



D. Y. Patil University

SYLLABUS FOR M.D. ANESTHESIA

At the end of three years of training as residents in anaesthesia, the candidates should be fully conversant with theory and practical aspects of:

- A. Human Anatomy and Physiology** of various organ systems and cellular components in relation to Anaesthesia including muscles, neuromuscular junction, nerve plexuses, cardiovascular, respiratory, neurological, hepatobiliary, renal, endocrine and temperature homeostasis, theories of mechanism of production of anaesthesia, changes during pregnancy, various tests/investigations to evaluate the functional status of organ systems as applied to Anaesthesia Management, Intensive Care Practice and Pain Relief
- B. Pharmacology** as applied to Anaesthesia, Intensive Care Practice and Pain Relief including General Pharmacological Principles, Pharmacokinetics and Pharmacodynamics of Anaesthetic Drugs (including Uptake and Distribution of Inhaled Anaesthesia agents and All the Adjuncts used in Anaesthesia, Drugs used for treatment of various Diseases and Drug Interaction.
- C. Pathophysiology of various diseases** including disorders of cardiovascular, respiratory, neurological, hepatobiliary, renal, endocrine and immune systems, various tests/investigations to grade/measure the disease process of various organ systems as applied to anaesthesia management, intensive care practice and pain relief
- D. Medicine** as applied to the practice of Anaesthesia including diagnosis and management of Diabetes, Hypertension, Bronchial Asthma, Chronic Obstructive Pulmonary Diseases, Respiratory Failure, ARDS, Myocardial Ischemia / Infarction, Arrhythmia, Shock, Congestive Heart Failure, Acute / Chronic Renal Failure, Head Injury, Unconscious patients, Status Epilepticus / Asthmaticus, Endocrine Disorders, Diseases related to Dysfunction of Hepatobiliary, Muscular, Connective Tissues and Immune system, Management of Perioperative Infection, Neuromuscular Disorders, Poisoning etc. and interpretation of ECG / Blood Gases / Other Biochemical Values and Function Tests
- E. Physics** as applied to Anaesthetic gases, vapours, anaesthesia machine, breathing systems, monitors, ventilators, therapeutic devices & other relevant equipment including physical principles involved in their construction and functioning
- F. Perioperative Anaesthesia management** including pre-operative evaluation, intra-operative management as well as post-operative care, monitoring (invasive as well as non-invasive) as applied to various surgical specialities and age groups.
- G. Theory and practice of various techniques / aspects of Routine & Emergency cases** of **General Anaesthesia** (e.g., Intravenous / Inhalational, Endotracheal / Mask / LMA / COPA, Spontaneous/Controlled mode of ventilation, induced hypotension / hypothermia etc.), **Regional Blocks** (Spinal, Epidural & Peripheral Nerve block) and **Local Anaesthesia**, including **various postures** required for anaesthetic/surgical procedures, their effects and **Recent Advances** for most minor to supra major surgeries in the field of:



- **General surgery:** e.g. minor cases like haemorrhoidectomy to supra major cases like Liver transplant
- **Gynaecology and Obstetrics**
- **ENT and Head & Neck**
- **Orthopaedics**
- **Ophthalmology**
- **Pediatric & Neonate:** Differences between adult and pediatric Anatomy, Physiology, Pharmacology, Anaesthesia principles, pediatric/neonatal emergencies, postoperative care, fluid & ventilator management, etc.
- **Cardiac, Vascular & Thoracic:** Conduct of closed heart as well as open heart surgeries (Valvular, Ischemic, Congenital -Cyanotic & Acyanotic), CABG (including off pump), Pulmonary Cases (Insertion of Double Lumen Tube, one lung anaesthesia), Thymus and Vascular surgeries etc. Ability to go on Cardiopulmonary bypass and disconnect from bypass, Ability to take, manage and interpret Arterial, Central Venous and P.A. Lines, postoperative care, management of re-explorations, etc.
- **Neurosurgery:** Ability to monitor ICP, Management of head injuries, bleeds, tumours, etc with raised ICT. Ability to safely manage cases in sitting, prone, lateral, jack-knife positions and Anaesthetic management for neuro-radiology procedures
- **Urology:** Management of endoscopic surgeries like TURP/TURBT etc, Problems related to TURP, extracorporeal shock wave lithotripsy, percutaneous placement of nephrostomy etc., anaesthetic management of patients with acute and chronic renal failure, anaesthetic management of renal transplant cases of donor as well as recipient.
- **Plastic:** Management of burns contractures, congenital faciomaxillary abnormalities like cleft lip and palate, faciomaxillary injuries like fracture mandible, maxilla, zygoma, panfacial fractures, difficult intubations, microvascular surgeries, reconstructive surgeries, aesthetic surgeries, etc.
- **Dental:** Monitored Anaesthesia Care, Anaesthetic management of pedodontia patients, maxillofacial surgeries including TMJ Ankylosis, Awake, Retrograde & Fiberoptic intubations
- **Endoscopies / laparoscopies:** Anaesthetic management, specific requirement and complications of various endoscopies like cystoscopy, ureteroscopy, PCNL, hysteroscopy, thoracoscopy, mediastinoscopy etc. and Lap. assisted/laparoscopic surgery like hysterectomy, tube ligation, appendicectomy, cholecystectomy etc.
- Anaesthesia for various **diagnostic, therapeutic and Specialized** procedures
- Anaesthesia for **Geriatric patients**
- Anaesthesia for surgery using **LASER**
- **Anaesthesia / Sedation techniques out side operating room:** Electroconvulsive shock therapy (ECT), Electrophysiologic tests, Radiofrequency ablation, Cardioversion, Cardiac catheterization, Special anaesthetic considerations in radiology and interventional radiology related to Dye allergies, Embolization, Monitoring / Equipment options in the MRI suite.



H. History of Anesthesia

- I. **Airway Management:** Assessment of difficult airway, Awake, Retrograde, Use of intubating LMA's, Intubating Stylets, Various laryngoscopes designated for difficult airway, Insertion of Combitube, Ability to perform Cricothyrotomy and use of Venturi, Minitrach & Fiberoptic intubations etc
- J. **Basic & Advanced Cardiopulmonary & Cerebral Resuscitation (CPCR)** for all age group of patients under different situations e.g., neonates, pregnant females, poisoning cases, trauma victims etc.
- K. **Acid base & Fluid management** including use of Crystalloids, Colloids, blood & blood products
- L. **Arterial, Central Venous and P.A. Lines:** Establishment, management and interpretation
- M. **Anaesthetic drugs** used in **perioperative care**
- N. **Equipments** (Minor to advanced monitoring) – their use, maintenance, sterilisation and care
- O. **Medical gases: Knowledge of** Manufacturing, Storage and Central pipeline Systems
- P. **Day Care / Outpatient** Anaesthesia.
- Q. **Remote Location Anaesthesia:** Anaesthetic practice during **disasters** and for large turnover surgeries in **camps / mass casualties**.
- R. **Emergency** Anaesthesia
- S. **Monitored Anaesthesia** Care
- T. **Labour Analgesia**
- U. **Pain relief** – Acute & Chronic
- V. **Critical care practice** including oxygen therapy, respiratory therapy, ventilatory support, haemodynamic monitoring, prevention and management of multi organ failure, and care of patients with brain damage or brain dead patients For organ Transplant
- W. **Advanced Trauma Life Support (ATLS)**
- X. **Occupational Hazards**
- Y. **Safety** in Anaesthesia
- Z. **Complications of Anaesthetic procedures, its prevention, detection and management**
 - AA. **Record keeping** in Anaesthesia
 - BB. **Medical Audit**
 - CC. **Quality Assurance**
 - DD. **Anaesthesia standards:** e.g., Minimum monitoring standard
 - EE. **Medicolegal** aspects in Anaesthesia
 - FF. **Ethics** in Anaesthesia
 - GG. **Principles of Evidence Based Medicine**
 - HH. **Basic Research Methodology and Clinical Trials**
 - II. **Bio-statistics**
 - JJ. **Computers:** Utility, computer assisted learning and data storage, Computerised anaesthesia records
 - KK. **Skills:** for planning of operation theater, pain clinic, recovery room, intensive care etc. including selection and purchase of equipments



