Care, Physiotherapy	• Physiotherapy • Position change • General hygiene
	Implementation of Bundle Therapy	Bundle Therapy • Central line Bundle • Ventilator Bundle • Sepsis Resuscitation Bundle • Sepsis ManagementBundle

Year IV

Outcomes	Contentscovered	T&L method
Clinical skills	ASA I-V, Elective & Emergency inMinor, Moderate andMajor Surgeries	• History taking, Physical Examination, Interpretation ofInvestigations, including Radiology for CXR and X-ray Cervical Spine • Management ofConcurrent illness and medications for Pre-op. assessment with relevance to anesthesia advice on Pre- op medications,& preparation • Decisions making on referral / consult • Risk assessment, Anesthesia Plan & Administrationof Anesthesia • Recovery andPost-op Care • Crisis Management & Resuscitation • Documentation of Records

Communication& Counseling Skills	ASA I-V Elective & Emergency inMinor, Moderate andMajor Surgeries	• Counsel patients and their relatives about the anesthetic interventions in minor and moderate surgeries • Communicate with colleagues of related disciplines about the techniques, risks and intervention in major and complicated surgeries • Obtain Informedconsent • Counsel on crisis and management ofcomplications • PresentationSkills

Pain Management	Acute Pain Management Chronic Pain Management, Fluoroscopy	• Systemic • Epidural /Caudal • Nerve Blocks; • Ultra soundguided • Epidural for Labor analgesia • Blocks under imaging • TENS • Radiofrequency ablation
ProceduralSkills	Intra-VascularAccess & Interpretation of graphs Airway Management of ASA I-V, Elective / Emergency inall major / complicated surgeries. Regional Techniques Peripheral Nerve Blocks IVRA	• Central I/Vcannulation • Arterial cannulation • Pulmonary Artery Catheterization • Endotracehal Intubation (Mallampati I &IV) • Cricothyroidotomy, Percutaneous Dilatational Tracheostomy,Video assissted intubation, Bronchoscopy, Thoracostomy • Sub-arachnoid Block Epidural / Caudal Combined Spinal Epidural • Brachial Plexus Wrist Block Intercostal Block • TAP Block Sciatic Block Three in One Block • Ankle Block • Biers Block

Use of Anesthesia Equipment andSundries	Use of Monitors and interpretationof information	• CNS • Monitoring,Evoked Potentials • BIS, CFAM(Cerebral Function Analysis Monitor) • PNS monitoring Nerve Stimulator /Locator • Respiratory Monitoring, Oximetry,,Capnography, Flow-Volume-loops, Compliance graphs, Airway Pressure, Arterial Blood Gases. Pulmonary Function Tests • Cardio- Vascular Monitoring Blood Pressure (Non-Invasive & Invasive) ECG Echocardiography, TEE, Cardio Output & Derived Indices • Haematologic, Hepatic, Renal Systems and Acid Base Balance. • Ability to order correct battery of investigations and correct interpretation of the obtained information
ICU Skills	Ventilatory support	• Assembly ofventilator • Choice of correct respiratory support by choosing correct variables andmodes • Choice of Sedation & Analgesia
	Cardiovascular support	• Ability to provide cardio vascular support with correct choiceof drugs and infusion devices

	Renal Support Hematologic support Nutritional support	• Drugs • Dialysis • Fluids, Blood and Blood Products, DeliveryDevices • Choice of Enteral / Parenteral Nutrition • Calculation of Nutritional Requirements

	General Patient Care, Physiotherapy Infection Control and Barrier Nursing Implementationof “Bundle therapy”	• Ability to advice the paramedics, Physiotherapy, General Hygeine of the Patient • Choice ofAntibiotics • MakingProtocols • Monitoring ofInfection Control • Central lineBundle • VentilatorBundle • Sepsis Resuscitation Bundle • Sepsis ManagementBundle

Rotation Details

A certificate testifying the candidate's attendance is obligatory for admittance to the final examination and an entry in the logbook must also appear to this effect. The trainer should arrange for the sub- specialty training according to the facilities available.

