

Subjects	Topics within Subjects	Details
Physiology (Approximately 32% of Total weightage)		
Cardiovascular		
	Functional anatomy: Muscle; Conductive; Relation to Function	Functional anatomy of the heart, including properties of cardiac muscle, nodal and conductive tissue, and its relationship to cardiac function
	Cardiac Cycle: Electrical/Mechanical/ Electrophysiological control	Mechanical and electrical changes during the cardiac cycle
	Cardiac Output: Determinants	Factors that influences cardiac output and its control and the application of this knowledge to clinical practice Electrophysiological control of the heart.
	Cardiac and Vascular Compliance	Concept of cardiac and vascular compliance
	Circulation: Overall: Control	Distribution and regulation of circulation: overall
	Circulation: Regional: Specific sites: Major organs: Control	Distribution, arrangements and regulation of Regional circulation: Coronary, muscle (skeletal), skin: other organs covered in specific physiology topics
	Myocardial oxygen balance	Myocardial oxygen balance
	Embolism	Physiology of embolism, ischaemia and infarction.
	Capillary/ Lymphatic Circulation/ Fluid Exchange in Tissues	Capillary circulation. Lymphatic circulation. Fluid exchange in tissues
	Blood Volume: Control	Control of blood volume in normal and abnormal conditions
	CVS responses to Changes	Cardiovascular responses to physiological and common pathological changes; e.g. i.Extremes of Age, ii.Exercise, iii.Obesity, iv.Altitude changes vi.Artificial ventilation, vii.Blood loss and shock, viii.Fluid loading and cardiac failure
Respiratory		
	Structure/ Function/ Humidification and heat exchange	Structure and function of the respiratory system. Humidification and heat exchange
	Lung volumes and capacities/ Dead space	Lung volumes and capacities and the application of this knowledge to normal and diseased respiratory states Dead space: anatomical and physiological

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Mechanics of breathing/ Control of ventilation/ Respiratory reflexes	Mechanics of breathing: pressure, flow, work, compliance, muscles, etc Control of ventilation and changes in ventilation in abnormal physiological and common pathological conditions Respiratory reflexes
	Alveolar ventilation	Alveolar ventilation
	Pulmonary circulation/ Interstitial space/lymphatics	Pulmonary circulation, pulmonary interstitial space and lymphatic function and their relevance in clinical practice
	V/Q Matching: Determinants	Normal and abnormal matching of ventilation and perfusion, the mechanisms causing ventilation-perfusion inequality including effects of posture, respiratory and circulatory changes, and an appreciation of its clinical significance
	O ₂ /CO ₂ ; Exchange/ Transport; Lungs/Capillary/Tissues; O ₂ cascade	Principles involved in transport of oxygen and carbon dioxide in blood and their applications in clinical practice Blood-tissue gas exchange.
	Changes with Physiology/Pathophysiology/Specific Situations	Respiration responses to conditions; e.g. i.Extremes of Age, ii.Exercise, iii.Obesity, iv.Altitude changes: high and low barometric pressures: short and long term adaptation v.Changes in posture (including under anaesthesia) vi.Common pathological conditions affecting ventilation and gaseous exchange
	Causes/Effects Hypoxia/Hypo/Hyperventilation	Causes and Effects of: i.Hypoxia and asphyxia. ii.Hypoventilation and hyperventilation.
	Respiratory therapy including Artificial ventilation	Respiratory inadequacy and failure; principles of therapy. Artificial ventilation: including common modes of ventilation used in Anaesthesia
	Non-respiratory functions	Non-respiratory functions of lung
Renal, Cellular, Body Fluids and electrolytes, Acid Base		
Renal		
	Functional anatomy/ Perfusion: control	Functional anatomy of the kidneys including the physiology, peculiar features and regulation of renal blood flow
	Glomerular filtration/Tubular function/Counter-current: Regulation	Glomerular filtration and tubular function Counter-current mechanisms in the kidney Regulation of renal function
	Assessment of function	Measurement of glomerular filtration rate and renal blood flow Physiological effects and clinical assessment of renal dysfunction
	Control of acid-base, osmolality, electrolyte, glucose, nitrogen products and drugs	Maintenance of acid-base, fluid osmolality and electrolyte balance Role of the kidney in the handling of glucose, nitrogenous products and drugs
	Response to Changes: Hypovolemia/ Stress/ Anaesthesia	Renal responses to hypovolaemia; hypotension; surgical stress and anaesthesia
	Endocrine functions: kidney	Endocrine functions of the kidney
Body fluids and Electrolytes		

