



# PRAVARA INSTITUTE OF MEDICAL SCIENCES (DEEMED TO BE UNIVERSITY)

Loni, Tal. Rahata, Dist. Ahmednagar 413736  
NAAC Re-accredited with 'A' Grade

## SYLLABUS

### PG Programme- MD (ANESTHESIOLOGY)

(As per MCI Regulations Governing PG Programme 2000,  
Amended as per Academic Council Resolution dated 11.12.2020)

## I. PREAMBLE

The purpose of PG education is to create specialists who would provide high quality health care and advance the cause of science through research & training.

A post graduate specialist having undergone the required training in anesthesiology should be able to recognize the health needs of the community. He or she should be competent to handle effectively medical problems and should be aware of the recent advances pertaining to his/her specialty. She/he should be highly competent anesthesiologist with broad range of skills that will enable him/her to practice anesthesiology independently. The PG student should also acquire the basic skills in teaching of medical/para-medical students. She/he is also expected to know the principles of research methodology and modes of consulting library. She/he should attend conferences, workshops and CMEs regularly to upgrade his/her knowledge.

The purpose of this document is to provide teachers and learners illustrative guidelines to achieve defined outcomes through learning and assessment. This document was prepared by various subject-content specialists. The Reconciliation Board of the Academic Committee has attempted to render uniformity without compromise to purpose and content of the document. Compromise in purity of syntax has been made in order to preserve the purpose and content. This has necessitated retention of “domains of learning” under the heading “competencies”.

## II. SUBJECT SPECIFIC LEARNING OBJECTIVES

The training should have clear objective, is competency based, is well planned & evaluated, is supervised and delivered by well trained teachers. It will have special emphasis on attitude and behavior, safety, communication, presentation, audit, teaching, ethics and law and management.

No limit can be fixed and on the number of topics that can be prescribed as course contents. The student is expected to know his/her subject in depth from various text books and journals; however more emphasis should be on the diseases/health problems most prevalent in that area. Knowledge of recent advances and basic sciences as applicable to his/her specialty should get high priority. Competency in anaesthesia skills commensurate with the specialty (actual hand on training) must be ensured.

**Specific learning objectives:**

- 1. Theoretical knowledge:** The student should have fair knowledge of basic sciences (Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Pharmacology, Statistics and Physics) as applied to Anaesthesia. The student should acquire in-depth knowledge including recent advances. He/she should be fully conversant with the bedside procedures (diagnostic and therapeutic) and have knowledge of latest diagnostics and therapeutics procedures available including radiological methods.
- 2. Teaching:** The student should learn the basic methodology of teaching and develop competence in teaching medical/paramedical students. The student should be familiar with the latest teaching (computer and power point presentation) modes including simulators training and evidence based medical education.
- 3. Attitude development:** The student should develop attitude that leads to appropriate communication with colleagues to function in a group in Operating Room /Intensive Care Unit, and develop the ability to function as a leader in the operating room.

**III. SUBJECT SPECIFIC COMPETENCIES**

The student during the training programme, should acquire the following competencies:

**A. Cognitive domain**

- Demonstrate knowledge of Anatomy related to;
  - ❖ Diaphragm, upper and lower airway, heart and coronary circulation ,
  - ❖ Regional anaesthesia - field block, central neuraxial, blockade, block for acute pain states
  - ❖ Procedures like -Intramuscular injections, arterial and venous cannulations and
  - ❖ Patient Positioning under anaesthesia
- Demonstrate knowledge of Physiology of various systems (respiratory, cardiovascular, hepatobiliary, renal, endocrine, pregnancy, haematological, neuromuscular, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP, central, autonomic and peripheral nervous systems, metabolic response to stress and trauma) in detail and translate its application in a problem solving manner.
- Demonstrate knowledge of Biochemistry relevant to fluid balance and blood transfusion, perioperative fluid therapy, acid base homeostasis in health and diseases.
- Demonstrate knowledge of commonly used drugs in anaesthesia practice (premedication, induction agents - intra-venous and inhalational, neuromuscular blocking agents and reversal of muscle relaxants) - general principles, concepts of pharmacokinetics and pharmacodynamics, drug interactions with the other drugs taken concomitantly by the patient and anaphylactoid reactions.

- Demonstrate knowledge of gas laws, medical gas supply system, fluidics, electricity, diathermy and oxygen therapy.
- Demonstrate knowledge of 'principles of physics' that govern functions of basic anaesthesia delivery equipment, airway devices – (laryngoscopes, airways etc), breathing systems and monitors, fiber optics, Lasers, Pacemakers and defibrillators, monitoring equipments (used for assessment of cardiac functions, temperature, respiratory functions, blood gases, intracranial pressure, depth of anaesthesia and neuromuscular block), Sterilization of equipments, manufacture, filling and transport of gases and liquid oxygen. etc.
- Demonstrate knowledge of importance of pre-anaesthetic assessment and optimization of a patient; consisting of evaluation, interpretation of laboratory investigation as applied to the care of the patients in planning and conduct of general anaesthesia.
- Demonstrate knowledge of basic life support, advanced cardiac, trauma life support, and neonatal resuscitation according to latest guidelines.
- Demonstrate knowledge of principles of sterilization and universal precautions, selection, maintenance and sterilization of anaesthesia and related equipment, Infection control, cross contamination in OT and ICU. Immune response and anaesthesia.
- Describe the development and history of anaesthesia as a specialty with knowledge of important personalities who have contributed towards it.
- Demonstrate knowledge of principles of artificial ventilation, management of unconscious patients, oxygen therapy, shock- (pathophysiology and management) and various protocols related to Intensive Care Unit.
- Demonstrate knowledge of post-operative care in the post-anaesthesia recovery room, in terms of management of
  - ❖ Post-operative pain: various modalities
  - ❖ Nausea and vomiting
  - ❖ Identified emergencies and postoperative complications.
  - ❖ Special precautions to be taken in specific surgical patients.
- Demonstrate knowledge of acute pain management, chronic pain therapy & therapeutic nerve blocks, acupuncture, acupressure and other non-conventional methods of treatment.
- Describe documentation, medico-legal aspects of anaesthesia and concept of informed consent.
- Demonstrate knowledge of research methodology and basics of biostatistics relevant to data collection, analysis, record keeping in anaesthesia, comparison and estimation of significance.
- Demonstrate ability to interpret blood gas analysis and other relevant biochemical values, various function tests and basics of measurement techniques, ECG.
- Explain blood coagulation mechanism, and their disturbances, rational use of blood and blood components.
- Demonstrate knowledge pertaining to special anaesthetic techniques as relevant to:
  - ❖ Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations
  - ❖ Associated medical disorders in surgical patients

- ❖ Geriatric and pediatric anaesthesia, Emergency, ENT, orthopedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.
- ❖ Induced hypothermia, incidental, environmental safety of patient.
- ❖ Malignant hyperthermia, myasthenia gravis, GB syndrome and other neuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchial asthma and hypertensive crises..
- ❖ Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/transplantation/burns and plastic surgery.
- ❖ Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery
- ❖ Shock, types, pathogenesis and management of patients in shock, renal failure, critically ill and/or on ventilator, Multiple organ failure
- Demonstrate knowledge pertaining to care of terminally ill, Hospices management, Do not resuscitate orders.
- Demonstrate knowledge of general principles of medical audit and Critical incident reporting.
- Demonstrate knowledge of Ethics and clinical trial.
- Demonstrate knowledge of Hospital, ICU and OT design and planning.
- Demonstrate knowledge of Medical education including evidence based medical education.
- Demonstrate knowledge of principles of human resources and material management.

## B. Affective Domain:

1. Should be able to function as a part of a team, develop an attitude of cooperation with colleagues, and interact with the patient and the clinician or other colleagues to provide the best possible diagnosis or opinion.
2. Always adopt ethical principles and maintain proper etiquette in dealings with patients, relatives and other health personnel and to respect the rights of the patient including the right to information and second opinion.
3. Develop communication skills to word reports and professional opinion as well as to interact with patients, relatives, peers and paramedical staff, and for effective teaching.

## C. Psychomotor domain

**At the end of the course, the student should acquire skills in the following broad areas and be able to:**

- Demonstrate ability **as a perioperative physician**, in terms of
  - ❖ Acquiring mastery in careful and relevant history taking, physical examination in clinical evaluation of the patient preoperatively.
  - ❖ Collecting and synthesizing preoperative data from parent hospital and other sources and to develop a rational strategy for the peri-operative care of the patient.
  - ❖ Thorough and systematic approach to preoperative evaluation of patients with and without systemic diseases, undergoing different types of operations.