Year 1		
Sr.no	Department Name	Duration(Months)
1	Pre-operative Clinics	2
2	Orthopedics/Trauma	2
3	General Surgery	3
4	Urology	2
5	Obstetrics/Gynecology	2
6	PACU/Acute Pain	1

Year 2		
Sr.no	Department Name	Duration(Months)
1	ICU	2
2	Orthopedics/Trauma	1
3	Obstetrics/Gynecology	2
4	General Surgery	2
5	Eye	2
6	ENT	2
7	Dental/Faciomaxillary	1

Year 3		
Sr.no	Department Name	Duration(Months)
1	General Surgery	2
2	Obstetrics/Gynecology	2
3	ICU	3
4	Burns/Plastic/Vascular	2
5	Pediatric/Neonatal	3

Year 4		
Sr.no	Department Name	Duration(Months)
1	Orthopedics/Trauma	1
2	Urology/Transplant	1
3	Anaesthesia outside OR	2
4	Neurosurgery	3
5	Cardio/Thoracic	2
6	Pain management Acute and Chronic	3

SECTION E

EVALUATION & ASSESSMENT

Assessment

It will consist of action and professional growth oriented *student-centered integrated assessment* with an additional component of *informal internal assessment*, *formative assessment* and measurement-based *summative assessment*.

Student-Centered Integrated assessment

It views students as decision-makers in need of information about their own performance. Integrated Assessment is meant to give students responsibility for deciding what to evaluate, as well as how to evaluate it, encourages students to 'own' the evaluation and to use it as a basis for self-improvement. Therefore, it tends to be growth- oriented, student-controlled, collaborative, dynamic, contextualized, informal, flexible and action oriented.

In the proposed curriculum, it shall be based on:

- Self-Assessment by the student
- Peer Assessment
- Informal Internal Assessment by the Faculty

Self-Assessment by the Student

Each student shall be provided with a pre-designed self-assessment form to evaluate his/her level of comfort and competency in dealing with different relevant clinical situations. It shall be the responsibility of the student to correctly identify his/her areas of weakness and to take appropriate measures to address those weaknesses.

Peer Assessment

The students shall also be expected to evaluate their peers after the monthly small group meeting. These should be followed by constructive feedback

according to the prescribed guidelines and should be non-judgmental in nature. This shall enable students to become good mentors in future.

Informal Internal Assessment by the Faculty

There shall be no formal allocation of marks for the component of Internal Assessment so that students are willing to confront their weaknesses rather than hiding them from their instructors.

It shall include:

- Punctuality
- Ward work
- Monthly assessment (written tests to indicateparticular areas of weaknesses)
- Participation in interactive sessions

Assessment Plan:

Program duration	Course contents	Assessment method
At the end of 2nd year of program	• Revision of core MBBS component including basic and clinical components. • Basic knowledge and Acquiring skill related to the specialty according to the objectives made. • First 2 mandatory Workshops as described in course outline.	Intermediate Examination: to be taken by university. It will include: • Written=300 • TOACS/Table viva=300 Total Marks =600

	• Submission of synopsis	
At the end of 4th year	• Training to act as an individual while managing patient or performing any task as defined by the objectives. • Training to act as a teacher, researcher, leader and a player in a team. • Overall development of a health care professional with all the set competencies of the Program. • All the mandatory and specialty-oriented workshops to be completed as mentioned in the curriculum • Rotations as described in the curriculum completed • Thesis completion and submission	Final Examination to be conducted by university. It will include: a) Written=300 b) TOACS/OSCE/LONG CASE/TABLE VIVA=300 c)Continuous internal assessment=100 Thesis evaluation =300 Total marks=600+100+300=1000

EXAMINATION FORMAT & RULES

Components of Mid-term Examination

- Written: Total Marks =300
- Clinical: TOACS/TABLE VIVA = 300

Total marks = 600

Components of Final Examination:

- Written: 300 Marks
- Clinical: TOACS/SHORT CASE/LONG CASE/TABLE VIVA = 300 Marks
- Continuous internal assessment =100
- Thesis Evaluation = 300

Total marks = 1000

Intermediate Examination:

Intermediate examination should be conducted for the candidate getting training, at the end of 2nd calendar year of the program.