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Body water; compartments: Fluids/ Electrolytes; distribution	Body water: distribution, movement and regulation Electrolyte composition of body fluids: distribution and regulation.
	Electrolytes (Na, K, Mg, Ca, PO ₄) Function/ Regulation	Function, regulation and physiological importance of sodium, potassium, magnesium, calcium and phosphate ions
	Composition and functions of lymph	Composition and functions of lymph
	Determinants of fluid/electrolyte movement: osmotic pressure, oncotic pressure, reflection coefficients, osmolality; Regulation	Determinants and Regulation of fluid/electrolyte movement: Osmotic pressure, oncotic pressure and reflection coefficients Measurement of osmolality and the regulation of osmolality
	Disturbances/ Evaluation/ Therapy: pathological conditions	Disturbances of body fluids and electrolytes in pathological conditions such as dehydration, over-hydration, oedema and electrolyte changes. Evaluation and principles of therapy of such pathological conditions
Acid Base Physiology		
	Acid-base balance in the body; Henderson-Hasselbalch equation: Application	Chemistry and physiology of acid-base balance in the body and the application of this knowledge to clinical situations Henderson-Hasselbalch equation and its application in clinical situation.
	Regulation: Buffers/ Respiratory and renal system	Chemistry of buffer mechanisms and their roles in the body Regulation of acid-base balance by the respiratory and renal system
	Changes in disordered states: evaluation/ therapy	Changes in disordered acid-base states: evaluation (including interpretation of arterial blood gases and electrolyte findings) and principles of therapy
Cellular		
	Components of cell/ Function	Structure and Functions of a cell and cellular components: mitochondria, endoplasmic reticulum, and other organelles Sources of energy available to cells through metabolic processes
	Cell membrane: properties and transport mechanism	Cell membrane and its properties Mechanisms of transport across cell membranes; diffusion, facilitated diffusion, primary active transport and secondary active transport
	Intracellular/ Extracellular fluid and electrolytes: Pumps and Regulation: Potentials; Gibbs-Donnan Effect	Composition of intracellular fluid and its regulation including the role of the sodium-potassium pump Membrane potentials and the Gibbs-Donnan Effect
	Receptors, G-proteins, secondary messengers	Role of Receptors, G-proteins and secondary messengers
Nervous system, Musculoskeletal		
Neurophysiology		
	Electrophysiology: neural tissue	Electro-physiology of neural tissue including resting membrane potential, conduction of nervous impulses, action potentials, excitatory and inhibitory post-synaptic potentials, and synaptic function
	Integration CNS activity	Integration of central nervous system activity via the cerebellum, hypothalamus, and limbic system
	Cerebrospinal fluid	Physiology of cerebrospinal fluid including formation, drainage, regulation and function

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Cerebral/Spinal cord circulation: Regulation and cerebral metabolism	Cerebral blood flow, cerebral perfusion pressure and cerebral metabolism in normal patient, patients under anaesthesia (effects of anaesthesia) and in patients with intracranial pathology
	Blood brain barrier	Structure, role and function of blood brain barrier
	Intra-cranial/Intra ocular pressure	Intra-cranial and intra ocular pressure: normal and regulation
	Neurotransmitters	Major neurotransmitters and their physiological role
	Principles of reflex activity	Principles of reflex activity
	Physiology of pain	i. Definition of pain, ii. Mechanisms of nociception, iii. Spinal cord modulation, iv. Role of chemical mediators, v. Central processing of the noxious impulse, vi. Inhibitory pathways and opioid receptors
	Sleep Physiology	Physiology of Sleep; including stages, basis and changes of electroencephalography with sleep, sedation and anaesthesia
Muscle physiology		
	Physiology/Functional Anatomy Skeletal; Smooth; Cardiac Muscles	Physiology and functional anatomy of skeletal, smooth, and cardiac muscle
	Microanatomy: Muscle spindle; Golgi organ; motor units; Fast/Slow muscle fibres	Muscle spindle and Golgi organ Concept of motor units Types of skeletal muscle fibres (i.e. fast or slow)
	Neuromuscular junction; receptors; excitation-contraction coupling; monosynaptic stretch reflex	The neuromuscular junction and its receptors Mechanism of excitation-contraction coupling Monosynaptic stretch reflex
	Single twitch; tetanus; Treppe effect: Physiological basis Relationship: muscle length and tension	Single twitch, tetanus and Treppe effect, and their physiological basis Relationship between muscle length and tension
Liver, Nutrition, Gastrointestinal		
Liver Physiology		
	Circulation: hepatic and portal: physiology; significance; changes	Anatomical and physiological considerations in hepatic blood flow, and the changes that occur with anaesthesia + Portal circulation and its significance
	Storage, synthetic, metabolic and excretory functions of liver and consequence of disease	Storage, synthetic, metabolic and excretory functions of the liver and the physiological consequences of hepatic disease; Handling of bilirubin in the body
	Assessment of function	Clinical laboratory assessment of liver function and hepatic failure