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TRAINING PROGRAMME

A. ADMINISTRATION OF ANAESTHESIA & PRE - OPERATIVE PATIENT CARE

I Year Residents:–

Assisting during minor & major anaesthesia procedures and managing patients in recovery or intensive care areas (all Under Supervision)

The first month of the first year will be spent in orientation in the operating rooms and attending lectures covering the basics of the discipline. After that the first year of training will be spent in learning the fundamentals of anesthesiology with emphasis on checking of anaesthesia equipment including anaesthesia machine, airway equipment and appropriate monitors, preparation of appropriate dosages of various drugs required at specific point of time, mastering clinical skills regarding selection and implementation of an appropriate anaesthesia plan, placement of lines, induction of anaesthesia, intubation, maintenance of anaesthesia, and the successful reversal of anesthetic agents. Emphasis will also be placed on learning regional anaesthesia and Cardiopulmonary resuscitation. Also the candidates will be assigned guides for thesis so as to help them prepare protocols.

To start with the first year residents will observe and then slowly become independent in giving general anaesthesia and Regional anaesthesia to patients belonging to ASA grade I & II for minor and major surgery, under graded supervision. They will be posted in rotation to the following specialties during the first year: Preoperative assessment area, General Surgery, Gynecology, Obstetrics, Orthopedic, ENT, and Recovery Room. They will be assigned to cases in the Operating Room at the hospitals attached to medical teaching institutes affiliated to the University under which they have registered and will gain experience under the direction and supervision of respective academic faculty.

II Year Residents:–

Assisting during minor & major procedures under anaesthesia, managing patients in recovery or intensive care areas and Independently conducting minor procedures under anaesthesia (GA/RA) for ASA grade I or II patients (excluding expected difficult airway cases and cases with expected major body fluid shift)

The second year of training will be devoted to the subspecialties/superspecialities of anesthesia at the hospitals affiliated to medical teaching institute and the university under the supervision of a faculty member with an aim to concentrate on mastering the knowledge and technical skills associated with providing anesthesia to subspecialty/superspeciality patients. Residents will be rotated in Pediatric anesthesia, Neuroanesthesia, Cardiovascular and Thoracic anesthesia, Ambulatory anesthesia, Obstetrics, Dental Surgery, Ophthalmology, Pain Clinic / Pain Management, Peripheral Theatres, Anaesthesia Outside Operating Rooms, Trauma care, Transplant Surgeries etc. They will be taught to give general anaesthesia and regional anesthesia (Extradural Block - EDB, Spinal Block, and Peripheral Nerve Blocks) to ASA grade I, II, III & IV patients under supervision for superspeciality theaters. They should be able to give GA/RA to other ASA grade I & II patients independently. Rotations in critical care areas e.g., Trauma Ward, Post Anesthesia Care Unit / ICU / Emergency Medical Service will also be part of the second year training curriculum. They should learn pediatric and trauma life support and maintain



skills for basic and advanced cardiac life support. The student should be able to analyze and present scientific data and write a thesis.

III Year Residents:–

Assisting during minor & major procedures under anesthesia, managing patients in recovery or intensive care areas and Independently conducting both minor and major procedures under anesthesia (GA/RA) for ASA grade I or II patients (excluding expected difficult airway cases and cases with expected major body fluid shift)

The third (final) year of training will be devoted to management of most complex cases available at the institute under the supervision of a faculty member. The residents will be trained to exercise independent judgment, to take responsibility while caring for such patients, and to take part in research projects under the supervision of a faculty member. The student should be able to plan and administer anesthesia to all patients under graded supervision including patients for Cardiac, Neurosurgery, Pediatric surgery and for all major surgery of subspecialty branches. The aim at the end is to be competent and independent soon after the third year of residency in providing anesthesia to elective and emergency cases belonging to all specialities. The resident should be able to manage critically ill patients and treat intractable pain. They should also know how to organize mass casualty.