Eligibility Criteria:

- Candidate remained on institution roll during the period approved for appearing in examination.
- Certificate of completion of mandatory workshops.
- Completion of Log book signed by supervisor/concerned Head of Department.

- Certificate of submission of Ethical Review Committee approved synopsis to the university if required as per rules of synopsis submission.

- Evidence of payment of examination fee as prescribed by the University from time to time.

- Certificates submitted through Principal/Dean/Head of academic institution shall be accepted as valid towards the candidature of an applicant.

- Submission of application for the examination and the conduct of examination.

Intermediate Examination Schedule and Fee:

a) Intermediate Examination at completion of two years training, will be held twice a year.

b) There will be a minimum period of 30 days between submission of application for the examination and the conduction of examination.

c) Examination fee will be determined periodically by the University.

d) The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.

e) The Controller of Examinations will issue Roll Number Slips on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee.

Written Examination:

The written examination will consist of 100 single best answer type Multiple Choice Questions. Each correct answer in the multiple-choice question paper will carry 02 marks. The short essay question will be clinical scenario or practice based, and each question will carry 10 marks.

The marks of written exam will be divided as follows:

- MCQs (single best type) = 300 Marks
- SEQ (10 seq) =100

Declaration of Result

The candidates scoring 60% marks in the written examination will be considered pass and will then be eligible to appear in the clinical and oral examination.

Clinical, TOACS/OSCE:

The clinical and TOAC/OSCE & Oral examination will evaluate patient care competencies in detail,

The examination will be of 300 total marks consisting of the following components

Clinical, TOACS/OSCE = Total Marks 300

a) Table viva I & II (100 each) = 200 marks

b) TOACS/OSCE =100 marks (10 stations with 10 marks each)

- Each table viva shall be of 25 minutes duration.
- Each TOACS/OSCE station shall be of 07 minutes duration.

Declaration of Result

- A student scoring 60% in Table Viva I, 60% in Table viva II ad 60% in TOACS/OSCE will be considered pass in the examination.
- A maximum total of four consecutive attempts (availed or un availed) will be allowed in the Intermediate Examination during which the candidate will be allowed to continue his training program. If the candidate fails to pass his Intermediate Examination within the above-mentioned limit of four attempts the candidate will appear in the whole examination, afresh.

Final Examination:

(At the end of 4th Calendar year of the program)

Eligibility Criteria:

To appear in the Final Examination the candidate shall be required:

- Result card showing that the candidate has passed intermediate Examination.
- Certificate of completion of 4 Years training duly signed by Supervisor, Head of parent Department and that of the Head of Department where rotations were done (if prescribed in the curriculum).
- Evidence of thesis submission to Department of Examination of the University.
- Evidence of payment of examination fee as prescribed by the university from time to time.
- The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.
- Candidate remained on institution roll during the period required for appearing in examination.
- Only those certificates, submitted through Principal/Dean/Head of academic institution shall be accepted.

Final Examination Schedule and Fee:

- Final examination will be held twice a year i.e., at least six months apart.
- Examination fee will be determined and varied at periodic intervals by the University.
- The examination fee once deposited cannot be refunded / carried over to the next examination under any circumstances.
- The Controller of Examinations will issue an Admittance Card with a photograph of the candidate on receipt of prescribed application form, documents satisfying eligibility criteria and evidence of payment of examination fee. This card will also show the Roll Number, date / time and venue of examination.