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Reticulo-endothelial/Protective functions	Reticulo-endothelial functions of the liver Protective function of the liver between the gut and the body
Nutrition and Metabolism		
	Energy balance; Basal metabolic: Measurement and factors influencing	Energy balance. Basal metabolic rate and its measurement Factors that influence metabolic rate
	Macro/Micro nutrients	Uptake, synthesis and metabolism of carbohydrates, fat and protein. Essential nutritional requirements, including the role of vitamins and trace elements
	Parenteral and enteral nutrition	Principles of parenteral nutrition and enteral nutrition
	Enzyme systems; disturbance; anaerobic metabolism	Common enzyme systems, evaluation of disturbances. Consequences of anaerobic metabolism
	Consequence: Starvation; Sepsis; Burns; Trauma	Physiological consequences of starvation Metabolic consequences of sepsis, burns and trauma
Gastrointestinal Physiology		
	Functions: secretory; digestion; absorption	Secretory function: salivary glands, stomach, small intestine, pancreas (external secretion) bile, volumes and composition, regulation. Digestion and absorption of carbohydrate, fat and protein.
	Oesophageal motility: Swallowing; Vomiting; Prevention of reflux	Swallowing Vomiting Factors preventing reflux of gastric contents into the oesophagus
	Gastric motility	Control of gastric motility and emptying
	Splanchnic circulation	Splanchnic circulation and its regulation.
	GI fluid loss	Gastro-intestinal fluid losses: effects and principles of treatment.
Maternal, Fetal and Neonatal		
Maternal Physiology		
	CVS; Resp changes; effect of positioning	Cardiovascular and respiratory changes during pregnancy and parturition, their causes, and their consequences Consequences of the supine posture during pregnancy
	Placenta: anatomy; physiology; function	Anatomy, physiology and function of the placenta, including: i.Placental gaseous and acid-base exchange ii.Placental blood flow iii.Barrier function
	Gaseous transfer	Transfer of gases between mother and fetus including the double Bohr and Haldane effects

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Non cardioresp changes: e.g. Endocrine and Haematological	Endocrine changes that occur during pregnancy and their consequences Haematological changes with pregnancy
Fetal Neonatal Physiology		
	CVS and Resp changes: At development and birth	Fetal circulation during development Circulatory and respiratory changes that occur at birth
	Pulmonary function of neonate	Pulmonary function; airway size, gas transfer, respiratory work, lung volume and role of surfactant
	Fluid, electrolytes, kidney function and control in neonate	Body fluids and electrolyte composition Control of body fluids in the neonate and how the control and composition differ from the adult
	Blood volume and haemoglobin in neonate	Blood volume and haemoglobin changes,
	Temperature regulation in neonate	Temperature regulation in the neonate; how this differs from the adult; explain the physical and physiological reasons for these differences
	Other organ functions in neonate: e.g. liver	Physiological differences in organ function, including liver, between the neonate and the adult
Endocrine and Thermoregulation		
Endocrine		
	Secretions: pituitary, thyroid, parathyroid, adrenals, pancreas, kidney, heart.	Secretions of the pituitary, thyroid, parathyroid, adrenals, pancreas, kidney and the heart.
	Formation; control; consequence of endocrine secretions	Neural control of endocrine secretions Formation and control; metabolism and excretion, over-secretion and under-secretion; evaluation of function.
	Prostaglandins and other autocooids	Prostaglandins and other autocooids
Temperature and Thermoregulation		
	Mechanisms: heat production by body; heat lost and gained; transfer of heat between body/environment	Mechanisms for heat transfer between the body and its environment Mechanisms by which heat is produced by the body Mechanisms by which heat is lost and gained by the body
	Mechanisms: managing body temperature with changes in environment and effects of anaesthesia on these mechanisms	Processes used for conserving as well as generating heat under situations of lowered environmental temperature, and the effects of anaesthesia on these processes Processes used for losing heat as well as increasing heat loss under situations of raised environmental temperature, and the effects of anaesthesia on these processes
	Thermoneutral zone, inter-threshold range and energy requirements	Thermoneutral zone, and describe the energy requirements for maintaining normal body temperature
	Hypothermia: effects	
Haematology, Immunology		
Haematology		