B. THESIS –

- The aim of thesis should be to make the student able to demonstrate capability in research by planning and conducting systematic scientific inquiry & data analysis and deriving conclusion.
- Thesis protocol should be submitted at the end of six months after admission in the course to the Research Committee of the Institute. The protocol must be presented in the department of Anesthesiology before being forwarded. The research committee appointed by the Dean/Principal to scrutinize in references to its feasibility, statistical validity, ethical aspects, etc would approve the Protocol.
- Protocol in essence should consist of:
 - Introduction and objectives of the research project.
 - Brief review of literature.
 - Suggested materials and methods, and (scheme of work)
 - Statistician should be consulted at the time of selection of groups, number of cases and method of study. He should also be consulted during the study.
 - Bibliography
- Chief guide for thesis will be from the department of Anesthesiology and co-guide(s), if needed, will be from the department of Anesthesiology or from other disciplines related to the thesis.
- The thesis shall relate to the candidate's own work on a specific research problem or a series of clinical case studies in accordance with the approved plan.
- The thesis shall contain: Introduction, review of literature, material and methods, observations, discussions, conclusion and summary and reference as per index medicus.



ACADEMIC ACTIVITIES – Participation by way of attendance / presentation in Didactic lectures, Symposia, Group discussions, Workshops, Morbidity & Mortality meet, Panel Discussion etc. **Each Student should actively participated in at least 6 academic sessions per year** during the total training period of three total 18).

A. LOG BOOK MAINTENANCE of all the clinical and academic work done by the student in his/her tenure of three years.

Minimum Procedures/Cases required to be done and entered in the log book

Regional Block	
Spinal	=30 to do
Epidural	=30 to do
Combined Spinal Epidural	= 20 to do
Caudal	= 10 to do
Bier Block (IVRA)	= 5 to do
Sciatic/Femoral	= 5 + 5 (to observe or do)
Ankle Block	= 5 (to observe or do)
Stellate Ganglion Block	= 3 (to observe or do)
Brachial Plexus	= 5 to observe & 10 to do
Sympathetic Block	= 3 (to observe or do)
Trigger Point injection	= 3 (observe)
Other peripheral N. Block	= 3 to do
Ophthalmic Blocks	= 5 (to observe)
Field Block	= 3 (to observe or to do)
Anesthesia for:	
General Surgery	= 50 (to do)
Gynecology	= 50 (to do)
Obstetrics	= 20 (to do)
ENT	= 20 (to do)
Orthopedics	= 20 (to do)
Ophthalmology	= 5 (to do)
Plastic Surgery	= 5 (to do)
Endoscopy / Laparoscopy	= 5 (to do)
Urology	= 5 (to do)
Pediatric Surgery	= 5 (to observe)
Craniotomy	= 5 (to observe)
Spinal Surgery	= 5 (to observe)
Joint Replacement	= 5 (to observe)
Anesthesia for organ transplant	= 5 (to observe - desirable)
ECT	= 10 (to do)
Radiology / CT Scan	= 5 (to do) Anaesthesia/sedation
Procedures	
Internal Jugular Cannulation	= 5 + 5 (to observe or do)
External Jugular Cannulation	= 5 to do



Subclavian Vein Cannulation	= 5 + 5 (to observe or do)
Peripheral Central Line	= 15 to do
Arterial Line Cannulation	= 10 to do
Endotracheal Intubation	= 250 to do
LMA insertion	= 30 to do
Difficult Airway Management	= 5 to do
Conduct of Cases	
ASA I	= 300 to do
ASA II	= 200 to do
ASA III	= 50 (to observe)
ASA IV	= 30 (to observe)
Labour Analgesia	= 5 (to observe or do)

UNIVERSITY EXAMINATIONS

- After successful completion 3 Years' residency

Theory Examination: Each paper 100 marks – 3 hrs duration

	Sections with marks
Paper I	Basic Sciences related to Anesthesia (History, Anatomy, Physiology, Pharmacology, Pathology, Physics, Instrument & Equipments, etc) 4 Sections, each having two questions: 'A' (13 marks), and 'B' (12 marks) Total = 100 marks
Paper II	Theory & Practice of Anesthesia - Pediatric anesthesia - Obstetric anesthesia - Cardiac anesthesia 4 Sections, each having two questions: 'A' (13 marks), and 'B' (12 marks) Total = 100 marks
Paper III	Clinical sciences like Medicine & Surgery related to Anesthesia - Neuro anesthesia - Critical care 4 Sections, each having two questions: 'A' (13 marks), and 'B' (12 marks) Total = 100 marks
Paper IV	Recent Advances in Anaesthesia 5 Questions of 25 marks each, out of which 4 questions have to be attempted Total = 100 marks
	TOTAL THEORY = 400

