

पाटन स्वास्थ्य विज्ञान प्रतिष्ठान सेवा आयोग
प्राज्ञिक सेवा, एनेस्थेसिया समूह, सह-प्राध्यापक पद, दशौं (१०) तहको
खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम

Paper II: Technical Subject

Section (A) - 45 Marks

APPLIED BASIC SCIENCES:

1. ANATOMY:

a. Anatomy of respiratory system:

- i. Nasal cavity, oropharynx and nasopharynx. Trachea and bronchus. Course, measurement and structure.
- ii. Larynx. Innervations.
- iii. Cricothyroid membrane.
- iv. Lungs. Topographical anatomy. Innervations. Circulation.
- v. Pulmonary veins, Bronchial arteries and veins. Relation between bronchial and pulmonary circulation.
- vi. Alveolar-capillary unit.

b. Anatomy of spine:

- i. Cervical, thoracic and lumbar vertebrae.
- ii. Anatomy of epidural space.
- iii. Spinal cord. Upper and lower extremity innervations.
- iv. Caudal epidural. Boundaries.
- v. Paravertebral space. Boundaries.
- vi. Anatomy of autonomic nervous system.
- vii. Anatomy of spinal cord, circulation

c. Anatomy of:

- i. Brachial plexus at different levels: interscalene, supraclavicular, infraclavicular and axillary area.
- ii. Femoral, Sciatic nerve and its course.
- iii. Transabdominis plane.
- iv. Stellate ganglion.
- v. Anatomic course of internal jugular vein and subclavian vein

2. PHYSIOLOGY:

a. Respiratory system:

- i. Spirogram. Lung Volumes and Capacities. Measurement. Clinical application. Lung function tests.
- ii. Functional residual capacity. Determinants.
- iii. Oxygen cascade. Significance.
- iv. Flow of gas in respiratory passages. Flow: laminar and turbulent. Hagen Poiseuille's Equation.
- v. Dead space. Alveolar gas concentration. Alveolar gas Equation
- vi. Lung zones. Ventilation and perfusion in different lung areas. Clinical application.

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- vii. Change in V/Q ratio in standing, supine, lateral and prone position. Awake and under anesthesia.
- viii. Physiology of one lung ventilation.
- ix. Shunts, V/Q mismatch. A-a gradient. Mixed venous oxygen saturation
- x. Blood gas transport. Oxygen-hemoglobin dissociation curve and its clinical applications.
- xi. Pulmonary circulation, pulmonary artery resistance pressure. Factors affecting pulmonary pressure.
- xii. Lung mechanics. Static and dynamic compliance. Compliance curves. Muscles of respiration. Diaphragm, its parts. Innervations.
- xiii. Effects of altitude on respiration.
- xiv. Respiratory centre. Control of respiration. Drugs affecting respiratory centre.
- xv. Peripheral and central chemoreceptors, their role and innervation.
- xvi. Flow-volume loops in normal and pathological conditions.

b. Cardiovascular System:

- i. Central and peripheral circulation. Distribution of blood volume in arteries, arterioles, capillaries, venules and veins.
- ii. Cardiac output. Measurement. Determinants.
- iii. Blood volume homeostasis and mechanisms.
- iv. Innervation/ control of circulation. Pressure receptors and pressure reflexes.
- v. Vasculopathy, Shock.
- vi. Coronary circulation. Physiology of supply and demand of oxygen to myocardium.
- vii. Cardiac cycle with respect to flow, volume and pressure.
- viii. Effect of autonomic nervous system in vasculature.
- ix. Mechanism of cardiac contractility. Assessment of contractility. Pressure-volume curves in normal and disease states.
- x. Micro-circulation. Autonomic control and in sepsis/ shock.
- xi. ECG interpretation. Normal and arrhythmias.
- xii. Systolic and diastolic dysfunction. Mechanism and application in anesthetic practice.
- xiii. Explanation of central venous pressure changes during cardiac cycle.
- xiv. Cardio-respiratory interdependency.
- xv. Trans-esophageal echocardiography (TEE). Basic principles. Indications, basic views of TEE.

c. Central Nervous System:

- i. Central nervous system nerve transmitters and receptors.
- ii. Cortical representation of sensory and motor pathways.

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- iii. Cerebral circulation.
- iv. Cerebro-spinal fluid. Generation, circulation and composition
- v. Intracranial pressure. Factors affecting. Cerebral perfusion pressure. Compliance curves.
- vi. Effects of anesthesia on EEG.
- vii. Mechanism of awareness. BIS monitoring.
- viii. Cerebral metabolic rate.
- ix. Fragile brain syndrome.
- x. Effects of extreme temperature on brain function.
- xi. Basics of brain death tests.
- xii. Phases of sleep.
- xiii. Cranial nerves.CNS contribution in autonomic functions.

d. Renal system:

- i. Role of kidney in water balance in body.
- ii. Renal circulation. Filtration, absorption, secretion. Functions of glomerulus, renal tubules and collecting ducts.
- iii. Role of kidney in acid-base balance, electrolyte balance and osmolarity.
- iv. Physiological Mechanism of perioperative oliguria, anuria and polyuria.
- v. Hormones secreted by kidneys. Their roles in physiology.
- vi. Methods of renal protection in perioperative periods.
- vii. Pathophysiology of pre, intra and post renal failure.
- viii. Assessment of renal functions.

e. Liver physiology:

- i. Metabolic functions of liver (glycogen, lipid, protein).
- ii. Hepatic circulation. Factors affecting.
- iii. Portal circulation.
- iv. Liver function tests.

f. Hematology:

- i. Blood grouping. Principles. Basics of cross matching.
- ii. Basic principles of stored blood.
- iii. Blood transfusion. Indications. Hazards.
- iv. Transfusion reactions.
- v. Component transfusion. FFP, Platelets, Packed cells. Cryoprecipitate. Indications. Side effects.
- vi. Anemia. Types
- vii. Coagulation disorders.
- viii. Abnormal hemoglobin.

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- ix. Disseminated intravascular coagulation. Mechanism, phases, identification, management.
 - x. Massive transfusion.
 - xi. Jehovah's witness.
 - xii. Blood conservation techniques.
 - xiii. Perspectives of artificial blood.
 - xiv. Bleeding time, clotting time, Prothrombin time, INR, ACT. Basic principles and interpretations.
- g. Neuromuscular system:**
- i. Resting and action potential.
 - ii. Mechanism of muscle contraction.
 - iii. Neuromuscular junction physiology.
 - iv. Neuromuscular transmission disorders.
 - v. Malignant hyperthermia.
 - vi. Myopathies.
 - vii. Applied physiology relevant to peripheral nerve stimulation
- h. Gastrointestinal system:**
- i. Gastric secretion, pH and volume.
 - ii. Nausea and vomiting.
 - iii. Esophageal reflux.
 - iv. Abdominal compartment syndrome mechanism
 - v. Pancreatic gland physiology
- i. Endocrinology:**
- i. Thyroid and parathyroid glands physiological role
 - ii. Adrenal glands. Pheochromocytomas.
 - iii. Autonomic dysfunction in diabetes. Tests of autonomic dysfunction.
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 - iv. Cardiovascular system involvement in different endocrinopathies:
physiological basis
 - v. Effect of anesthesia and surgical stress upon endocrinological
parameters/ systems
 - vi. Starvation, ketoacidosis. Pathophysiology.
- j. Ophthalmology:**
- i. Mechanism of intra-ocular pressure.
 - ii. Oculo-cardiac reflexes.
- k. Pregnancy:**
- i. Physiology of pregnancy.

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- ii. Anesthetic implications of the changes in pregnancy.

I. Neonatology:

- i. Prematurity.
- ii. Fetal circulation.
- iii. Pharmacokinetics in neonates.
- iv. Cardiovascular, respiratory and renal systems in neonates.
- v. Neonatal ventilation.
- vi. Neonatal resuscitation.

3. PHARMACOLOGY:

- a. Pharmaco-kinetics of anaesthetic drugs. Uptake. Distribution. Transport and drug binding, partition coefficients, pK and ionization, Regional uptake, MAC, enzyme induction and drug elimination.
- b. Sedatives-Barbiturate and non-barbiturate hypnotic, common Tranquillizers. Premedicants.
- c. Analgesics, Opioid, NSAIDS. Interaction with other drugs.
- d. Local anaesthetics. Methods of prolongation of action. Effects and treatment of overdose.
- e. Drugs and the parasympathetic system. Cholinergic and anti-cholinergic compounds.
- f. Drugs and the sympathetic system. Sympathomimetic drugs alpha and Beta-adrenergic compounds and their antagonists. Effects of Monoamine oxidise inhibitors.
- g. Drugs used in the control of blood pressure. Ganglion blocking drugs. drugs acting on the peripheral sympathetic nerves, catecholamine synthesis and storage. Vascular smooth muscle relaxants
- h. Cardiacglycosides. Digitalis and related compounds. Onset and duration. Factors modifying action, precipitating factors, toxicity.
- i. Inhalation anaesthetic agents. Nitrous oxide, halothane, ether. General properties and effects of other halogenated anaesthetic agents.
- j. Intravenous induction agents. Thiopentone, ketamine, propofol etc.
- k. Neuroleptic agents.
- l. Histamine and antihistamines.
- m. Analeptic, complications of their use.
- n. Oxytocics, and their interaction with inhalation anaesthetics.
- o. Neuromuscular blocking agents, including abnormal responses and recurarisation.
- p. Diuretics
- q. Hormone therapy. Insulin and its substitutes. Steroids. Thyroid and antithyroid drugs.
- r. Anaphylaxis. Anaphylactoid reaction.

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- s. Drug interactions and concurrent medications.