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Blood constituents: production; function; breakdown	Production, function and breakdown of blood constituents including red blood cells, haemoglobin, and plasma proteins Constituents and functions of plasma
	Coagulation and fibrinolysis	Platelets and their role in coagulation Intrinsic and extrinsic coagulation pathways Mechanisms of preventing thrombosis Fibrinolysis and its regulation
	Assessment of function	Methods for assessing coagulation, platelet function and fibrinolysis
	Anaemia: consequences	Consequences of acute and chronic anaemia
	Transfusion and Issues	Origin and importance of blood groups of cross-matching Constituents of blood products, their source, role and risks Changes during blood storage and the problems of massive blood transfusion and their management
	Abnormal haemoglobins	Abnormal haemoglobins and their clinical significance
Immunology		
	Normal immune function and auto-immunity	Basic immunology including non-specific resistance mechanisms and specific immunity. Auto-immunity
	Tissue typing; transplant and rejection	Principles of tissue typing Principles of tissue/organ transplantation and the mechanisms of rejection of allogeneic organs
	Hypersensitivity reactions; anaphylactoid/anaphylaxis; other drug reactions	Mechanism and pathophysiological effects of hypersensitivity. Significance of route of drug administration with regards to drug reactions Principles of management strategies for anaphylactic/anaphylactoid reactions
	Altered immune function due to: Anaesthesia; Surgery; Critical illness; Depression	Effects of anaesthesia, surgery and critical illness on immune function Implications of depression of immune status.
	Assessment of function	Assessment of immune reaction
Pharmacology + Biostatistics (33%)		
General Pharmacology:		
Pharmacodynamics		
	Basic sciences of biochemistry, cellular membranes and intracellular elements	Knowledge of the biochemistry, physical chemistry of cellular membranes and intracellular elements for understanding drug actions and metabolism
	Modes of drug action	Modes of drug action such as receptor theory, enzyme interactions and physico-chemical interactions
	Receptor theory (in detail)	Detailed knowledge of receptor theory including, ionic fluxes, second messenger, G proteins, nucleic acid synthesis, regulation of receptor number and activity and evidence for presence of receptors.

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Dose-effect relationships: graded/quantal response, therapeutic index, potency/efficacy, antagonists/agonists types/ differences	Detailed knowledge of dose-effect relationships of drugs with reference to: graded and quantal response, therapeutic index, potency and efficacy, competitive and non-competitive antagonists, partial agonists, mixed agonist-antagonists and inverse agonists
	Law of Mass Action, Affinity, dissociation constants	Law of Mass Action, Affinity and dissociation constants
	Mechanism of action of GA agents	Theories of mechanism of action of general anaesthetic agents
Pharmacokinetics		
	Single/Multiple compartment models	Concept of single and multiple compartment models
	half-life, half-time, clearance, zero/ first order kinetics, volume of distribution, bio-availability, area under plasma concentration time curve, extraction ratio, loading/ maintenance dosage regimens	Concept of and the mathematics required to apply the concept of half-life, clearance, zero and first order kinetics, volume of distribution, bio-availability, area under the plasma concentration time curve, extraction ratio, loading and maintenance dosage regimens
	Absorption of drug at various sites of administration: Determinant factors	Absorption of drug at clinically utilized sites of administration and factors that will influence it
	Distribution of drugs: determinants/ factors; different physiological/ pathological conditions	Factors influencing the distribution of drugs (e.g. protein binding, lipid solubility, pH, pKa) and variation in different physiological and pathological conditions
	IV/infusion kinetics; context sensitive half time, effect-site and effect-site equilibration time: clinical applications.	Concepts related to intravenous and infusion kinetics; context sensitive half time, effect-site and effect-site equilibration time and their clinical applications.
	Epidural/ Subarachnoid space kinetics	Pharmacokinetics of drugs administered in the epidural and subarachnoid space
	Drug clearance: mechanisms and variation in different conditions	Mechanisms of drug clearance and variation in different physiological and pathological conditions
	Hepatic and non-hepatic metabolism, Phase 1 & 2 reactions, hepatic extraction ratio, first pass, enzyme induction/ inhibition	Hepatic and non-hepatic metabolism of drugs, Phase 1 and Phase 2 reactions, hepatic extraction ratio and its significance, first pass effect, enzyme induction and inhibition
	Clinical drug monitoring	Clinical drug monitoring
Variability in drug actions		
	Tolerance, tachyphylaxis, dependence, addiction, idiosyncrasy	Tolerance, tachyphylaxis, dependence, addiction, and idiosyncrasy Mechanisms of tolerance
	Alterations of response: physiological/ pathological conditions	Alterations to drug response due to: a. Different physiological conditions eg: neonates, the elderly and pregnancy b. Different pathological conditions eg: cardiac, respiratory, renal and hepatic disease
	Adverse drug reaction including Anaphylaxis/ anaphylactoid reaction	Adverse drug effects Anaphylaxis and anaphylactoid reaction
	Drug interactions: Mechanisms	Mechanisms of drug interaction