- ❖ Prioritizing problems, present cases clearly and systematically to attending consultants.
- ❖ Developing working relationships with consultants in other specialties to assist in preoperative evaluation and get a good consultation.
- ❖ Interacting with preoperative patients and developing effective counseling techniques for different anaesthetic techniques and peri-operative procedures.
- ❖ Assessing and explaining risk of procedure and taking informed consent.
- ❖ Managing information in preoperative evaluation and outcome enhancement and communication skill to patients and relatives.
- ❖ Ability to choose and order the required investigations to be done in a particular patient peri operatively
- Demonstrate ability in performing
  - ❖ Pre-operative equipment check
  - ❖ selection of drugs
  - ❖ Preparation of work table etc.
- Identify conditions like difficult airway by following difficult airway algorithms.
- Demonstrate ability to establish topical airway anaesthesia for awake intubation
- Demonstrate management of a Failed intubation drill on a Mannequin according to latest guidelines
- Demonstrate ability to monitor and assess depth of anaesthesia
- Demonstrate abilities to manage body fluid composition; volume status; replacement of fluid and blood loss; use of whole blood and blood components.
- Demonstrate abilities to manage Electrolyte and acid base derangements; osmolality and osmolality.
- Demonstrate acquisition of skills to initiate mechanical ventilation; select appropriate type and mode of ventilator; and monitor proper functioning of ventilator.
- Identify the need to perform intra-operative laboratory tests, blood gases, coagulation profile and interpret the results with clinical correlation
- Demonstrate ability to manage co-morbid conditions and anaesthesia
- Demonstrate ability to perform cannulation of arteries, central and peripheral veins.
- Demonstrate ability in using and interpreting the following routine non-invasive and invasive monitors intra-operatively:
  - a. Electrocardiogram with ST-segment analysis
  - b. Noninvasive blood pressure
  - c. Capnograph: values and changes in values and waveform.
  - d. Pulse oximetry: values and changes in values
  - e. Neuromuscular blockade monitor
  - f. Invasive arterial pressure: waveform and changes in the waveform
  - g. Central venous pressure: values and waveform
  - h. Pulmonary artery pressure: Values and waveforms, pulmonary capillary wedge tracing.
  - i. Cardiac output
    - i) Mixed venous oxygen saturation
    - ii) Evoked potential
    - iii) Transesophageal echocardiography: basic understanding

- Demonstrate skills in providing basic life support, advanced cardiac life support, trauma life support and paediatric-neonatal life support, train medical and paramedical staff in BLS and ALS.
- Demonstrate mastery in common procedures like vascular access, use of latest invasive and non-invasive monitoring equipment, lumbar puncture, management of appropriate mechanical ventilation and total care of Intensive Care Patient.
- Demonstrate ability to administer general anaesthesia and regional anaesthesia for ASA I to V, under supervision.
- Demonstrate ability to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision.
- Demonstrate ability to use ultrasound machine for giving blocks and venous cannulation.
- Demonstrate ability to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac, Neurosurgery, Pediatric surgery, and for all major surgeries, able to manage critically ill patients and treat intractable pain.
- Demonstrate following abilities in **Emergency Anaesthesia, Trauma and Resuscitation:**
  - ❖ Organize resources in case of mass casualty.
  - ❖ Perform triage.
  - ❖ Assess, transport and manage mass casualties / disaster management and camp anaesthesia.
  - ❖ Manage massive haemorrhage and massive blood transfusion.
  - ❖ Transport critically ill patient.
  - ❖ Perform anaesthetic management of geriatric patients with fracture neck of femur
  - ❖ Manage severe burns patients, rapidly progressing spinal compression, massive haemoptysis and lobectomy, peritonitis from various suspected causes, preparation and management of bowel obstruction, septic shock, acute upper airway obstruction such as foreign body, epiglottitis, infections, cardiac tamponade from examples post cardiac surgery, malignant pericardial effusion, peri-operative management of rupture aneurysm of abdominal aorta
  - ❖ Basic Cardiac Life Support and Advanced Cardiac Life Support, Basic Trauma Life Support, Advanced Trauma Life Support, and Cerebral preservation.
  - ❖ Management of intra-operative cardiac arrest
  - ❖ Management of intra-operative bronchospasm
- Demonstrate ability to document a Medico-legal aspect.
- Demonstrate ability to provide special sedation / **anaesthesia requirements outside operating Room**, eg **Radiology**: for CT, MRI (especially in relation to dye allergy and embolization, **Onco radiotherapy**, **Electroconvulsive shock therapy** (modified ECT. **Non-invasive cardio-radiologic procedures** including balloon angioplasty and cardiac catheterization, **Non-invasive neuro-radiologic procedures**, **lithotripsy** etc .
- Demonstrate ability to analyze data and write a thesis, present scientific data, participate in anaesthesia audit.



- Demonstrate ability to critically review and acquire relevant knowledge from the journals about the new development in the specialty
- Demonstrate following abilities in the **Post Anaesthesia Care Unit (PACU)**
  - ❖ Assess the patient's recovery and condition for a safe discharge or transfer.
  - ❖ Observe, recognize and treat the commonly occurring problems likely to arise in the Post-anaesthesia Care Unit (PACU) especially those in relation to cardio-respiratory systems:
    1. Airway integrity and compromise.
    2. Arrhythmia
    2. Hypertension
    3. Hypotension
    4. Pain prevention and pain relief
    5. Nausea and vomiting
    6. Decreased urine output
    7. Emergence delirium
    8. Delayed emergence from anaesthesia
    9. Shivering
    10. Post-obstructive pulmonary edema.
  - ❖ Assess patient recovery and the parameters for transfer from the PACU to the ward, ICU, home.
  - ❖ Score the patient's condition according to the Aldrete system, including fast tracking after out-patient surgery.
- Demonstration of following abilities in **Intensive Care Unit**
  - ❖ Understanding the spectrum of critical illnesses requiring admission to ICU.
  - ❖ Recognizing the critically ill patient who needs intensive care -Trauma, burns, all types of shock, Sepsis, SIRS and ARDS, Poisoning, infectious patient (HIV, Hepatitis) and patients with metabolic disturbances.
  - ❖ Monitoring progress of patients by physiological scoring systems
  - ❖ Practicing infection control practices and control of nosocomial infections.
  - ❖ Inserting central venous lines, arterial lines using ultrasound and interpreting the data.
  - ❖ Managing cardiovascular instability, respiratory failure and postoperative pulmonary complications
  - ❖ Understanding of the operation of mechanical ventilators including different ventilatory modalities non-invasive ventilation, complications and modes of weaning.
  - ❖ Principles and application of Oxygen Therapy
  - ❖ Glycemic control in the critically ill patient
  - ❖ Practice of Hypothermia and prevention of cerebral injury after cardiac arrest
  - ❖ Delivering appropriate nutritional support - enteral and parenteral.
  - ❖ Proper use of sedative/hypnotic drugs in the ICU.
  - ❖ Practicing ethical and legal aspects of critical care
  - ❖ Good communication skills with patient and relatives.
  - ❖ Proper Sterilization of ICU equipment.

- Demonstration of following abilities in **Acute and Chronic Pain Management**
  - ❖ Assessment of patients with pain including: history taking, physical examination, and interpretation of investigations.
  - ❖ Classify types of pain - acute chronic, traumatic, cancer pain, etc. with the knowledge of Pain pathways in detail.
  - ❖ Practice the different modalities of physical therapy that may relieve both acute and chronic pain
  - ❖ Practice the acute pain, cancer pain guidelines and WHO treatment ladder.
    - ❖ Practice routes of administration and risk/benefits of drugs used for acute and chronic pain relief, patient controlled analgesia and treat the common pain syndromes.
  - ❖ Demonstrate practice of pain management in patients with problem drug use, drug dependency and addiction and identify the parameters for referral to a pain medicine specialist.
- Demonstrate Organization of acute pain service and role of acute pain nurse for pain assessment in various groups of patients, Physiological changes secondary to Pain, practice different modalities of pain control. Pharmacology and side effects of opioid analgesia and non-opioid analgesia, principle of patient-controlled analgesia and assessment of its efficacy, Pharmacology and side effects of epidural/intra-theal opioid. Neurological assessment of epidural blockade and management of failed block. Management of regional blockade – brachial plexus, para-vertebral and intra-pleural block. Management of epidural abscess. Substance abuse and acute pain control. Pain control in concurrent medical diseases – COAD, IHD, bleeding tendency, geriatric. Pain control in burns patients. Pain control in trauma patients included multiple rib fracture
- Demonstration of abilities to manage **Chronic Pain**
  - ❖ Practice different modalities of chronic pain management - physical therapy, psychotherapy, (including cognitive behavioural approaches), neuro-ablation, neuro-augmentation, spinal opioid, interventional neuro-blockade, non-opioid analgesia.
  - ❖ Anatomy, indication, technique and complication of chemical sympathectomy (lumbar sympathectomy, stellate ganglion block, celiac plexus block).
  - ❖ Practice principles of management of cancer pain, principle of management of non-cancer neuropathic pain - phantom limb pain, post-herpetic neuralgia, complex regional pain syndrome, trigeminal neuralgia. Principle of management of non-cancer nociceptive pain - myofascial pain, lower back pain, intractable angina, burns, chronic pancreatitis, PVD.
  - ❖ Practice Epidural steroid injection (all levels) and long-term epidural catheterization.
  - ❖ Observe and practice following blocks: Infra-orbital nerve, Intercostal nerve
  - ❖ Recognize complications associated with each blocks and know appropriate treatment of each
  - ❖ Know the indications for stimulation techniques such as transcutaneous electrical nerve stimulation (TENS), dorsal column stimulation, and deep brain stimulation.
  - ❖ Mechanisms and side effects of other therapies used for treating pain.