4. PHYSICS IN ANESTHESIA

- a. Flow and velocity. Laminar and turbulent flow. Viscosity and density. Newtonian and non-newtonian fluids.
- b. Principles of rotameter.
- c. Gas laws.
- d. Vapour. Vapour pressure. Vaporization. Saturated vapour pressure.
- e. Vaporizers. Principles and common vaporizers used in anesthesia. Azeotropes.
- f. Heat, thermal conductivity in the body. Latent heat of vaporization. Methods of heat conservation and heat loss from the body.
- g. Temperature and methods of temperature measurement. Thermister, Thermocouples.
- h. Physics of pulse oximetry.
- i. Physics of capnography.
- j. Electrical cautery. Monopolar and bipolar.
- k. Humidification. Types of humidifier (hot water and ultrasonic)
- l. Laplace law. Implications in anesthesia and physiology.
- m. SI units.
- n. Source of ignition and explosions.
- o. Bernoulli principle.
- p. Venturi principles and its applications.
- q. Radiation hazards in OR
- r. Sterilization of anesthetic equipment.
- s. pH, pCO₂, pO₂ measurement

5. ANESTHESIA MACHINE:

- a. Gas supply units:
- Pipeline
 - Cylinder/ compressed gas
 - Bourdon pressure gauge and strain gauges
 - Pressure regulators
 - Flowmeters
 - Anti-hypoxic devices
 - Vaporizers
 - Ventilators
 - Pressure relief valve
 - Oxygen flush
 - Common gas outlet
 - Oxygen analyzer
- b. Partition of anesthesia machine as per pressure within the system.

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- c. Safety features of anesthesia machine.

6. EQUIPMENT:

- a. Laryngoscopes. Recent developments.
b. Airway devices.
c. Face masks.
d. Tracheal tubes. Types. Descriptions.
e. LMAs. Recent modifications of supraglottic devices.
f. Breathing circuits and classifications.
g. Peripheral nerve stimulator/ locator. Principles of functioning
h. Fiberoptic bronchoscope.
i. Ultrasound machine.
j. Pulse oximeter.
k. Noninvasive blood pressure devices
l. Precordial stethoscopes
m. Capnograph.
n. Gas analyzers.
o. ABG machines.
p. AMBU bags.
q. Artificial ventilators.
r. Defibrillator. Types
s. Infusion and syringe pumps.
t. Humidifiers and nebulizers.
u. Oxygen therapy devices.
v. Vascular transducers.
w. Transtracheal jet ventilator.
x. Temporary pacemaker.
y. CPAP and BiPAP machine new advance ventilatory modes

CLINICAL ANESTHESIA: CONTENT

1. Preoperative anesthetic evaluation and preparation

Airway assessment and management

- a. Airway anatomy
b. Airway assessment
c. Prediction of the difficult airway
d. Techniques of airway management
e. Airway equipment
f. Management of acute upper airway obstruction
g. Anaesthesia of the airway
h. Indication of intubation
i. Difficult airway algorithm: ASA, DAS
j. Assessment and management of extubation

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- k. Complication of intubation and reintubation
- l. Indications and complications of surgical airways: tracheostomy, cricothyroidotomy

2. Anaesthesia for Gastrointestinal and Hepato-biliary Surgery

- a. Anaesthetic considerations and perioperative management for
 - i. Gastro-intestinal surgeries: cholecystectomy, appendectomy, hernia repair
 - ii. Bowel perforation
 - iii. Bowel obstruction
 - iv. Bowel resection: hemicolectomies, anterior and abdomino-perineal resection (APR)
 - v. Acute gastro-intestinal bleeding
 - vi. Gastrectomy: partial, sub-total, total
 - vii. Pancreatic resections: Whipple's surgery
 - viii. Hepatic resection surgeries
 - ix. Splenectomy
 - x. Portoshunting procedures
 - xi. Liver transplant
- b. Postoperative management
 - i. Effect on respiratory physiology
 - ii. Postoperative pain management
 - iii. Postoperative pulmonary complications

3. Anaesthesia for Laparoscopic Surgery

- a. Anaesthetic consideration in laparoscopic surgery
 - i. Positioning
 - ii. Pneumoperitoneum
 - iii. Complications

4. Anaesthesia for Genitourinary Surgery

- a. Anaesthetic considerations and perioperative management of
 - i. Nephrectomy
 - ii. Nephrolithotomy, Pylolithotomy, Cystolithotomy
 - iii. Lithotripsy
 - iv. Prostrate surgery: open and endoscopic
 - v. Percutaneous nephrolithotomy (PCNL)
 - vi. Adrenal surgery: pheochromocytoma
 - vii. Endourology

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- viii. Ileal conduits and Neo-bladder formation
- b. Complications – TUR Syndrome

5. Anaesthesia for Orthopaedic Surgery

- a. Choice of anaesthetic technique: Risks/Benefits of GA versus Regional
- b. Anaesthetic considerations in:
 - i. Lower extremity surgery
 - ii. Upper extremity surgery
 - iii. Spine surgery
 - iv. Shoulder surgery
 - v. Fractures
 - vi. Surgery under tourniquet
 - vii. Cement implantation
 - viii. Arthroscopic surgery
 - ix. Joint replacement surgery
 - x. Autonomic dysreflexia and spinal shock
- c. Postoperative complications
 - i. Compartment syndrome
 - ii. Fat embolism
 - iii. Pulmonary embolism