Written Part of Final Examination

a) The written examination will consist of 100 single best answer type Multiple Choice Questions (MCQs) and 10 Short Essay Questions (SEQs). Each correct answer in the Multiple-Choice Question paper will carry 02 marks. Each Short Essay Question will carry 10 marks.

b) The Total Marks of the Written Examination will be 300 and to be divided as follows:

- Multiple Choice Question Paper Total Marks = 300
- Short Essay Question Paper Total Marks = 100

Total=300

Paper 1

- MCQs 100 (2marks each)

Paper 2

- SEQs 10 (10 marks each)
- Paper 1 shall comprise of hundred (100) "single best answer" type Multiple Choice Questions. Each Question shall carry 02 marks.
- Paper 2 shall comprise of ten (10) Short Essay Questions, each carrying 10 marks.

Declaration of Results

- The candidates scoring 60% marks in aggregate of Paper 1 and Paper 2 of the written examination will be declared pass and will become eligible to appear in the Clinical Examination.

Clinical, TOACS/OSCE:

a) The Clinical Examination will consist of 04 short cases, 01 long case and TOACs/OSCE with 01 station for a pair of Internal and External Examiner. Each short case will be of 07 minutes duration, 05 minutes will be for examining the patient and 02 minutes for discussion.

b) The Total Marks of Clinical and TOACs/OSCE & Oral will be 300 and to be divided as follows:

- Short Cases (4) Total Marks = 100
- Long Case (1) Total Marks = 100
- TOACS/OSCE & ORAL Total Marks = 100

Total= 300

Declaration of Results

- A student scoring 60% in long case, 60% in short cases ad 60% in TOACS/OSCE will be considered pass in the examination.
- Candidate, who passes written examination, shall be allowed a maximum of Three availed attempts within two years to pass Clinical/Oral examination. However, in case of failure to pass Clinical examination within stipulated attempts the credit of passing the written examination shall stand withdrawn and candidate shall have to take entire examination including written examination, afresh. The candidate who has completed his/her training along with all requirements mentioned in curriculum shall have to appear in the final examination at least once within a period of 7 years from the time of induction. Failure to compliance with this the matter shall be referred to competent authority through proper channel for final decision.

Synopsis and Thesis Writing:

Thesis writing must be completed and thesis shall be submitted at least 6 months before the end of final year of the program.

Thesis evaluation & defense shall be carried out at the end of 4th calendar year of MS

Submission / Evaluation of Synopsis

a) The candidates shall prepare their synopsis as per guidelines provided by the Advanced Studies & Research Board, available on the university website.

b) The research topic in clinical subject should have 30% component related to basic sciences and 70% component related to applied clinical sciences. The research topic must consist of a reasonable sample size and sufficient numbers of variables to give training to the candidate to conduct research, to collect & analyze the data.

c) Synopsis of research project shall be submitted by the end of the 2nd year of MS/MD program. The synopsis after review by an Institutional Review Committee, shall be submitted to the University for consideration by the Advanced Studies & Research Board, through the Principal / Dean /Head of the institution.

Submission and evaluation of Thesis Evaluation (300 Marks)

- The Thesis shall be submitted to the Controller of Examination through Head of Institute, duly signed by the Supervisor, Co-Supervisor(s) and Head of the Department.
- Submission of Thesis is a prerequisite for taking Final Theory Examination.
- Examiners shall be appointed by the Vice chancellor on recommendation of Controller of Examination from a panel approved by Advance Studies & Research Board for evaluation of thesis.
- All MD/MS/MDS thesis shall be evaluated by 2 examiner, one internal and one External examiners (The supervisor must not be the evaluator)

- Thesis defense shall be held after approval of evaluation reports by Advanced Studies & Research Board.
- Thesis defense shall be conducted by the external examiners who evaluated Thesis of the candidate.
- The candidate scoring 60% marks in Thesis defense examination will be declared as pass in the examination.