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Drug abuse	Pathophysiology of drug abuse with particular reference to the perioperative period and potential drug interactions (specific drugs to consider include alcohol, nicotine, benzodiazepines, opioids, cannabinoids, cocaine, amphetamines and ecstasy)
	Pharmacogenetics: malignant hyperpyrexia (in detail including Tx), porphyria, atypical cholinesterase, cytochrome function	Pharmacogenetic disorders such as malignant hyperpyrexia, porphyria, atypical cholinesterase and variation of cytochrome function Management of malignant hyperthermia with reference to the pharmacology of dantrolene
Pharmaceutical aspects/drug development		
	Drug preparations: additives; shelf-life	Shelf-life, changes drug potency during storage and methods of preserving shelf-life of drugs. Drug additives including buffers, anti-oxidants, anti-microbial and solubilizing agents
	Isomerism	Isomerism
	Drug evaluation and trials	
Core Anaesthetic drugs:		
	Detailed knowledge when relevant of: Pharmaceutical characteristics: Chemical nature/ source, preparation, purity and stability, dosage, strengths of preparation, inhaled concentrations Pharmacokinetic characteristics: routes of administration, absorption, distribution, metabolism and excretion Pharmacodynamic characteristic: site/s and mechanisms of action, structure activity relationships, variation in drug effects, monitoring of drug effects, effects on other systems, Unwanted, adverse effects and toxic effects Clinical considerations: considerations in pregnancy and lactation, elderly, neonatal or paediatric patients; indications and contraindications for use	
	Inhalational agents	
	Intravenous agents	
	Local Anaesthetics	
	Opioids	
	Analgesics: Non-opioids: NSAIDs; Paracetamol	
	Neuromuscular blockers and reversal agents,	
	Antiemetics	
	Adjuvant medications for pain	
	Oxygen	
Drugs for Mx of monitored parameters/ Major systems of Anaesthetic Interest		
	Detailed knowledge when relevant of: Pharmaceutical characteristics: preparation, purity and stability, dosage, strengths of preparations Pharmacokinetic characteristics: routes of administration, absorption, distribution, metabolism and excretion Pharmacodynamic characteristic: site/s and mechanisms of action, structure activity relationships, variation in drug effects, monitoring of drug effects, effects on other systems, unwanted, adverse effects and toxic effects Clinical considerations: considerations in pregnancy and lactation, elderly, neonatal or paediatric patients; indications and contraindications for use	

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	ANS: Cholinergics and Anti-Cholinergics	Drugs that affects the autonomic system including the cholinergic system and anticholinesterases
	CVS: Contractility; Rate; Rhythm, Vascular tone	Drugs that affects the Cardiovascular system: i.Contractility ii.Rate and Rhythm iii.Vascular tone
	Resp: bronchial tone/ Pulmonary vasculature	Drugs that affects the Respiratory system: i.Bronchial tone ii.Pulmonary vasculature
	Renal & Volume: Diuretics; Blood products; Fluid replacement	Drugs/Fluids that affects Renal system and Volume Status: i.Diuretics ii.Blood products iii.Fluid replacement
	Haemostasis function: prevention; facilitation	Drugs that affects the coagulation pathway, platelet function and fibrinolytic pathway.
Drugs for Mx of conditions of periop concern and poisoning	Required knowledge includes: General idea of preparations, strength and dosages, routes of administration, absorption, distribution, metabolism and excretion Site/s and mechanism of action, variation in drug effects, effects on other systems, adverse effects; indications and contraindications	
	Endocrine: Hypothalamic-pituitary-adrenal axis; Steroids; Diabetes mellitus; Thyroid function	Drugs that affect the endocrine system: i.Hypothalamic-pituitary-adrenal axis and steroids ii.Diabetes mellitus iii.Thyroid function
	GI drugs:GI volume & composition; GI vasculature	Drugs that affect the gastrointestinal system: i.Gastric volume and composition ii.Gastrointestinal vasculature
	Genitourinary Drugs: Uterus/ Prostate	Drugs that affect the uterus and prostate
	Psychotherapeutic drugs.	Psychotherapeutic drugs.
	Anticonvulsants	Anticonvulsant drugs including Mg
	Antimicrobials	Antimicrobials drugs
	Drugs affecting immune system + Cytotoxics	Drugs that affect the immune system Cytotoxic drugs.
	Poisoning: General Mx	General principles of the management of poisoning General knowledge of methods to decrease absorption and enhance drug elimination using modalities such as charcoal, emetic agents, gastric lavage, haemodialysis and charcoal haemoperfusion etc