- ❖ The principles of pain management in special patient groups including the elderly, children, disabled, intellectually handicapped and those unable to communicate.
- ❖ Awareness of the principles for insertion and management of implantable drug delivery pumps.
- ❖ Awareness of the basic principles of palliative care.
- **Demonstrate practice of Regional Anaesthesia**
  - ❖ Applying general principles of pharmacology of local anaesthetics and various adjuvants.
  - ❖ Familiarizing with the relevant anatomy for regional techniques.
  - ❖ Application of indications and contraindications to regional anesthetic technique including central neuraxial blocks, peripheral nerve blocks and sympathetic nerve blocks.
  - ❖ Assessing adequacy of regional anaesthesia, and learn techniques of supplementation of inadequate blocks.
  - ❖ Providing effective anxiolytics and sedation of patients by both pharmacologic and interpersonal technique.
  - ❖ Performing the following regional anaesthesia techniques:
    - Brachial plexus, cervical plexus, stellate ganglion block, lumbar plexus, lumbar sympathetic, Sciatic nerve block, Femoral nerve block, 3 in 1 block, Wrist block, Popliteal Nerve block, Trigeminal nerve block, Retro bulbar blocks, Paravertebral blocks, Intercostal blocks, Caudal block – adult and pediatric, Ankle block, Epidural block/Catheter, Subarachnoid block, Bier's block, All peripheral nerves of the upper and lower limbs.
- **Demonstrate practice of Thoracic Anaesthesia**
  - ❖ Pre-operative assessment of patients undergoing Thoracotomy (lung resection), thoracoscopy, video assisted thoracoscopy and mediastinoscopy
  - ❖ Various approaches and their relevant equipments for lung isolation.
  - ❖ Various double lumen tubes and their placement.
  - ❖ Application of Principle of chest drain.
- ❖ Respiratory Physiology and management of one lung ventilation (OLV). Indications, contraindications and hazards of OLV.
  - ❖ Application of the knowledge of Anatomy of lung and broncho-pulmonary segments.
  - ❖ Anatomy and techniques for intercostals nerve block and thoracic epidural. Management of thoracic epidural anaesthesia and analgesia
  - ❖ Anatomy, techniques and placement of paravertebral block/catheter.
  - ❖ Post-operative care of patients after lung surgery.
  - ❖ Peri-operative management of patients with myasthenia gravis.
  - ❖ Peri-operative management of patients with mediastinal mass.
  - ❖ Anaesthetic management of mediastinoscopy, major airway stenting.
  - ❖ Lung volume reduction surgery and problems.
- **Demonstrate practice of Cardiovascular Anaesthesia:**
  - ❖ Application of the knowledge of Anatomy and physiology of valvular disease, coronary arteries and their territories. Pulmonary circulation, coronary circulation, cerebral circulation, visceral circulation.

- ❖ Application of the knowledge of Distribution of blood volume to different organs and systems and their control. Microcirculation. Venous system, venous pressure, its influence on various functions.
  - ❖ Regulation of blood pressure, hypotensive anaesthesia.
  - ❖ Anatomy and physiology of all operable congenital heart disease like ASD, VSD, PDA, TOF, transposition of great vessels.
  - ❖ Application of the knowledge of anatomy and physiology of vascular heart disease like co-arctation of aorta.
  - ❖ Assessment of cardiac patient with ischaemic heart, valvular heart disease and other diseases listed above. Understanding of cardiac catheterization, echocardiography, stress testing, and radio-nucleide imaging.
  - ❖ Application of Principle and complication of cardiopulmonary bypass
  - ❖ Application of Principle of trans-esophageal echocardiography
  - ❖ Application of Principle of circulatory support: inotropes, IABP, pacing
  - ❖ Coagulation and management of coagulopathy.
  - ❖ Off pump bypass
  - ❖ Intra-operative management of aortic surgery and major peripheral vascular surgery, aneurysm grafts, recanalisation procedures.
  - ❖ Understanding of the adult patient with congenital heart disease and their management during anaesthesia.
  - ❖ Postoperative cardiac critical care, including cardiovascular problems, analgesia.
  - ❖ Insertion of invasive monitoring for arterial monitoring, central venous pressure monitoring, pulmonary artery catheter insertion and interpretation.
  - ❖ Robotic cardiac surgery.
- **Demonstrate practice of Paediatric Anaesthesia**
    - ❖ Application of knowledge of Anatomical changes in paediatric patient and neonates.
    - ❖ Application of knowledge of Physiology and pharmacology in paediatric patient.
    - ❖ Guideline for pre-operative fasting in children and pre-medication.
    - ❖ Anaesthetic equipment: laryngoscopes, airways, endotracheal tubes, LMAs, PLMA and breathing circuit for children.
    - ❖ Anaesthesia management for premature and newborn.
    - ❖ Emotional problems for parent and child and principles of premedication. Consent by parents and their presence during induction. To become skilled in communicating with children, parents and other relatives.
    - ❖ Problems of transporting a sick pediatric patient from the ward to the operating room and back with regard to temperature maintenance, cardiovascular stability, ventilation and oxygenation.
    - ❖ Estimate preoperatively blood volume, hourly fluid requirements, fluid deficit, third space loss, acceptable blood loss and apply principles of fluid and blood replacement in the perioperative period.
    - ❖ Induce and maintain anaesthesia by inhalation, intravenous, intramuscular and rectal routes and monitor pediatric patients.

- ❖ Understand the benefits, risks and techniques of regional anaesthesia in children. Anatomy and techniques of caudal, dorsal penile and inguinal regional block, spinal and epidural block
- ❖ Learn to recognize and treat post anaesthesia complications like apnea, laryngospasm, acid-base and electrolyte disturbances, febrile and convulsing child and bleeding child.
- ❖ Common problems related to common congenital syndromes presenting for surgery. Anaesthetic management of a child with concurrent disease – Down's, Pierre Robin syndrome, von Willebrand's disease, Goldenhar's, Sturge-Weber, Tracher-Colin, Prune-Belly, and cyanotic and non-cyanotic congenital heart disease.
- ❖ Paediatric resuscitation: drugs, doses and defibrillation of children of all ages, from the very premature neonates to those children with complex coexisting disease.
- ❖ Management of patients requiring paediatric intensive care, ventilatory management, and support of circulation.
- ❖ Resuscitation of neonates and children of all ages. A period of one to two months in a PICU is recommended for all post graduate students undergoing advanced training in paediatric anaesthesia.
- ❖ Paediatric pain management
- ❖ Assessment of a child with URTI, with a heart murmur.
- ❖ Management of fluid and electrolytes in children.
  - ❖ Anaesthetic management of a malignant hyperthermia susceptible child.
  - ❖ Anaesthetic management of FB bronchus, oesophagus, Wilm's tumour, congenital diaphragmatic hernia, tracheo-oesophagus fistula, thoracotomy.
  - ❖ Anaesthesia for Fetal Surgery.
  - ❖ Sedation techniques including the selection, management and monitoring of children for diagnostic and therapeutic procedures, with particular attention to working in areas outside the theatre suite.
- **Demonstrate practice of Transplant anaesthesia**
  - ❖ Application of knowledge of basic pathophysiology of renal and liver failure. Principles of anesthetizing an immuno-compromised patient.
  - ❖ Principles of anesthetizing patient with end stage renal/liver disease and patient with organ transplantation. Perioperative management.
- **Demonstrate practice of Neuroanaesthesia**
  - ❖ Application of basic knowledge of cerebral circulation and intra cranial pressure and its implications
  - ❖ Anaesthesia to patients with neurologic disease, head injury undergoing neurologic or non-neurologic surgery and for diagnostic procedures requiring anaesthesia.
  - ❖ Anesthetic implications of the most common neurosurgical procedures, transnasal, trans-sphenoidal pituitary surgery. Posterior fossa surgery. Surgery for supratentorial pathology.
  - ❖ Application of basic concepts behind electrophysiologic monitoring of the brain and spinal cord.