Continuous Internal assessment

It will consist of professional growth oriented student-centered integrated assessment with an additional component of formative assessment and measurement-based summative assessment.

Attendance

- Students joining postgraduate training program shall work as full-time residents during the duration of training maximum 2 leaves are allowed in one month, and should take full responsibility and participation in all facets of the educational process. The period of training for obtaining degrees shall be four completed years including the period of examination.

Presentations

- In addition to the conventional teaching methodologies interactive strategies will also be introduced to improve both clinical and communication skills in the upcoming consultants. Presentations must be conducted regularly as scheduled and attended by all available faculty and residents. As a policy, active participation of the postgraduate resident will be encouraged. Proper written feedback will be given for these presentations and that will be a part of Resident's Portfolio as well. Reflection of the events to be written by the residents as well and must be included in their portfolios.

Task evaluation

- This competency will be learned from journal clubs, review of literature, policies and guidelines, audit projects, medical error investigations, root cause analysis and awareness of healthcare facilities. Active participation and ability to fulfill given tasks will be encouraged. Written feedback must be given and documented to be included in portfolio

Continuous Internal Assessment format (100 Marks)

- The award of continuous internal assessment shall be submitted confidentially in a sealed envelope.
- The supervisor shall submit cumulative score of internal assessment of all training years to be added together to provide a final cumulative score of Continuous Internal Assessments of all the trainees to the Head of the Department/ Dean of Post Graduate studies.
- The Head of Department/ Dean shall submit the continuous internal assessment score through the Principal/ Registrar office to the Examination Department of the University. Score of continuous internal assessment once submitted shall be final and cannot be changed subsequently under any circumstances.
- The weightage of internal assessment in the final examination will be 10%.
- Continuous Internal Workplace Based Assessments will be done by the supervisors, that may be based on but not limited to:

    - Generic and Specialty Specific Competency Assessments
    - Multisource Feedback Evaluations
    - Assessment of Candidates' Training Portfolio

TOOLS OF ASSESSMENT FOR THE COURSE:

TOOL USED	DOMAIN TESTED
MCQs	Knowledge
SEQs	Knowledge
TOACS/OSCE	Knowledge. Skill Attitude
PRESENTATIONS (wards, seminars, conferences, journal clubs)	Knowledge. Skill Attitude
Portfolios and log books.	Skill Attitude
Short cases.	Knowledge

	Skill Attitude
Long cases	Knowledge Skill Attitude
Continuous internal assessment	Skill Attitude
Feedback from department where rotation is being conducted.	Knowledge Skill Attitude

SECTION F

AWARD OF DEGREE IN MS ANESTHESIOLOGY

"A candidate having declared successful in all the components of examination i.e Theory & Clinical examination as well as Thesis defense shall be declared pass and shall be conferred degree in MS Anesthesiology"

SECTION G

- **Log Book**

  As per format approved by the university (available on university website)

SECTION H

- **Portfolio:**

As per format approved by the university available at university website.

SECTION I

Paper Scheme

TABLE OF SPECIFICATIONS

INTERMEDIATE EXAMINATION

TOTAL MCQs=100, TOTAL SEQs=10

BASIC SCIENCES:

Sr. no	Topic	Level of Cognition			MCQs	SEQs
		C1	C2	C3		
1.	Anatomy	5	5	0	10	
2.	Physics, monitoring & anesthesia delivery devices	5	7	0	12	
3.	Mathematics		3		3	1
4.	Pharmacology	3	4	3	10	
	Total				35	1

CLINICAL SCIENCES:

Sr. no	Topic	Level of Cognition			MCQs	SEQs
	CLINICAL SCIENCES	C1	C2	C3		
1.	Evaluation and pre-op preparation		1	1	02	
2.	Regional anesthesia		2	3	5	1
3.	General anesthesia		1	3	4	
4.	Monitored anesthesia care and sedation			3	2	
5.	IV fluids during anesthesia			3	1	1
6.	Complications during anesthesia		1	3	4	
7.	Poat operative period			2	2	1
8.	Central and peripheral nervous systems		1	4	5	1
9	Respiratory system		1	4	5	1