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Poisoning: Specific Effects/Mx: Paracetamol, aspirin, TCAs, sedatives, cyanide, digoxin; organophosphates	Physiological effects of and management of the overdose of agents such as paracetamol, aspirin, tricyclic anti-depressants, sedatives, cyanide, digoxin and organophosphates
Biostatistics/Clinical trials		
	Design of clinical trial	Considerations of a good study design including: a. Study design b. Types of errors and techniques to minimize errors c. Sampling d. Bias and confounders e. Optimal power of the study
	Statistical Analysis	a. Types of data b. Descriptive statistics to measure central tendency and distribution of data c. Parametric and non-parametric tests in statistical inference d. Linear regression analysis and correlation e. Sensitivity, specificity, positive and negative predictive value of diagnostic tests f. Risks and estimation of Risk g. Calculation of power of a study
	Evidence Based Medicine	a. Levels of evidence b. Systemic review c. Meta-analysis
Physics and Equipment (15%)		
Physics and Measurement e.g. common gas laws,		
Physics		
	Basic Physical and Mathematical principles	A. Mathematical concepts such as exponential functions, integration, differentiation, time constants and half life B. Electrical concepts such as current, potential difference, resistance, impedance, inductance and capacitance as they relate to biomedical apparatus C. SI system of units D. Conversion between the different units: e.g. of pressure measurement
	Behavior of gases, liquids and vapors	Laws governing the behavior of gases, liquids and vapors in relation to temperature, pressure and volume.
	Physics of flow	Principles of flow and velocity of gases and liquids including relationship to viscosity and density and characteristics of laminar and turbulent flow. Application of Bernoulli's principle
	Diffusion; hydrostatic pressure and osmotic forces	Laws of diffusion: O ₂ , CO ₂ , drugs, electrolytes etc Concept of hydrostatic pressure and osmotic forces

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Heat and Humidity	Physical principles of heat transfer. Relative and Absolute Humidity
	Ultrasound	Basic physics of ultrasound and the Doppler principle
Principle of measurement	Pressure measurement of gases, liquids	
Clinical Monitoring	Includes everything that is required for monitoring at bedside: OT or Intensive care unit: including principles, calibration, sources of errors, limitations and interpretation of readings or	
Cardiovascular System		
	Cardiac function: Electrical	Electrocardiogram (ECG) including calibration, sources of errors and limitations
	Cardiac function: Mechanical	Heart tones, Echocardiography, Doppler, Cardiac Output
	Vascular pressure: Non-invasive	
	Vascular pressure: Invasive	Including invasive arterial blood pressure, central venous pressure, pulmonary arterial pressure, pulmonary artery occlusion pressure, left atrial pressure and left ventricular end-diastolic pressure (LVEDP).
	Vascular system: volume and resistance	Blood volume and SVR
	Organ blood flow	
Respiratory System		
	Evaluation of respiratory function	Lung volumes, gas flow, ventilation, blood flow, diffusion, compliance, resistance, gas transport, gas concentrations and pressures in ventilating gas mixtures and body fluids.
	Measurements of ventilation	Measurements of ventilation, including respirometers, inspiratory force, spirometry, flow-volume loops.
	Measurements of gases of clinical significance	Measurements of gases of clinical significance including O ₂ , CO ₂ , nitrogen, anesthetic gases and vapors; using ultraviolet or infra-red absorption, paramagnetic analysis, gas chromatography, mass spectrometry and Raman scattering
	Capnography	Principles of capnography including calibration, sources of errors and limitations
	Measurement of flow	Measurements of gas flow including flowmeters and rotameter
	Oxygenation	Measurements of oxygenation such as pulse oximetry including principles, calibration, sources of errors and limitations
	Blood gases	Measurements of Blood Gases: Electrodes for pH, PO ₂ , PCO ₂ , Calibration, Temperature Corrections, Errors
Nervous system		
Brain Spinal cord	Consciousness	Electroencephalogram (EEG) (raw and processed), Principles and available anesthesia monitors; (including Bispectral, others), Evoked potentials
	Other neurological functions	Motor (MEP) and sensory (SSEP)
	Intracranial pressure	
	Blood flow and oxygenation	Measurement of brain tissue oxygen saturation (including near infrared spectroscopy (cerebral oximetry) Measurement of regional flow such as transcranial doppler, jugular venous oxygen saturation.