- ❖ Application of knowledge of general principles of positioning the patient for surgery and the advantages and disadvantages of each position.
- ❖ Effects of anaesthesia on the electroencephalogram (EEG) and evoked potentials.
- ❖ Differential diagnoses and treatment alternatives of intraoperative intracranial hypertension (“tight brain”)
- ❖ Management of Head Trauma, and its anesthetic management and various protocols regarding their management and associated trauma.
- ❖ Intracranial surgery and spinal surgery, both routine and emergency.
- ❖ Monitoring: techniques for detection and management of air embolism.
- ❖ Lumbar puncture and CSF drainage.
- ❖ Non-surgical management of the head trauma patient, Systemic complications of severe brain injury.
- ❖ Management of subarachnoid haemorrhage and vasospasm.
- ❖ Diagnosis and management of patients with brainstem death; and dealing with patient’s relatives
- **The following are special procedures which the post graduate student must be able to perform**

**Sr. No. Name of procedure**

1. Blind Nasal intubation
  2. Failed intubation drill (includes Fiberoptic Laryngo/ Bronchoscope)
  3. Double Lumen Tube
  4. Bronchial Blocker placement
  5. Jet Ventilation
  6. Suctioning and physiotherapy of wet lung
  7. Intubation in Neonates
  8. Initiation and management of ventilation
  9. Combined Spinal Epidural
  10. Brachial Plexus Block
  11. Intravenous Regional Anaesthesia
  12. Elbow, Wrist, Digital, Sciatic, Femoral, Lateral Cutaneous Nerve of thigh, Ankle – each
  13. Cervical-Superficial and Deep, Stellate, Splanchnic – each
  14. Central Venous Line by Brachial, Jugular and Subclavian veins
  15. Radial and Femoral Artery cannulation
  16. CVP monitoring
  17. Pulmonary Capillary Wedge Pressure
  18. Neuro-muscular transmission Monitoring
  19. Anaesthetic Depth eg. BIS monitoring
- Demonstration of anesthetic abilities in the intraoperative period keeping into consideration the specific requirement of the surgical procedure – ENT, Orthopaedic, Gynaecology – Obstetrics, General surgery, Onchosurgery, replacement surgeries, urosurgery, vascular, plastic, Thoracic, Dental etc

**\* Ultrasound Guided Regional Anesthesia**

- ❖ *“Ultrasonography Syllabus” learning & practical training shall be completed by postgraduate students (during their three years course of MD in anesthesiology) of MD anesthesiology. The students shall be posted for ultrasonography training as follows:*
  - a) *2nd term of first year – 10 days posting*
  - b) *2nd term of second year – 10 days posting*
  - c) *1st term of third year – 10 days posting*
- ❖ *“Ultrasonography syllabus” learning & practical training shall be completed by postgraduate students (during their two years course of DA in anesthesiology) of DA anesthesiology. The students shall be posted for ultrasonography training as follows:*
  - a) *2nd term of first year - 15 days posting*
  - b) *1st term of second year - 15 days posting*
- ❖ *The necessary skills of ultrasonography shall be acquired by the MD & DA students before appearing for final university theory & practical examinations*
- ❖ *The Head of the department shall prepare the time table / posting of MD/DA postgraduate students by rotation in the Radio-Diagnosis department of their respective Medical Colleges.*
- ❖ *As per the syllabus & in relation to anesthesiology practical skills, the basic applied & practical training of Ultrasonography & Doppler shall be conducted by the faculty of Radio-Diagnosis department of the respective Medical Colleges.*
- ❖ *Knowledge to be acquired by MD & DA PG students*
  - 1) *Ultrasound physics-Image generation (2 Theory Lecture)*
    - a. *Ultrasound waves*
    - b. *Piezoelectric effect*
    - c. *A B modes*
    - d. *Principles of Doppler*
  - 2) *Equipment (1 Theory Lecture)*
    - a. *Probe selection*
    - b. *Knobology*
    - c. *Depth, Gain, MB, Needle Guide etc.*
    - d. *Image storing & archiving*
  - 3) *Sono-anatomy of common arteries, veins and nerves- (2Theory Lecture)*
    - a. *Applied sono-anatomy of Brachila Plexus, Lumbarplexus & Sacral Plexus*
    - b. *Applied sono-anatomy of thoracic lumber, PV areas*
    - c. *Ability to interpret 3D anatomy from 2D cross sectional Image*
    - d. *Applied sono-anatomy Neck for central venous canulation of IJV, subciavian vein*

- e. *Applied sono-anatomy of abdomen –spleen ,liver & kidney, IVC, Aorta & Portal vein (For assessment of soft organ injury in trauma cases)*
- 4) *Skill to be attained*
  - a. *Image acquisition*
  - b. *Ability to effectively apply “PART” maneuver-pressure, alignment, rotation & tilting*
  - c. *Performance, patient, monitor - ergonomics*
  - d. *Needling (get the needle on the target)*
  - e. *In plane & out of plane concepts*
  - f. *Ability to use needle visualization preset*
  - g. *Ability to get the target, needle tip visualization*
- 5) *Teaching & Learning Methods*
  - a. *Lectures to cover up the basic principles & sono-anatomy*
  - b. *Practical demonstration in the operating room*
  - c. *Phantom*
  - d. *training for needling*
- 6) *Attitude and Behaviour*
  - a. *Provides explanations of regional anaesthesia techniques in a way that patients can understand.*
  - b. *Understand the patient anxieties about regional techniques, especially the stress of undergoing surgery while conscious.*
  - c. *Recognizes the need for communication with staff about us of regional block*
  - d. *Handles patients gently during performance of regional block*
  - e. *Meticulous attention to safety and sterility during performance of regional blocks.*
  - f. *Enlist help/advice from other professionals when appropriate.*
- 7) *Workspace & Training objectives*
  - a. *Trainees should take appropriate opportunities to use regional anaesthesia in patients undergoing a range of operations in specialities such as orthopaedics, gynaecology, urology and plastic surgery I order to demonstrate their attainment of the listed requirements*
  - b. *Lectures to cover up the basic principles and sono anatomy*
  - c. *Practical demonstration the operation room*
  1. *Phantom training for needling*
- 8) *USG guided central venous cannulations*
  - a. *Internal Jugular vein: Subclavial Vein, Femoral Vein*
- 9) *Cleaning & Disinfection*



*a. Knowledge about the cleaning solution & its implication*

10) PCPNDT act rules & regulations & Guidelines.

**\* The above have been added under the heading “Ultrasound Guided Regional Anesthesia” as per Academic Council Resolution No. AC/2020/D-5 (i), dated 11.12.2020 and Notification No. 26/2021 of PIMS (DU).**

## **Suggested Time Frame for Training the PG Students:**

The student should be taught as per the following schedule to acquire the skills:

### **1. First 6 months:**

- During the first 6 months, the student should be taught expertise in the management of uncomplicated cases not belonging to any super specialty (ASA I and II cases). To start with, the student will observe and slowly become independent in giving general anaesthesia and spinal anaesthesia to ASA I and II cases for minor and major surgery, under graded supervision.
- The postgraduate student should learn the basic principles of safe and effective anaesthesia, resuscitation, and both the prevention and treatment of pain, perioperative care of the surgical patient, care of handling equipments, basic techniques in anaesthesia, and anaesthetic pharmacology, and electrical safety.
- He/she should select the thesis topic and submit the protocol for his thesis.

### **2. Next 18 months**

- The student should widen his experience and should be able to undertake anaesthetic care of all routine cases, assist in the anaesthetic care for routine obstetric practice, understand basic principles of critical care, pain management, and participate in audit.
- The student should be trained in administration of general anaesthesia and regional anaesthesia for ASA I to V under supervision. The student should be able to give extradural block (EDB) lumbar and thoracic, Spinal Block, and Peripheral Nerve Blocks under supervision, and use of Ultrasound machine for giving blocks and venous cannulation. The student should learn paediatric and trauma life supports and maintain skills for basic and advanced cardiac life support.
- It is advised that they should be posted in the following specialties: general surgery including gastrointestinal surgery, transplant, ENT, Urology, Obstetrics, Dental Surgery, Eye, ICU, Pain Clinic and peripheral theatres like ECT, radiodiagnostic and therapeutic procedures (CT scan, MRI scan, angiography).
- The student should be able to analyze data and write a thesis. He/she should be able to present scientific data.