6. Anesthesia for Trauma

- a. Assessment, resuscitation and optimization of trauma patients.
- b. Pain management in trauma patients,
- c. Role of anesthesiologist in major disaster management.
- d. Anaesthetic consideration in:
 - i. Cervical spine injury
 - ii. Polytrauma
 - iii. Posttraumatic circulatory shock
 - iv. Spinal shock, autonomic dysreflexia

7. Regional Anaesthesia

Indication, contraindication, techniques and complications of:

- a. Central neuraxial blocks:
 - i. Spinal anesthesia
 - ii. Epidural anaesthesia
 - iii. Combined spinal/epidural anaesthesia
 - iv. Caudal anaesthesia
- b. Upper extremity blocks
 - i. Axillary block
 - ii. Interscalene block

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- iii. Supraclavicular block
- iv. Infraclavicular block
- v. Peripheral block: radial, ulnar, median, wrist, digital blocks
- vi. Intravenous regional technique
- c. Lower extremity blocks
 - i. Femoral-sciatic block
 - ii. Ankle block
 - iii. Popliteal block
 - iv. Fascia iliaca block
- d. Miscellaneous blocks:
 - i. Topical anesthesia
 - ii. Anaesthesia for airway for fiberoptic bronchoscopy
 - iii. Superior laryngeal block
 - iv. Ocular blocks
 - v. Intercostal blocks
 - vi. Intrapleural blocks
 - vii. Paravertebral blocks
 - viii. Iliohypogastric / ilioinguinal block
 - ix. Obturator nerve block
 - x. Pudendal nerve block
 - xi. Penile block
 - xii. Transverse abdominis plane (TAP) block
- e. USG guided nerve blocks: principles and implication

8. Anaesthesia for Burn, Plastic and Reconstructive Surgery

- a. Preoperative assessment and preparation
- b. Anaesthetic considerations in:
 - i. Burn patients including facial burns and inhalational injuries
 - ii. Patient with quadriplegia
 - iii. Major plastic and reconstructive surgery
 - iv. Cleft lip and cleft palate surgery
 - v. Liposuction

9. Anaesthesia for ENT and Head and Neck Surgery:

- a. Anaesthetic considerations for
 - i. Ear surgery
 - ii. Nasal surgery
 - iii. Tonsillectomy/Adenoidectomy
 - iv. Laryngeal surgery
 - v. Radical Neck Dissection
 - vi. Rigid/Flexible Bronchoscopy

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- vii. ENT Tumors
- viii. ENT infections
- ix. Facial trauma
- x. Laser surgery
 - 1. Types of laser and their use
 - 2. Hazards of laser surgery and appropriate precautions
 - 3. Management of an airway fire
- b. Tracheostomy: open and percutaneous
- c. Postoperative pain management and complications

10. Anaesthesia for Dental and Maxillofacial surgery:

- a. Dental chair anesthesia and Conscious sedation.
- b. Anaesthetic considerations in
 - i. Maxillary surgery
 - ii. Mandibular surgery
 - iii. TMJ surgery
 - iv. Blind nasal intubation
 - v. Retrograde intubation
 - vi. Fiberoptic intubation
 - vii. Uncooperative patient for dental extraction

11. Anesthesia for Ophthalmic Surgery

- a.
 - i. Concomitant diseases
 - ii. Considerations regarding intraocular pressure (IOP)
 - iii. Effects of ophthalmic medications
- b. Retrobulbar/peribulbar nerve blocks
- c. Anaesthetic considerations in
 - i. Penetrating globe injury
 - ii. Cataract surgery, Retinal surgery
 - iii. Strabismus surgery

12. Post Anaesthesia Care Unit (PACU)

- a. Monitoring standards
- b. Staffing
- c. Discharge criteria
- d. Complications in PACU
 - i. Postoperative nausea and vomiting (PONV)
 - ii. Respiratory: Apnea, laryngospasm, bronchospasm, respiratory depression, postoperative pulmonary complication
 - iii. Cardiovascular: Tachyarrhythmia, Bradyarrhythmia, Hyper/Hypotension, Ischemia, Failure

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- iv. Neurological: Delayed recovery, CVA, Delirium
- v. Hypo/Hyperthermia

13. Complications of Anaesthesia

- a. Neurological
 - i. Non-awakening and delayed awakening
 - ii. Awareness under anaesthesia
 - iii. Acute postoperative confusional state
 - iv. CVA
 - v. Hypoxic encephalopathy
- b. Respiratory
 - i. Upper airway and dental trauma
 - ii. Laryngospasm, laryngeal trauma, laryngeal edema
 - iii. Aspiration
 - iv. Esophageal perforation
 - v. Negative pressure pulmonary edema
 - vi. Pneumothorax
- c. Cardiovascular
 - i. Myocardia ischemia/infarction
 - ii. Dysrhythmias
 - iii. Congestive heart failure
- d. Miscellaneous
 - i. Anaphylaxis
 - ii. Malignant hyperthermia
 - iii. Inhalational agent induced hepatic dysfunction
 - iv. Physiology and complication of positioning in anaesthesia