10	Cardiovascular system		1	4	5	1
11	Gastrointestinal/hepatic system		1	4	5	
12	Renal and urinary system/ electrolyte balance		1	4	5	1
13	Hematological system		1	4	5	
14	Endocrine and metabolic system		1	4	5	1
15	Neuromuscular diseases and disorders		1	4	5	1
16	Physical impairment and disability/ geriatrics		1	2	3	
17	Ethics, practice management and medicolegal issues		1	1	2	
	Total				65	9

FINAL EXAMINATION

BASIC SCIENCES

Sr. no	Topic	Level of Cognition			MCQs	SEQs
		C1	C2	C3		
1.	Physics & monitoring		3	4	7	
2.	Anesthesia delivery devices		3		3	
3.	Pharmacology	5	5		10	0
	Total				20	0

CLINICAL SCIENCE:

Sr. no	Topic	Level of Cognition			MCQs	SEQs
		C1	C2	C3		
1.	Regional anesthesia	2	3	5	10	
2.	Special techniques in anesthesia	2	3		5	
3.	Central and peripheral nervous systems		2	1	3	1
4	Respiratory system		1	3	4	
5	Cardiovascular system		1	3	4	1
6	Gastrointestinal/hepatobiliary system			2	4	
7	Renal & Urinary systems, electrolyte balance	1	1	2	4	1
8	Hematological system		2	1	3	
9	Endocrine and metabolic system	1	1	2	4	
10	Neuromuscular disorders	1	2	1	4	1
11	Acute and chronic pain		1		1	1
12	Pediatric anesthesia		1	2	3	1
13	Obstetric anesthesia		1	2	3	1
14	ENT		2	1	3	1
15	Ophthalmology anesthesia		1	2	2	
16	Anesthesia for laparoscopic surgery		1	1	2	
17	Plastic surgery, liposuction			1	1	
18	Orthopedic anesthesia		1	2	3	1
19	Trauma		1	3	4	
20	Anesthesia for ambulatory surgery			1	1	
21	Geriatric anesthesia		1	1	2	
22	Critical care		2	3	5	1
23	Electroconvulsive therapy		1		1	
24	Organ donation		1		1	
25	Anesthesia outside OR			2	2	
26	Medicolegal issues, workplace ethics		1		1	
	Total				80	10

SECTION J

Resources and references (books and other resource material)

- *Miller's Anesthesia*, 9th edition, 2019, Editor-in-Chief Michael Gropper. *Miller's* has been *the* comprehensive textbook in our specialty since the first edition in 1981, and it touches on every facet of anesthesiology. All anesthesia providers should have access to the current two-volume 3112-page edition.
- *Stoelting's Anesthesia and Co-existing Disease*, 8th edition, 2021, Editors Roberta Hines and Stephanie Jones. First published in 1983, *Stoelting's Anesthesia and Co-existing Disease* is the leading textbook regarding co-existing and uncommon diseases, with a stated goal to "provide a concise description of the pathophysiology of disease states and their medical management that is relevant to the care of the patient in the perioperative period.
- *Anesthesia Equipment: Principles and Applications*, 3rd edition, 2020, Editor Jan Ehrenwerth. Every anesthesia professional should understand the machines they utilize. This textbook, was first published in 1993, answers the questions pertaining to anesthesia machines, airway equipment, monitors and other perioperative devices.
- Smith and Aitkenheads Textbook of Anaesthesia 7th Edition
- Morgan & Mikhail's Clinical Anesthesiology 7th Edition
- Marino The ICU book by Paul L. Marino MD PhD FCCM (Author)

SECTION K

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Signed by head of Department