### **3. Last 12 months**

- Thesis should be submitted minimum of 6 months before the final MD examination.
- The post graduate student should be given experience of various super-specialties like cardiothoracic and vascular surgery, neurosurgery and transplantation, and paediatric surgery. The student should be able to plan and administer anaesthesia to all emergency patients under supervision including patients for Cardiac,

Neurosurgery, Pediatric surgery, and for all major surgeries. The aim at the end is to be competent and independent soon after the third year of junior residency in providing anaesthesia to elective and emergency cases.

- The post graduate student should be able to manage critically ill patients and treat intractable pain. They should also know how to organize resources in case of mass casualty. The curriculum should be able to provide 04 months of elective Intensive Care Unit posting (2 months during initial years under supervision and 2 months independently in the last six months).

**4. At the end of 3 years, the post graduate student should have the skills to:**

- Plan and conduct anaesthesia and provide post-operative care including pain relief for elective and emergency surgical procedures related to all surgical specialties.
- Carry out basic life support (BLS) and advanced life support (ALS) and train medical and paramedical staff in BLS and ALS.
- Manage patients admitted to an intensive care unit with the help of latest equipment.
- Manage patients suffering from acute and chronic intractable pain.
- Organize the hospital environment to manage mass casualty situation and camp anaesthesia.
- Critically review and acquire relevant knowledge from the journals about the new development in the specialty.
- Should be able to participate in anaesthesia audit.

Overall the student should acquire skills in the following practical competencies:

- ❖ Information management in preoperative evaluation and outcome enhancement and communication skill to patient and relatives.

## **IV. Syllabus**

The course content of **1<sup>st</sup> year** should cover the following:

**1. Anatomy related to:**

- Diaphragm, upper and lower airway
- Regional anaesthesia, field block, central neuraxial, blockade, block for acute pain states
- Intramuscular injections, arterial and venous cannulations and positioning.

**2. Physics related to:**

- Anaesthesia machine - assembly of necessary items.
- Airway equipment including laryngoscopes, airway devices
- Breathing systems
- Monitoring in anaesthesia with concepts of minimum monitoring
- Gas laws, medical gas supply system
- Fluidics
- Electricity and diathermy
- Oxygen therapy

**3. Physiology related to:**

- Theories of anaesthesia
- Respiratory, cardiovascular, hepatobiliary, renal and endocrine system, pregnancy, blood, muscle and N-M junction, Nerve impulse transmission, ECG, regulation of temperature and metabolism, stress response, cerebral blood flow and ICP. Central, autonomic and peripheral nervous systems.
- Metabolic response to stress and trauma.

**4. Pharmacology related to**

- General principles, concepts of pharmacokinetics and pharmacodynamics
- Drug interactions in anaesthesiology, anaphylactoid reactions
- Drugs used for premedication, induction of anaesthesia, general anaesthetics-intra-venous and inhalational, neuromuscular block and reversal of muscle relaxants.

**5. Biochemistry** relevant to fluid balance and blood transfusion, perioperative fluid therapy, acid base homeostasis in health and diseases.

6. Theoretical background of the commonly used anaesthetic techniques of general and regional anaesthesia, general principles of pre-anesthetic assessment and medication, recovery from anaesthesia and post operative care, effects of positioning during anaesthesia.
7. Introduction to the operation theatre, post-anaesthesia care rooms
8. Introduction to acute, chronic pain and pain management.
9. Documentation and medico-legal aspects of anaesthesia. Defensive anaesthesia. Concept of informed consent.
10. Resuscitation - basic and advanced life support (cardiac and trauma life support), neonatal resuscitation.
11. Intensive care of critical patients with introduction to artificial ventilation, management of unconscious patients, oxygen therapy, shock - pathophysiology and management.
12. Introduction to Research methodology, basics of biostatistics.

The course content of **2<sup>nd</sup> year** should cover the following:

Anatomy related to blocks for chronic pain, chemical neurolysis and different organ systems.

**1. Physics related to:**

- equipments used in anaesthesia monitors, ventilators, vaporizers,
- fiberoptics.
- Laser
- Pacemaker and defibrillator
- Monitoring equipment used for assessment of cardiac functions, temperature, respiratory functions, blood gases, intracranial pressure, depth of anaesthesia and neuromuscular block.
- Sterilization of equipment
- Computers in anaesthesia

2. Pharmacology of drugs used in cardiovascular, respiratory, endocrine, renal diseases and CNS disorders.
3. Interpretation of blood gases and other relevant biochemical values, various function tests and basics of measurement techniques, ECG.
4. Blood coagulation mechanism, disturbances, blood components.
5. Special anaesthetic techniques as relevant to –
  - Outpatient anaesthesia, hypotensive anaesthesia, anaesthesia in abnormal environments including rural area and calamitous situations
  - Associated medical disorders in surgical patients
6. Geriatric and pediatric anaesthesia
7. Emergency, ENT, orthopedic, ophthalmology, obstetrics, dental, radio-diagnosis and radiotherapy.
8. Medical statistics relevant to data collection, analysis, record keeping in anaesthesia, comparison and estimation of significance.
9. Care of terminally ill, Hospices management. Do not resuscitate orders.
10. Postures and anaesthesia.
11. Induced hypothermia, incidental, environmental safety of patient.
12. Malignant hyperthermia, myasthenia gravis, GB syndrome and other neuromuscular diseases, obesity, COPD, Diabetes mellitus, bronchial asthma and hypertensive crises..
13. Third world anaesthesia.
14. Inherited metabolic diseases and anaesthesia.

The course contents of **3<sup>rd</sup> year** should cover the following:

1. Principles of anaesthetic management of neuro/cardiac/thoracic/vascular/transplantation/burns and plastic surgery.
2. Anaesthesia for patients with severe cardiac, respiratory, renal and hepatobiliary disorder posted for unrelated surgery
3. Shock, types, pathogenesis and management of patients in shock, renal failure, critically ill and/or on ventilator.
4. Multiple organ failure
5. Infection control, cross contamination in OT and ICU.
6. Immune response and anaesthesia.
7. Concept of cytokines, and other enzymes.
8. Selection, maintenance and sterilization of anaesthesia and related equipment
9. Chronic pain therapy and therapeutic nerve blocks.
10. Acupuncture, acupressure and other non-conventional methods of treatment.
11. Principles of neonatal resuscitation, ventilation and critical care.
12. Principles of human resources and material management.
13. General principles of medical audit. Critical incident reporting
14. Ethics and clinical trial.
15. Hospital, ICU and OT design and planning.
16. Medical education including evidence based medical education.

## V. *TEACHING AND LEARNING METHODS*

### **Postgraduate Training Teaching methodology**

Didactic lectures are of least importance.

- Teaching should include seminars, journal clubs, symposia, tutorials, case discussions, and research presentations.
- Reviews and guest lectures should get priority for theoretical knowledge.
- Bedside teaching, grand rounds, interactive group discussions and clinical demonstrations should be the hallmark of clinical/practical learning.
- Student should have hands-on training in performing various procedures (medical/surgical concerning his specialty) and ability to interpret various tests/investigations.
- Exposure to newer specialized diagnostic/therapeutic procedures concerning his/her subject should be given.
- A postgraduate student of a postgraduate degree course in broad specialities/super specialities would be required to present one poster presentation, to read one paper at a national/state conference and to present one research paper which should be published/accepted for publication/sent for publication during the period of his postgraduate studies so as to make him eligible to appear at the postgraduate degree examination.
- Log books shall be maintained regularly and should be checked and assessed periodically by the faculty members imparting the training.
- The postgraduate students shall be required to participate in the teaching and training programme of undergraduate students and interns.
- Department should encourage e-learning activities.

### **Thesis: Supervision**

- The postgraduate is responsible to a Faculty member and the latter should be available to advise and assist the student in his clinical assignments
- Departmental teaching committee will be responsible for the educational activities of the department and the teaching schedule.
- This involves providing services for emergencies and it makes different demands upon the anaesthesiologist. It should be learned through experience, with reduced staff. The clinical work during emergency should have a close supervision. The standards should be maintained of the agreed competence on schedule. The emergency duties should be properly arranged with duty off. The postgraduates may have to do emergency duty as per schedule

**During the training programme, patient safety is of paramount importance; therefore, skills are to be learnt initially on the models, later to be performed under supervision followed by performing independently; for this purpose, provision of skills laboratories in medical colleges is mandatory.**

**Simulators:**

Simulators should be used for the events of high importance but infrequent occurrence and where there may be high risks to the patients. The simulators can also be used for assessment purposes.