Minimum passing marks in each head 40% and aggregate: 50% in all papers



Practical Examination:

	Description	Marks	Preparation time	Assessment time
	Clinical cases One long case – 120 marks Two short cases - 60 each	300		
Viva (Four Tables)	Viva Voce on Equipments, Drugs, Investigations, ECG , Dissertation	100		
	TOTAL PRACTICAL	400		

Minimum passing marks: 50% separate in clinical and viva

- One Long case : 120 marks
- Two short cases : 60 marks each
- Practical demonstration and assessment : 60 marks

- 20 marks for assessment- three year performance including participation, PG activity and state /national conferences representation, publications.
- 40 marks for practical demonstration of techniques which includes (any four of the below each of 10 marks).
 - 1) Central venous cannulation-internal jugular/subclavian
 - 2) Intra arterial cannulation
 - 3) Insertion of supraglottic airway devices (Sureme, Proseal, ambu lma, l lma, l gel)
 - 4) Regional blocks-Upper limb – interscalene, supraclavicular, infraclavicular, axillary
Lower Limb-different approaches of sciatic, popliteal, femoral blocks.
 - 5) Central neuraxial block- spinal/epidural/needle through needle/cervical epidural/thyroid block.

Recommended Reading

I. Books

S.No	Name	Authors/Editors	Year of publication	Last Edition	Publication House
1	Lee’s Synopsis of Anaesthesia	G.B.Cashman, N.J.H Davies	2006	13th	Butterworth-Heinemann
2	Wylie & Churchill Davidson’s – A practice of Anaesthesia	Thomas E. Healy Paul R. Knight	2003	7th	Arnold
3	Anaesthesia	Miller Ronald D.	2005	6 th	Elsevier Churchill Livingstone
4	Yao and Artusio’s Anesthesiology	Fun-Sun F.Yao	2003	5th	Lippincott Williams & Wilkins
5	Anesthesia and Coexisting	R. K. Stoelting S.F. Dierdorf	2002	4th	Churchil Livingstone



	Disease				
6	Anesthesia and Uncommon Disease	Fleisher	2005	5th	Saunders Elsevier
7	Clinical Anaesthesiology	G.E.Morgan M.S.Mikhail	2005	4th	McGraw-Hill
8	Understanding Anaesthesia Equipment	Jerry A. Dorsch Susan E. Dorsch	1998	4th	Williams & Wilkins
9	Wards Anaesthesia Equipments	Davey	2005	5th	Bailliro Tindall
10	Anatomy for Anaesthetists	Harold Ellis Stanley Fieldman	2005	8th	Blackwell Science
11	Pharmac. & Physiology in Anaesthetic Practice	R. K Stoelting S.C.Hillier	2006	4th	Lippincott-Raven
12	Shnider and Levinson's Anesthesia for Obstetrics	Hughes Levinsons Rosen	2002	4th	Lippincott Williams & Wilkins
13	Paediatric Anaesthesia	Gregory	2005	4th	Churchil Livingstone
14	Cardiac Anesthesia	Kaplan	2005	4th	W. B. Saunders & Co
15	Thoracic Anesthesia	Kaplan	2003	3rd	Churchil Livingstone
16	Clinical Application of Mechanical Ventilation	David W. Chang	2001	2nd	Delmar-Thomas Learning

II. "Recent Advances in Anaesthesia and Analgesia" Last two Editions: Mosby Publications

III Journals

1.Indian Journal of Anaesthesia	5. Anaesthesia
2.Journal of Anaesthesiology and Clinical Pharmacology	6. British Journal of Anaesthesia
3.Indian Journal of Critical Care Medicine	7. Anesthesia & Analgesia
4.Anesthesiology Clinics of North America	8. Anesthesiology