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

Neuromuscular function	Depth of paralysis	
	Localisation for regional anaesthesia	
Temperature and Humidity		
	Principles of temperature sensing devices	
	Measurement: Temperature and Humidity	Various sites of measurement; calibration; interpretation; sources of error
Miscellaneous monitoring devices		
Minimum monitoring standards		
Equipment and safety e.g. anaesthesia machine, airway equipment, safety in the OT		
Equipment		
	Supply of medical gases	The supply of medical gases (bulk supply and cylinder)
	Oxygen therapy	Oxygen supplementation and oxygen therapy
	Airway devices for positive ventilation	Devices to facilitate manual and mechanical ventilation: masks, airways, supraglottic devices, endotracheal tubes etc
	Devices to facilitate placement of airway	Devices to facilitate endotracheal intubation and tube change adjuncts: bougies, jet stylets, soft and rigid tube change devices
	Suction	Set-up and operation of medical suction
	Breathing circuits and components	Circle breathing circuits and Ayre's T-piece and components: advantages and hazards of use Removal of carbon dioxide in a circle system and associated hazards.
	Ventilators	Commonly used modes of ventilation available in Anaesthetic practice
	Scavenging	
	Vaporisers	
	Anaesthesia machine	Components and operation of the anaesthetic machine Anaesthesia machine check
	Temperature and humidity	Methods of maintaining and regulating temperature and humidity: including active warming of patients: safety and hazards
Safety		
	Electrical safety	Microshock and macroshock, and the mechanisms for preventing these. Safety features of the operating room and equipment used in the operating environment; including surgical diathermy, its safe use and the potential hazards
	Fire, explosions, LASERS	Fire and explosions hazards: causes, prevention and management Surgical lasers, their safe use and the potential hazards

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Biozards	Anaesthetic gas pollution, Infectious diseases: airborne and contact; Universal precaution, Needlestick injuries
	Radiological investigations	Principles of radiological investigations (X-rays, CT scan and MRIs), their safe use and the potential hazards
Patient safety considerations		
	Positioning and Pressure effects	Understands safe positioning of patient on the operating table and is aware of the potential hazards e.g. nerve injury, pressure points, ophthalmic injuries, Risks of tourniquet usage
	Drug error	Considerations for prevention of drug errors: selection, checks, preparation, labelling and administration
	Blood product administration	Consideration for preventing error; management of reactions
Anatomy (10%)		
Head and Neck (including airway)		
	Face; Eye; External ear	In particular Eye: Contents of the orbit Determinates of ocular perfusion and intra-ocular pressure Innervation and eye reflexes (including: oculo-cardiac, oculo-respiratory, oculo-emetic) Innervation of the face
	Nose; Oral Cavity; Pharynx	Nose: Innervation and blood supply Oral cavity: structures (floor of mouth, tongue, teeth, hard and soft palate), innervation. Pharynx: Subdivisions; Innervation
	Larynx	Innervation; muscles; blood supply; cartilages Vocal cords, positions with paralysis Differences between infant and adult
	Trachea	Structure, innervation and relationships in neck and chest
	Neck	Surface Anatomy, musculoskeletal structure, Innervation Major vessels, nerves and nerve plexuses Structural relationships: normal anatomy and current imaging techniques including roentgenograms, ultrasound, CT and MRI.
Cardiovascular/ Respiratory anatomy		
Cardiovascular System	Heart	Normal Anatomy of Heart and Major Vessels correlating to current imaging: Radiographic: Roentgenograms, CT, MRI Coronary Circulation Heart conduction system; innervation and control systems
	Vessels of Anaesthetic interest	Anatomy, anatomical relations and ultrasonic anatomy of the vessels in the following regions (relevant to vascular cannulation): Neck; Subclavian and axillary region; Femoral region; Cubital fossa; Wrist; Foot