**Rotation:****Schedule for three years of MD Anaesthesia postings:**

The post graduate student should be exposed to the following areas of clinical anaesthesia practice:

1. Pre-anaesthesia clinic
2. Pain clinic
3. Recovery and Post anaesthesia Care Unit ( PACU )
4. Intensive Care Units
5. Dialysis and transplant
6. All specialty theatres
7. Peripheral areas: Radiology, MRI, ECT and other interventional laboratories

**The suggested schedule of the Operating Theatre can be as follows:** This may change as per availability of specialties.

Operation theatre	Months
General Surgery	6
Urology	1
Ophthalmology	1
Otorhinology	2
Dental	1
Orthopedics/Trauma/casualty	3
Gynecology	3
Obstetrics	3
Pediatrics surgery	2
Burns/Plastic	1
CTVS	2
Neurosurgery	2
ICU	4
Pain	1
Recovery	1
Organ Transplant	(Radiology,Radiotherapy)
posting in the other areas. ECT, Cardiac Cath)	



## **VI. ASSESSMENT**

### **FORMATIVE ASSESSMENT, during the training programme**

**Formative assessment should be continual and should assess medical knowledge, patient care, procedural & academic skills, interpersonal skills, professionalism, self directed learning and ability to practice in the system.**

#### **General Principles**

Internal Assessment should be frequent, cover all domains of learning and used to provide feedback to improve learning; it should also cover professionalism and communication skills. The Internal Assessment should be conducted in theory and clinical examination. The thesis is assessed separately.

**Quarterly assessment during the MD training should be based on:**

- 1. Journal based / recent advances learning**
- 2. Patient based /Laboratory or Skill based learning**
- 3. Self directed learning and teaching**
- 4. Departmental and interdepartmental learning activity**
- 5. External and Outreach Activities / CMEs**

**The student to be assessed periodically as per categories listed in postgraduate student appraisal form (Annexure I)**

#### **SUMMATIVE ASSESSMENT ie., assessment at the end of training**

The summative examination would be carried out as per the Rules given in **POSTGRADUATE MEDICAL EDUCATION REGULATIONS, 2000.**

#### **Post graduate Examination**

The examinations shall be organised on the basis of 'Grading' or 'Marking system' to evaluate and to certify post graduate student's level of knowledge, skill and competence at the end of the training. Obtaining a minimum of 50% marks in 'Theory' as well as 'Practical' separately shall be mandatory for passing examination as a whole. The examination for M.D./ MS shall be held at the end of 3rd academic year. An academic term shall mean six month's training period.

The final examination consists of three parts:

- 1) Thesis
- 2) Theory evaluation
- 3) Practical/Clinical and Oral evaluation

## 1. Thesis

Every post graduate student shall carry out work on an assigned research project under the guidance of a recognised Post Graduate Teacher, the result of which shall be written up and submitted in the form of a Thesis. Work for writing the Thesis is aimed at contributing to the development of a spirit of enquiry, besides exposing the post graduate student to the techniques of research, critical analysis, acquaintance with the latest advances in medical science and the manner of identifying and consulting available literature.

Thesis shall be submitted at least six months before the Theory and Clinical / Practical examination. The thesis shall be examined by a minimum of three examiners; one internal and two external examiners, who shall not be the examiners for Theory and Clinical examination. A post graduate student shall be allowed to appear for the Theory and Practical/Clinical examination only after the acceptance of the Thesis by the examiners.

## 2. Theory consists of four papers of 3 hours each having 10 short structured questions with 10 marks each:

**Paper I** : Basic Sciences as applied to Anaesthesiology

**Paper II** : Practice of Anaesthesia: Anaesthesia in relation to associated systemic and medical diseases.

**Paper III** : Anaesthesia in relation to subspecialties/superspecialties

**Paper IV** : Intensive Care Medicine, Pain Medicine and Recent advances.

## 3. Practical/Clinical Examination: will consist of: 3 clinical cases

**Long case** : One, duration 30 min (history, examination, Diagnosis and Management, Discussion) **100 Marks** (1x100)

**Short cases** : Two, 15 minutes each for short case. In short cases only relevant history important to anaesthesia to be taken (history, clinical examination and diagnosis, discussion). **Each 50 Marks** (2x50)

**Oral/Viva-voce** should be conducted preferably on four tables with one examiner on each table: **Each 50 Marks** (4x50)

Table one : ECG, X-rays, ABG Cards, Pulmonary function tests, Capnographs, clinical exercises card.

Table two : Anaesthetic Drugs, Emergency Drugs, IV Fluids, Nerve Blocks (skeleton).

Table three : Anaesthesia machine including circuits and Vaporizers, ETT, Supraglottic Airway devices, ICU Ventilator and oxygen therapy equipment.

Table four: Resuscitation equipments, resuscitation demonstration, Difficult Airway Equipment, monitoring equipments.

### Alternative

1. One long case, viva voce at one station with all examiners, and : 150 marks

2. 28 OSCE station covering two stations of short cases, drugs ECG, X-rays, PFT, ABG, Respiratory loops, Resuscitation etc.,: 150 marks

## VII. MANDATORY COMPLIANCE

- 1 The Model Weekly Time Table for Teaching learning activities is enclosed as : **Annexure – I**
- 2 Mandatory compliance of a PG student in T.L. process and CIA during the three year of study are given in : **Annexure – II**
- 3 The units for Quarterly assessment for CIA is given in : **Annexure – III**
- 4 Post Graduate student Quarterly Appraisal form for CIA is enclosed as : **Annexure – IV**
- 5 Mandatory Requirements to be eligible to appear for the University Summative Evaluation Examination is given in : **Annexure – V**
- 6 The Proforma of the Certificate on Attendance, Training Completion, Publication and Presentation Research / Poster / oral submission of Dissertation and present of all theory practical fee to be duly filled in and duly signed by PG Guide HOD, Finance Officer, Dean of faculty an HOI to be submitted to university COE before the issue of Hall Ticket for final exam is given us : **Annexure – VI**
- 7 The model QP pattern of paper I/II/III/IV, each of 100 marks and of 3 hours duration is enclosed as : **Annexure – VII**
- 8 The model Blue print for setting of Question papers and proper verbs/ phrases to be used in QP setting is given in : **Annexure – VIII**
- 9 The model marks list for practical and Vivavoce for PG medical MD/MS/ examination is enclosed as. : **Annexure – IX**

## VIII. RECOMMENDED READING

### Books (latest edition)

1. Lee's Synopsis of Anaesthesia
2. Clinical Anesthesiology by Morgan
3. Cardiac Anaesthesia By Joel Kaplan
4. Clinical Anaesthesia by Barash, Cullen and Stoelting
5. Textbook of Anaesthesia by Aitkenhead Rowbotham and Smith
6. Anaesthesia for neonates and infants by Smith
7. Pharmacology and Physiology for Anaesthetists by Stoelting
8. Principles of Obstetric Anaesthesia by Craford
9. Miller's Anesthesia
10. Stoelting RK, Miller RD Basics of Anaesthesia
11. ICU Book, Paul Marino
12. Text Book of Critical Care, by Fink et al
13. Regional Anaesthesia, P Prithviraj
14. Practical Management of Pain, Raj
15. Stoelting and Dierdorf: Anaesthesia and Co-existing Disease

16. Dorsch and Dorsch: Understanding Anaesthesia Equipments
17. ECG by Shamroth/Goldman
18. Anatomy for Anaesthetists by Harold Ellis
19. Clinical Anesthesia by P.G.Barash
20. Longneckers Anaesthesiology- McGraw Hill

**Must refer:**

1. Cucchiara and Michenfelder: Clinical Neuroanaesthesia
2. Cottrell and Smith: Anaesthesia and Neurosurgery
3. Complications in Anaesthesiology by Orkin
4. Complications in Anaesthesia by Raven
5. Airway management by JL Benumof
6. Obstetric Anaesthesia by Chestnut

**Journals**

03-05 international Journals and 02 national (all indexed) journals

## Annexure - I

**P.G. Teaching Time Table – Model**

Clinical postings (OPD – IPD Duties Ward Rounds, Casualty posting, ICU posting, posting to support Departments like Radiology, Anaesthesia CCL , Pathology, FMT, Postings to field work and PHCs Camps and other postings as per provisions of MCI, are mandatory on all week Day as per posting.

<b>Day of the week</b>	<b>Time 03 to 5 PM</b>
Monday	Journal Club
Tuesday	Case presentation / Micro Clinic- Patient based Training
Wednesday	Seminar / GD / Panel Discussion
Thursday	Lecture by Faculty on select Topics
Friday	Clinical Meet / CPC / CME
Saturday	Guest Lecture by Experts / Skill Lab or Simulation Lab
Sunday (Select ones)	Medical Camps / Blood Donation Camp / Other types of Camps

## Note

1. The Dept may select suitable days for a particular task assigned. But all of 7 tasks per week are a must
2. All the PG Teachers, PG students must attend these PG TLE Activities.
3. Attendance for these activities shall be maintained at the Department and Institutions. Implementation of the MCI Regulations, Syllabus and Time Table is the responsibility of HOD / HOI.