14. Cardiopulmonary resuscitation

- a. Physiology of CPR
- b. Advance Cardiac Life Support (ACLS) protocol
 - i. Specific algorithms
 - ii. Controversies
 - iii. Pharmacology of resuscitation drugs
- c. Neonatal and pediatric resuscitation
- d. CPR in pregnancy
- e. Defibrillator: physics, types, uses

15. Anaesthesia for Ambulatory Surgery (Day Care Anaesthesia)

- a. Preoperative assessment, preparation and premedication
- b. Appropriate selection of patients
- c. Anaesthetic technique and Drugs

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- d. Advantages and limitations of day care surgery/ anesthesia
- e. Discharge criteria
- f. Postoperative complication
- g. Criteria for hospital admission

Section (B) - 55 Marks

16. Anesthesia beyond OT (Non-Operating Room Anaesthesia)

- a. Preoperative assessment, preparation and premedication
- b. Special considerations:
 - i. Location and personnel
 - ii. Monitoring
 - iii. Anaesthetic technique and drugs
 - iv. Transport
 - v. Recovery
- c. Anaesthetic consideration for various procedures:
 - i. Radiology suits: CT, MRI
 - ii. Radiation therapy
 - iii. Endoscopic procedures: ERCP, UGI endoscopy, colonoscopy etc
 - iv. Cath Lab: Angiography
 - v. Cardioversion
 - vi. Electroconvulsive therapy

17. Obstetric Anesthesia

- i. Preoperative assessment and premedication of parturient
- ii. Physiological changes associated with pregnancy
- iii. Premedication of obstetric patients
- iv. Physiology of uteroplacental unit – placental drug transfer
- v. The fetus: fetal circulation, changes at birth, principles of fetal assessment and monitoring
- vi. Pain pathways relevant to labor
- b. Analgesia for vaginal delivery, methods of painless delivery
- c. Anesthesia for Caesarean section
- d. Effects of anaesthesia/analgesia on uterine blood flow/uterine activity
- e. Anesthesia for obstetric emergencies
- f. Anesthetic management in:
 - i. Pre-eclampsia and eclampsia
 - ii. Antepartum haemorrhage and postpartum haemorrhage
 - iii. Cord prolaps
 - iv. Preterm labor
 - v. Uterine dehiscence, uterine inversion

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- vi. Amniotic fluid embolism
- g. Non-obstetric surgery in the pregnant patient
- h. Anesthesia to parturient with medical diseases: DCM, PPCM, HTN, valvular heart disease, bronchial asthma
- i. CPR in the pregnant patient
- j. Neonatal resuscitation.

18. Anaesthesia for patients with systemic diseases:

Preoperative assessment, optimization and perioperative management of:

a. Respiratory diseases

- i. Asthma
- ii. COPD
- iii. Chronic respiratory failure
- iv. Cystic fibrosis
- v. Pulmonary fibrosis
- vi. Pulmonary hypertension
- vii. Sarcoidosis
- viii. Sleep apnea

b. Cardiovascular diseases:

- i. Hypertension
- ii. Ischaemic heart diseases
- iii. Patients who had undergone valve replacement surgery
- iv. Patients who had undergone PCI, CABG
- v. Patients having pacemaker, left ventricular assist device
- vi. Ventricular dysfunction
- vii. Cardiomyopathies
- viii. Aortic/mitral/pulmonic/ tricuspid stenosis
- ix. Mitral/ aortic regurgitation
- x. Acute and chronic heart failure
- xi. Cardiogenic shock, IABP
- xii. Cardiac tamponade
- xiii. Cardiac arrhythmias: brady/tachyarrhythmia, A Fib
- xiv. Pulmonary artery hypertension
- xv. Patients on Antiplatelet Drugs
- xvi. Brugada Syndrome
- xvii. Long Q - T interval Syndrome
- xviii. Athlete's heart

c. Endocrine disease:

- i. Diabetes mellitus
- ii. Thyroid disease
- iii. Parathyroid disease
- iv. Pituitary disease

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- v. Adrenal disease / pheochromocytoma
- vi. Carcinoid
- d. Collagen vascular diseases:**
 - i. Rheumatoid arthritis
 - ii. SLE
 - iii. Scleroderma, Ankylosis spondylitis
- e. Neuromuscular diseases:**
 - i. Myasthenia gravis
 - ii. Muscular dystrophy
 - iii. Gullain Barre Syndrome
 - iv. Poliomyelitis
 - v. Transverse myelitis
 - vi. Tetanus
 - vii. Cerebral palsy
- f. Hemoglobinopathies**
 - i. Hemolytic anemia
 - ii. Hemophilia
 - iii. Von Willebrand's disease
 - iv. Porphyria
- g. Infectious diseases**
 - i. Current RTI
 - ii. AIDS
 - iii. Hepatitis, Malaria, Tuberculosis, Dengue
 - iv. Flues
 - v. Other systemic infections / Sepsis
- h. Substance abuse**
 - i. Acute intoxication
 - ii. Chronic addiction
- i. Cancer and effects of chemotherapeutic agents**
- j. Patients on prolong steroid therapy**
- k. Obesity**
 - i. Classification, organs system changes in obesity
 - ii. Sleep apnea syndrome, hypopnea
 - iii. Bariatric surgeries