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Major organ systems	Blood supply of other major organs: kidneys, central nervous system including spinal cord, liver, gastrointestinal system
Respiratory System	Thorax	Thorax: surface anatomy, intra-thoracic structures and relations Innervation of the intra-thoracic structures. Muscles of Respiration, Accessory Muscles
	Lung	Tracheobronchial tree: Divisions Lung lobes and segments Bronchial and pulmonary circulations Microscopic anatomy
Neuroanatomy (Central nervous system and peripheral nervous system): Anatomy and (where relevant) radiological feature		
Central nervous system		
	Skull and Brain	Skull Brain: Cerebral cortex, Cerebellum, basal ganglia, major nuclei and motor and sensory pathways, Brain stem: nuclei and cranial nerves, Ventricular system, Cerebral circulation; circle of Willis, venous sinuses and drainage Meninges: Epidural, Subdural and Subarachnoid Spaces Radiological features of common acute neurosurgical conditions
	Spine and Spinal Cord	Variations in vertebral configurations Spinal and sacral nerves: dermatomal and myotomal innervation Ascending and descending tracts Epidural (cervical, thoracic, lumbar, caudal), subdural and subarachnoid space Blood supply
Autonomic Nervous system	Parasympathetic Nervous System Sympathetic Nervous System	
Peripheral nervous system	Anatomy and (where relevant) radiological features (including ultrasound imaging). Note that head and neck covered in head and neck session	
	Truncal	Paravertebral space, intercostal space, neurovascular plane in the thorax and abdominal wall, e.g. transversus abdominis plane, rectus sheath, ilioinguinal etc. Perineum including penile innervation etc
	Brachial Plexus	Brachial plexus: formation, branches, relations and distributions
	Lumbosacral plexus	Lumbosacral plexus: formation, branches, relations and distributions
Clinical Medicine (10%)		
Acute Medicine	Presentation, Investigation and immediate management of common crisis encountered in the OT	

Master of Medicine (Anaesthesiology) Part A Syllabus (Current as of 23 April 2019)

	Cardiovascular conditions	Abnormal rhythms such as tachyarrhythmias, bradyarrhythmias, narrow or broad complex, asystole, associated with or without haemodynamic changes according to recognised guidelines including ACLS Hypotension or Hypertension Acute myocardial ischaemia
	Respiratory issues	Difficult airway algorithm Dyspnoea or Hypoxia Hypocapnoea or hypocarbia Hypercapnoea or hypercarbia Laryngospasm or Bronchospasm High airway pressures during positive pressure
	Neurological issues	Perioperative confusion, delirium, cognitive dysfunction or failure to awaken
	Specific conditions of interest	Local anaesthetic toxicity Malignant hyperthermia Anaphylaxis Blood Transfusion Reaction Electrolyte abnormalities: e.g. Hyperkalemia and hypokalemia
Perioperative Medicine	Common issues in Perioperative Medicine e.g. URTI, airway assessment, management of chronic disease, acute pain management	
	Generic preoperative issues	Common perioperative issues e.g. Airway assessment, Premedication, URTI
	Specific common conditions	Pathophysiology, assessment and perioperative management of commonly encountered disease conditions; such as a. CVS conditions: e.g. Ischaemic heart disease, Valvular heart disease, Hypertension b. Respiratory conditions: e.g. Asthma, Chronic obstructive lung disease, chronic smoking, Obstructive sleep apnoea c. Endocrine conditions: e.g. Diabetes, Hyper and Hypothyroidism d. Metabolic conditions: e.g. Morbid obesity, e. End stage renal failure f. Haematological conditions: e.g. Anaemia; use of anti-coagulants or antiplatelet medication management
	Abnormal findings	Identification and appropriate management of abnormal findings in the perioperative period: a. History and Physical examinations (e.g. Heart murmur, thyroid nodule etc) b. Investigations and Management e.g. (Abnormal ECG, CXR, blood investigations etc)
	Postoperative Management	a.Criteria for safe extubation b.Management in recovery c.Acute Pain Management e.g. management of patient on PCA, Epidural

Prepared by

Dr Tay Kwang Hui

Master of Medicine (Anaesthesiology) Chief Examiner, 2019

In consultation with Master of Medicine (Anaesthesiology) Examination Committee