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## Annexure – II

**Mandatory Compliance of a PG student in Teaching – Learning Activities  
As per MCI Regulations Syllabus and Advisory**

Sr. No.	Activities to be carried at by a PG student	Number per I <sup>st</sup> year (Minimum)	Number Per II <sup>nd</sup> Year (Minimum)	Number per III <sup>rd</sup> year (Minimum)	Total Number (Minimum) For 3 years
1	Presentation of Journal Articles in Journal club	12	12	6	30
2	a Case Presentation / Clinic	4	8	8	20
	b Skill Lab & Simulation	4	4	4	12
3	a Presentation of Seminars	4	4	4	12
	b Leading a Group Discussion on a select Topic	4	4	4	12
	c Assignment submission	4	4	4	12
4	a Lectures / Tutorials to UG students /panel Discussion	4	4	4	12
	b Clinical meeting CMC/ CPC	12	12	12	36
	c BLS	1	--	--	1
	d ACLS	1	--	--	1
5	Medical Camps Health Checkup at Villages / Schools/ Blood Donation / etc.	6	6	6	18
6	a Orientation Programme	1	1	1	3
	b Research Methodology Workshop	1	--	--	1
	C Presentation of synopsis of the Thesis / Dissertation	1	--	--	1
	d Presentation of Mid Term work of Thesis / Dissertation	--	1	--	1
	e Presentation of final Draft of Dissertation / Thesis	--	--	1	1
	f Presentation of Research Article	--	0 or 1	0 or 1	1
	g Publication of an Article	--	0 or 1	0 or 1	1 or 2
7	LOG Book	1 (a)	1 (b)	1 (c)	1 a+b+c
8	CIA	4	4	4	12
9	Any other Activity Specified by Dept.				

- Note :- 1. The Department may conduct periodic preparatory tests in Theory / Practical/Clinicals and Vivavoce. Quiz and MCQ test may to be adopted
2. The 12<sup>th</sup> CIA may also include a preparation examination on the model of university examination as a training cum assessment

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**Annexure – III**

**Units of Quarterly Assessment of Every student (Internal)**  
**Formative Assessment – Quarterly Assessment** (Total 12 CIAs)  
 As per Annexure III.

**1. Journal Based / Recent Advances learning**

(Bases on Journal Clubs / Select Article Presentation , Review Article preparation and presentation)

**2. Patient Based and Laboratory Based and skill Based learning**

(Based on clinical Posting – OPD / IPD Ward Rounds/ casualty/ Case Examination/ presentation /Diagnosis / Interpretation /of Clinical Diagnostics/ Differential Diagnosis, Prognosis/ Morbidity/ Mortality/ Community Medicine/ Promotion/ prevention/ Control/ Prophylaxis/ Epidemiology/ Simulation Studies/ Skill Based Studies and so on)

**3. Self Directed Learning and Teaching**

(Seminars Panel Discussion Group Discussion, Assignments, Case studies, Preparation of Charts and Models etc. , Role Play, Debates, Moot courts, etc)

**4. Departmental and Inter Departmental Learning Activities.**

(Participation in UG/PG teaching / Horizontal and Vertical Integrated Lectures, Clinical meeting / CPC / CME)

**5. External and out research Activities**

(Participation in Camps, Posting and Visit to PHCs, Satellite clinics, Mobile Clinics, Health checkup Camps, Blood Donation Camps, Immunization Camps school Visits. Crisis / Disaster Management, Celebration of Commemorative Days and soon)

**6. Thesis / Dissertation Research Work related to selected Topic****7. a) Log Book maintenance/ Portfolio management - To maintain LOG Book or portfolio management of all the TL Activities**

b) Presentation / Publications of Research Article

No.	Particulars	Minimum for 3 months
1	Journal based Recent Advance Learning- Presentation of select Article in Journal clubs	3
2	a Patient Based laboratory or Skill based learning- Case presentation / Clinic	1 (1 <sup>st</sup> year) 2 (2 <sup>nd</sup> & 3 <sup>rd</sup> year)
	b Skill Lab / Simulation Lab Work	1
3	a Self Directed Learning & Teaching- Presentation of Seminar	1
	b Leading a Group Discussion on select Topic in GD	1
	c Assignment Submission	1
4	a Lecture / Tutorials / Panel Discussions with UG students	1
	b Clinical Meetings (CME's) CPC/Dept. meeting	3
5	Medical Camps	1
6	Dissertation Work Research methodology workshop	Yes / No
7	Log Book & Attendance	Yes / No
8	Any other Activity Prescribed (T/P/Viva)	Yes / No

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## Annexure IV

**Postgraduate Students Appraisal Form**  
**Pre / Para /Clinical Disciplines – MD/MS Degree**

**Name of the Department/Unit :** \_\_\_\_\_ **Roll No.:** \_\_\_\_\_  
**Name of the PG Student :** \_\_\_\_\_  
**Period of Training : FROM.....TO.....**  
**Quarterly Assessment (1/2/3/4/5/6/7/8/9/10/11/12)**

Sr. No.	PARTICULARS	Not Satisfactory			Satisfactory			More Than Satisfactory			Remarks
		1	2	3	4	5	6	7	8	9	
1.	Journal based / Recent advances learning										
2.	Patient based/Laboratory or Skill based learning										
3.	Self-directed learning and teaching										
4.	Departmental and interdepartmental learning activity										
5.	External and Outreach Activities / CMEs										
6.	Thesis / Research work										
7.	Log Book Maintenance										
8.	Performance in Theory/Practical/Viva voce Tests										
	<b>Overall Assessment</b>										

- **Publications of Research Article** Yes/ No
- **Presentation of Research Article**
- **The student has complied with mandatory requirement for quarterly assessment & presentation of Research Profile** Yes/No

**Remarks\*** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**\*REMARKS:** Any significant positive or negative attributes of a postgraduate student to be mentioned. For score less than 4 in any category, remediation must be suggested. Individual feedback to postgraduate student is strongly recommended.

SIGNATURE OF ASSESSEE

SIGNATURE OF HOD

\_\_\_\_\_  
**HEAD OF THE INSTITUTION**

**Annexure - V**

**Mandatory Requirements to be eligible to appear for university  
Summative Examination / Evaluation – As per MCI Regulations.  
(As per MCI Medical Education Regulation 2000, amended from time to time till date)**

1. Minimum percent of Attendance as per MCI Regulations.
2. Satisfactory performance in 12 CIA conducted and certified by HOD HOI and PG Guide.
3. Certificate from F.O. stating that all the fees due from the student are paid and credited to PIMS-DU A/c
4. Presentation of a Research Article / Poster in a national / state level conference /Seminar / Workshop.
5. Publication of a Research Articles as first – author in (indexed in scopus or web of science or as fixed by MCI Regulations and visited by UGC (ARE list).
6. a) Thesis – Finalisation of Topic and Title – submission of Synopsis following IEC clearance within 6 months of Adm. Topics  
b) After II year of a Admission or 3 terms Midterm Review .  
c) Thesis to be submitted at least 6 months before final examination.  
d) Thesis to be examined by 3 Examiners. (1 Internal and 2 External PG Examiners)  
e) Its Acceptance is a must for appearing for University T & P Exam

Note :- HOD & HOI shall ensure provisions of 1,2,3,4,5,6 a,b,c. The COE shall ensure provisions of 1,2,3,4,5,6 a,b,c ,d,e & e as per MCI Regulations

**HEAD OF DEPARTMENT**

**HEAD OF INSTITUTION**

**DEAN OF FACULTY**

**REGISTRAR**

## Annexure - VI

Ref. No.

Date: \_\_\_\_\_

**Compliance to MCI's Regulations Governing Post Graduate Programme in Medical Faculty**

Department of \_\_\_\_\_ PG Programme: MD/ MS in \_\_\_\_\_

Name of Candidate: \_\_\_\_\_, JR-III

PRN No. \_\_\_\_\_ Date of Admission \_\_\_\_\_

**Certification on**  
**Attendance and Training Completion**  
**Publication & Presentation of Research Articles (Poster/ Oral)**  
**Submission of Dissertation & Payment of All types of prescribed fees**

It is hereby certified that the said candidate JR-III in the Dept. of \_\_\_\_\_ at Rural Medical College has completed 6 academic terms/ 3 academic years and fulfilled the prevailing provisions of the MCI Regulations governing MD/MS PG programmes and the rules of PMT, PIMS-DU. Details are as under.