19. Anaesthesia for Paediatric and Neonatal Surgery

- a. Anatomical, physiological and pharmacologic consideration in neonate, infants and children
- b. Preoperative assessment and preparation
 - i. Fasting guidelines
 - ii. Premedication
- c. Monitoring

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- d. Perioperative fluid and electrolyte management
- e. Perioperative temperature management
- f. Prematurity. Its effect on organ system and anesthetic concerns
- g. Pain management and regional anesthesia
- h. Anaesthetic management for common pediatric and neonatal routine and emergency surgeries:
 - i. Inguinal hernia, phimosis
 - ii. Foreign body in the airway
 - iii. Congenital pyloric stenosis
 - iv. Tracheoesophageal fistula, Esophageal atresia
 - v. Diaphragmatic hernia.
 - vi. Intestinal obstruction,
 - vii. Congenital anorectal malformation, Hirschprung's disease
 - viii. Gastrochisis, omphalocele,
 - ix. Meningomyelocele
 - x. Epiglottis
 - xi. A child with recent upper respiratory tract infection

20. Geriatric Anaesthesia

- a. Physiologic effects of aging
- b. Pharmacologic consideration
 - i. Drug distribution/metabolism/pharmacodynamics
- c. Effect of anaesthetic medication
- d. Anaesthetic consideration in
 - i. Positioning
- e. Temperature control
- f. Postoperative delirium and management

21. Thoracic anesthesia

- a. Preoperative assessment and optimization of patients planned for lung resection/thoracotomy
- b. Pathophysiology of lateral position and open thorax
- c. Chest drains, underwater seal drains.
- d. Anaesthetic considerations in:
 - i. One lung anaesthesia
 - ii. Myasthenia gravis
 - iii. Pulmonary hypertension
 - iv. Lobectomy
 - v. Pneumonectomy
 - vi. Tracheal resection
 - vii. Bronchoscopy
 - viii. Mediastinoscopy/Video assisted thoracoscopy

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- ix. Esophageal surgery
- x. Airway laser surgery
- e. Management of specific problems:
 - i. Mediastinal mass
 - ii. Brochopleural fistula
 - iii. Pulmonary haemorrhage
 - iv. Bullae
 - v. Pneumothorax
 - vi. Flail chest
- f. Perioperative fluid management in thoracic surgery
- g. Postoperative management
 - i. Pain management after thoracotomy
 - ii. Ventilator strategies
- h. Basics of lung ultrasound

22. Cardiac and Vascular Anaesthesia

- a. Preoperative assessment:
 - i. Appropriate investigations: ECG, Echo, TMT, Stress Echo, Cardiac CT scan, Coronary Angiogram
 - ii. Risk stratification
 - iii. Preoperative optimization
- b. Monitoring:
 - i. Use of hemodynamic monitoring: cardiac output, BIS, cerebral oximetry
 - ii. TEE
- c. Anaesthetic considerations in
 - i. PCI, Imaging
 - ii. Temporary pacing
 - iii. Valve replacement surgery
 - iv. CABG: off pump and on pump
 - v. Major shunt repairing surgery, congenital anomaly
 - vi. Closed heart surgery
 - vii. Major vascular surgery: thoracic/abdominal aortic aneurysm surgery
 - viii. Peripheral vascular surgery
 - ix. Emergency vascular surgery
 - x. Carotid artery surgery
- d. Principles of cardiopulmonary bypass, cardioplegia
- e. Aortic X-clamp, techniques, indications, systemic effects

23. Neuroanaesthesia

- a. Preoperative evaluation of neurosurgical patients

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- b. Preoperative investigations: Basics of CT Scan, MRI of brain and spinal cord
- c. Preoperative optimization
- d. Monitoring in neuroanaesthesia:
 - i. Intracranial pressure,
 - ii. Trans-cranial Doppler,
 - iii. EEG,
 - iv. Evoked potentials
- e. Anaesthetic consideration regarding
 - i. Traumatic Brain Injury and management
 - ii. Increased ICP
 - iii. Supratentorial masses, Pituitary surgery
 - iv. Infratentorial surgery
 - v. Intracranial vascular surgery: aneurysm, AV malformation
 - vi. Functional neurosurgery
 - vii. Occlusive cerebrovascular disease
 - viii. Spinal cord surgery / spinal injury
 - ix. Interventional neuroradiology
 - x. Epilepsy surgery
 - xi. Paediatric neurosurgery
 - xii. Neuroendocrine disease
 - xiii. Induced hypotension
- f. Postoperative care and critical care management of neurosurgical patients including:
 - i. Severe head injury
 - ii. Spinal cord injury
 - iii. Subarachnoid hemorrhage
 - iv. Seizures
- g. Complications of neurosurgical patients
 - i. Electrolyte disorders – SIADH
 - ii. Diabetes Insipidus
 - iii. Cerebral salt wasting syndrome
 - iv. Air embolism
 - v. Intracranial hypertension
- h. Fluid therapy in neurosurgery
- i. Be able to manage cases in sitting, prone, lateral, jack-knife positions
- j. Methods of Brain protection
- k. Declaration of Brain death; brain death criteria

24. Anaesthesia for Organ Transplant

- a. Transplantation immunology
- b. Management of recipient for kidney and other solid organ transplant
- c. Management of live and deceased organ donor

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- d. Management of transplant patient for non-transplant surgery
- e. Critical care aspects in Organ transplants.