1.	<b>Attendance Fulfillment *</b>	<b>% Attendance</b>	<b>Remark – Eligibility</b>
	I Academic Term		
	II Academic Term		
	III Academic Term		
	IV Academic Term		
	V Academic Term		
	VI Academic Term		
	Overall fulfillment		Fulfilled / Not Fulfilled
* Fulfillment of a minimum of 80% of attendance/ academic term, for 6 terms/ 3 years including imparted training, assignment, fulltime responsibilities and participation in all facets of PG education process including periodic assessment and so on as per MCI Regulations.			
2.	Log Book maintained as per MCI Regulations & Fulfilled the graded responsibilities in the management and treatment of patients entrusted for their care		Yes/ No
	Verified by Dr. _____ Certified by Dr. _____		
3.	Successful participation in teaching and training programmes organized by the department for UG and Interns		
4.	Presented and Participated in Seminars, Journal Clubs, Case Presentations, Group Discussions, Clinical Meetings, CME Ward Round, CPC, Practicals organized by the Department as per the timetable.		

5.	Participated in training sessions in diagnostics, medical/ surgical training, in basic/ applied medical and allied clinical specialties and Medical Camps as per the timetable	
6.	The Performance of the PG students in 12 CIAs (Conducted quarterly) are satisfactory as per appraisal proforma as per MCI Regulations.	
7.	Presented one research poster and one research article (oral) in a Seminar/ Symposia/ Workshop/ Conference (National/State). The certificates for presentation of paper/ poster are enclosed.	
8.	Published one research article in a scientific journal as per norms. The copy of the published research article is enclosed.	
9.	Submitted a Dissertation entitled _____ _____ _____ under the guidance of Dr. _____	
10.	Paid all the fees (tution fees and other fees) vide receipt No. _____ for all 3 years.	
11.	Produced NOC from all the sections of PMT PIMS-DU concerned about "NO DUES"	
12.	Paid Examination fees of Rs. _____ vide Challan/ Receipt No. _____ dated _____ issued by Finance Officer PIMS-DU.	

It is hereby declared that the all the duly certified and verified documents, related to the aspects mentioned above, are in the custody of department concerned and student section of Rural Medical College with due authentication and signature of concerned HOD/ Dean/ Principal/ Dean of Faculty) and will be made available for any MCI inspection as per norms and Regulations.

Accordingly He/She is eligible/ not eligible for appearing in final year PG examination as per the MCI Regulations governing PG Programmes.

**PG Guide**

Dr. \_\_\_\_\_

Seal

**Head of the Department**

Dr. \_\_\_\_\_

Verified and certified that all types of prescribed fees and fines PMT, PIMS-DU, College, Hostel & Others mentioned at sl.no. 10, 11, 12 are paid by the student and credited to the accounts of PMT & PIMS-DU.

Seal

**Finance Officer**  
PIMS-DU

Verified the relevant documents and certify that the candidate is eligible to appear for final year PG Examination as per MCI Regulations and rules of PIMS-DU.

**Dean**

Faculty of Medicine

Seal

**Dean**

Rural Medical College

Ref \_\_\_\_\_

**For Officer Use Only** Date: \_\_\_\_\_

The HOD, HOI and Dean have certified that the

- a. Candidate is eligible to appear for PG Theory and Practical/ Clinical Examination as per MCI Regulations. F.O. has certified that all the fees has been credited to PMT, PIMS-DU Accounts.
- b. The Dissertation submitted has been evaluated by external examiners and then have approved the same for acceptance as per MCI Regulations.
- c. Hence the candidate be permitted to appear for the PG examinations (Theory & Practical/ Clinical) scheduled in the month of \_\_\_\_\_ year \_\_\_\_\_.

**Controller of Examinations**



**Submitted for perusal and approval**

**Vice Chancellor**



## Annexure – VII

**PRAVARA INSTITUTE OF MEDICAL SCIENCES**  
(Deemed to be University)

**Post Graduate Degree in Anesthesiology(MD)**

**Examination \_\_\_\_\_ 20\_\_**

**Paper – I/ II/ III/ IV**

**Paper Title : \_\_\_\_\_**

**Date:     /     /20**

**Marks : 100**

**Time:**

**Instructions to candidate:**

- 1) All questions are compulsory
- 2) Answer written in illegible handwriting will not be assessed.
- 3) Write answers on both sides of answer paper.
- 4) Neat diagrams must be drawn wherever necessary.
- 5) Write prescription where indicated, and in the use of drugs their doses should be given.

<b>Que. 1</b>	Marks 10
<b>Que. 2</b>	Marks 10
<b>Que. 3</b>	Marks 10
<b>Que. 4</b>	Marks 10
<b>Que. 5</b>	Marks 10
<b>Que. 6</b>	Marks 10
<b>Que. 7</b>	Marks 10
<b>Que. 8</b>	Marks 10
<b>Que. 9</b>	Marks 10
<b>Que. 10</b>	Marks 10

## Annexure – VIII

**Table 1: Showing BLUEPRINTING for theory paper setting**

The number of Questions & their distribution of marks shall be as per MCI model Question Paper [only Illustration]

LAQ/ SAQ and their Marks								
LEVEL	Q	Q	Q	Q	Q	Q	Q	Total
	Mark	Mark	Mark	Mark	Mark	Mark	Mark	
Knowledge								
Comprehension								
Application								
Analysis								
synthesis								
Evaluation								
TOTAL								1000

The Questions (Whether LAQ or SAQ) Must aim at assessing all the 6 domains

**Note:** This is only an illustration. Actual Number of Questions and their distribution of marks shall be as per model Question Paper of MCI. (i.e. regarding the number of LAQ / SAQ and their marks distribution)

**Table 2: Showing appropriate verbs suitable to level of knowledge for theory paper setting**

Level	Suggested Verbs
<b>Knowledge</b>	Define, Describe, Draw, Find, Enumerate, Cite, Name, Identify, List, label, Match, Sequence, Write, State
<b>Comprehension</b>	Discuss, Conclude, Articulate, Associate, Estimate, Rearrange, Demonstrate understanding, Explain, Generalize, Identify, Illustrate, Interpret, Review, Summarize
<b>Application</b>	Apply, Choose, Compute, Modify, Solve, Prepare, Produce, Select, Show, Transfer, Use
<b>Analysis</b>	Analyze, Characterize, Classify, Compare, Contrast, Debate, Diagram, Differentiate, Distinguish, Relate, Categorize
<b>Synthesis</b>	Compose, Construct, Create, Verify, Determine, Design, Develop, Integrate, Organize, Plan, Produce, Propose, rewrite
<b>Evaluation</b>	Appraise, Assess, Conclude, Critic, Decide, Evaluate, judge, Justify, Predict, Prioritize, Prove, Rank

**Table 3: Showing examples of theory questions**

Sr. No.	Type	Explanation	Examples
1	Long essay question	<ul style="list-style-type: none"> <li>✓ Question should pose clinical problem that will require student to apply knowledge along with integration with disciplines</li> <li>✓ Avoid one liner as question</li> <li>✓ Question stem should be structured</li> <li>✓ Marking distribution should be provided</li> <li>✓ Use of proper verbs from higher domains as given in this document</li> <li>✓ Avoid recall based questions</li> </ul>	
2	Short notes	<ul style="list-style-type: none"> <li>✓ Sample a wider content</li> <li>✓ Questions should be task oriented</li> <li>✓ Reasoning questions provide opportunity for testing integration, clinical reasoning and analytical ability of the student</li> </ul>	

**Table 4: Showing Objective structured clinical examination [OSCE] typical station**

Sr. No.	Type of station	Time allotted	Example	Evaluation
1	Procedure			
2	Response			

## Annexure – IX

**University Examination  
Model Marks Sheet  
For Practical / Clinical Examination and Vivavoce**

Duration \_\_\_\_\_

Max Mark – 400

## Illustration only

No.	Type of Examination	Marks Allotted	Scored
1	Long Cases		
2	a) Short cases (No. of small cases and Marks for each cases) 1/2/3/4----- b) Ward Round c) Any other		
3	Spotter / OSPE/ Oral / Vivavoce Sub Divisions i)                      iv) ii)                     v) iii)                    vi)		
	Ground Total	400	

PG Examiners	Name	Signature
1	Chairman Name	
2	Internal Examiner	
3	External Examiner	
4	External Examiner	

Date:-

Place:-

- Note:- 1) The Number of cases, type of cases and type of practical and orals / vivavoce and their distributions of marks shall be as per MCI Regulations / Syllabi.
- 2) The HOD / Chairman / Co Chairman BOS shall ensure at this proforma is prepared as per the MCI Regulations / Syllabi.