25. Pain Medicine

- a. Introduction:
 - i. Definition, Introduction and multidisciplinary approach of pain management.
- b. Anatomic and Physiology
 - i. Anatomic and Physiological principles of pain
 - ii. Acute and chronic mechanism of pain
 - 1. Classification of pain
 - 2. Conduction, transmission and modulation
 - 3. Pain pathways
 - 4. Transition from acute to chronic pain
- c. Clinical Principles
 - i. History taking for patient with chronic pain
 - ii. Pain scales / disability scoring/ psychological evaluation
 - iii. Physical examinations of patient with chronic pain
 - iv. MRI and other imaging studies
- d. Labor analgesia: principles and techniques
- e. Acute pain
 - i. Assessment of pain, preemptive analgesia
 - ii. Perioperative pain management / trauma pain management
 - 1. Analgesia modalities: NSAID, opioid, local anaesthetics
 - 2. Regional analgesia
 - 3. Adjuvant analgesic
 - 4. Patient controlled analgesic system
 - iii. Pain management in opioid tolerant patient
- f. Chronic pain
 - i. Non cancer pain
 - 1. Neuropathic pain, common neuralgias
 - 2. Mechanical pain, myofascial pain
 - 3. Common pain conditions: low back pain, post-surgical pain, CRPS, phantom pain, etc.
 - 4. Headache
 - ii. Cancer pain
 - 1. Approach to the patient with cancer, Palliative care
 - 2. Management option and techniques
- g. Pharmacology and pharmacological adjunctive therapy
 - i. Opioids, non opioids
 - ii. Adjuvants (alpha 2 agonists, corticosteroids, magnesium, neostigmine, ketamine, benzodiazepines, antidepressants, etc.

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- h. Non pharmacological therapy
 - i. Psychological intervention
 - ii. Physical therapy
 - iii. Acupuncture
 - iv. Electrical stimulation
- i. Interventional pain management
 - i. Diagnostic and therapeutic neural blockages
 - ii. Epidural steroid injections
 - iii. Sympathetic blocks
 - iv. Intrathecal drug delivery system
 - v. Spinal cord stimulators
 - vi. Radiation hazard and safety
- j. Palliative Medicine

26. Critical Care Medicine:

Critical care course content part I

- a. Central Venous canulation: Land mark and USG technique
- b. Arterial Line placement and care
- c. Pericardiocentesis
- d. Temporary Cardiac pacing (Basic)
- e. Chest tube insertion and care
- f. Bronchoscopy and applied anatomy
- g. Tracheostomy: Procedure and Care, Complication
- h. Percutaneous Suprapubic cystotomy
- i. Anesthesia for bed side procedure in ICU
- j. Renal replacement therapy in ICU
- k. Caloric calculation - Nutrition in critically ill patients
- l. Emergency abdominal Ultrasound in ICU
- m. Emergency chest Ultrasound in ICU
- n. Neurologic and ICP monitoring in ICU
- o. Basic echocardiographic in ICU
- p. ICU Scoring systems: APACHE, SOFA, SAPS, RASS
- q. Basics of IABP and ECMO

Critical care course content Part II

- 1. General Critical Care
 - a. An approach to critically ill patient
 - b. Infection prevention in ICU
 - c. System wise clinical recording of critically ill patient
 - d. Hypoxia: Pathophysiology, differential diagnosis, treatment
 - e. Analgesia and Sedation in ICU

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- f. DVT and PE: cause, risk factors, diagnosis, treatment and prevention.
 - g. Fever in ICU
 - h. Acid Base Disorders: etiology, diagnosis and management
 - i. Hemodynamic monitoring in ICU
 - j. Antimicrobials in ICU, Antibiotic stewardship
 - k. Nosocomial infections
 - l. SIRS, Sepsis, Severe Sepsis, Septic Shock, MODS: definition, diagnosis, pathophysiology, management and recent guidelines
 - m. Fluid and Electrolyte Imbalance: Disorders of Na, K, Ca, Mg, P: diagnosis and management
 - n. Bed sores: prevention, scoring and management
 - o. Nutrition in ICU
 - p. Anemia and Bleeding disorders; transfusion of blood and blood products in ICU
 - q. Transport of critically ill patients
 - r. Early mobility, physiotherapy and rehabilitation in ICU
 - s. End of life care in ICU
 - t. Record keeping in ICU
2. Respiratory Critical Care
 - a. Respiratory Failure: type, cause, management
 - b. ALI / ARDS: pathophysiology and management.
 - c. Pneumonia: CAP, HAP, VAP, etiology, management
 - d. Acute bronchospastic condition and management
 - e. Mechanical ventilation: indication, basic modes, advance modes, noninvasive ventilation, weaning, and spontaneous breathing trail, VILI, VIDD. Lung protective ventilation, care of patients under mechanical ventilation.
3. Cardiac Critical Care
 - a. Acute coronary syndrome: early diagnosis and management
 - b. Heart failure: types and management
 - c. Pulmonary edema: pathophysiology and management
 - d. Arrhythmias: types, etiology and management
4. Neuro Critical Care
 - a. TBI, Spinal Cord Injury and management
 - b. Coma: cause and management
 - c. Seizure: cause and management
 - d. CNS infections
 - e. GBS and Myasthenia Gravis
 - f. Critical illness polyneuropathy
5. Nephrology Critical Care
 - a. AKI: cause, prevention and management
 - b. Renal Replacement Therapy

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6. Endocrine dysfunction in critically ill patients
 - a. Hypoglycemia and hyperglycemia in ICU
 - b. Thyroid dysfunction in ICU
7. Critical Care Toxicology
 - a. Diagnosis and management of common poisoning: OPP, Paracetamol, Snake bites
8. Obstetric Critical Care
 - a. Diagnosis and management of Pre-eclampsia, Eclampsia, hypertensive crisis, severe haemorrhage, ovarian hyper-stimulation syndrome
9. Management of postoperative critically ill patients:
 - a. Post cardiac surgery, post thoracotomy, postpneumectomy, complex gastrointestinal surgery
10. Miscellaneous:
 - a. Pancreatitis - causes and treatment
 - b. Liver Failure - causes and supportive measures
 - c. Brain death test and diagnosis
 - d. Rapport and communication in ICU
 - e. Dispute management in ICU
 - f. Critical care of patients with cerebral malaria, HIV - AIDS, SARS, and other Avian infections
 - g. Hepatorenal syndrome, hepatopulmonary syndrome. Diagnosis and critical care support

27. Recent Advances in anesthesia and critical care

28. Ethics

- a. Basic principles of ethics
 - i. Autonomy, beneficence, non-maleficence, justice
- b. Ethical systems
 - i. Teleological, deontological
 - ii. Different value systems: cultural, religious
- c. Discussing/framing an ethical argument
- d. Common areas of ethical conflict in anesthesia
- e. Duty to report colleagues
- f. Informed consent
 - i. Surgical, anesthetic
 - ii. Patient refusal, limited consent (models of autonomy vs. beneficence)
 - iii. Age (Children)
 - iv. Mental competence, substitute decision making
 - v. Coercion vs. persuasion
- g. Duty of Care
 - i. The physician-patient "contract"
 - ii. The patient dangerous to the physician (AIDS, Hep B, violence)

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- iii. Confidentiality
- h. Allocation of resources
- i. End of Life
 - i. Brain death
 - ii. With-holding/withdrawing treatment
 - iii. Advance Directives/ Living Wills
 - iv. No blood products,
 - v. DNR: Do Not Resuscitate
- j. Research Ethics

29. Legal Issues

- a. Consent
- b. Informed consent
 - i. Disclosure of risk
 - ii. Laws re consent
 - iii. Substitute decision makers
- c. Malpractice: Torts, Duty of Care, definition of negligence
- d. Law suits:
 - i. How to handle the threat of a law suit
 - ii. The usual course of a law suit
 - iii. Avoiding law suits
 - iv. Responsibility of the resident vs. the staff anaesthetist
 - v. When the resident disagrees with the staff's actions
- e. Confidentiality
- f. Hospital bylaws
- g. Statutory reporting
- h. Coroner's Act

30. Teaching & Communication Skills

- a. Teaching skills
- b. Learning skills
- c. Communication skills with:
 - i. Patients and families
 - 1. Effective interviewing and information-giving skills
 - 2. Determining how information is received
 - 3. Braking bad news
 - ii. Colleagues, nurses, hospital employees
 - 1. Conveying a sense of urgency
 - iii. Managing disagreement

31. Professional "Structure"

- a. Role of Nepal Medical Council
- b. Role of Society of Anesthesiologists of Nepal (SAN), World Federation of Societies of Anaesthesiologists (WFSA), Nepalese Society of Critical Care Medicine (NSCCM), Pain Society of Nepal

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- c. Guidelines for Anesthesia Services in Nepal
- d. Specialist: Certification, Standard setting
- e. Legal obligations of resident to hospital and university
- f. Health Insurance System: structure, fee schedule, review committee.
- g. Narcotic drug control act, drug act and regulation, consumer protection act, human organ transplant act,
- h. National Drug Policy - 1995 and essential drug lists
- i. History of anesthesia in Nepal
- j. World History of Anaesthesia and Few notable names in Anaesthesia –
 - i. William T G Morton
 - ii. Arthur E Guedel
 - iii. John Snow
 - iv. Robert Macintosh
 - v. BA Sellick
 - vi. E B Tuohy
 - vii. Henry Edmund Gaskin Boyle
 - viii. Hans G. Epstin
 - ix. Thomas Philip Ayre

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