Course Specifications/ Learning Objectives

MBBS Degree Programme

Faculty of Medicine

University of Ruhuna

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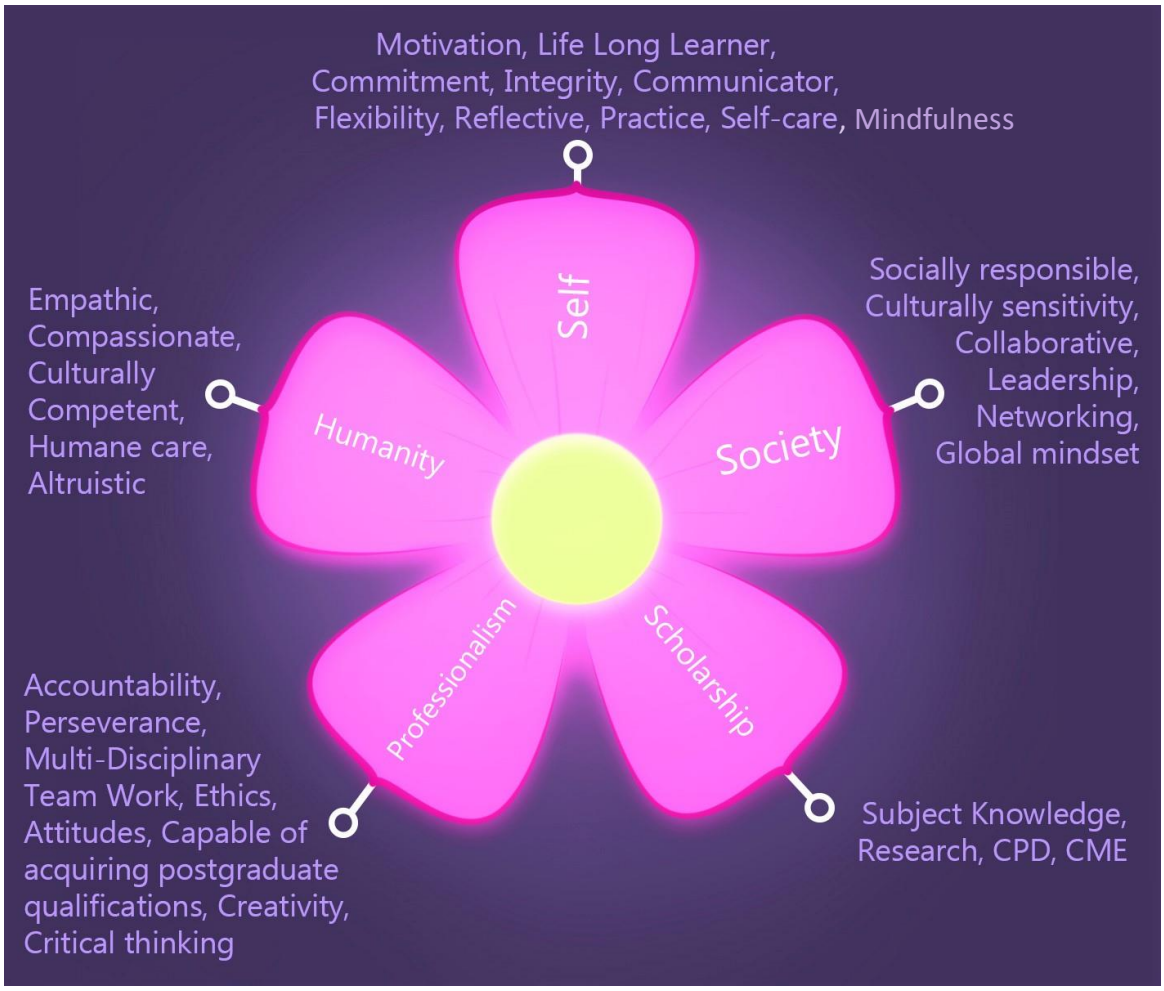
Attributes



Aims

To produce a medical graduate;

- with adequate knowledge and skills required to practice medicine under diverse circumstances
- with professionalism, leadership qualities and managerial competencies required to practice medicine in the global context
- who is an ethical and safe practitioner with humane attributes to work as a healthcare provider
- who is a lifelong learner and researcher capable of contributing to scientific advancement

Intended Learning Outcomes

The intended learning outcomes and competencies had been developed under five major headings as identified in the attributes

1. Development of self
2. Development of society
3. Scholarship
4. Professionalism
5. Humane qualities

Development of self

- Identify strengths deficits and limits in yourself through self-reflection, peer and teacher feedback
- Ability to set goals and design processes of learning through independent study to rectify the identified deficits
- Capability to incorporate changes to yourself and work patterns based on feedback received on a daily basis
- Identify gaps in the domains of knowledge, skills, attitudes and devise learning activities to bridge the gaps thereby becoming a lifelong learner
- Become self-motivated to accomplish specific targets
- Display determination and commitment to complete the task
- Flexibility to adapt to changes
- Display honesty and integrity
- Be able to obtain care of their individual physical psychological health related issues
- Be able to practice mindfulness

Development of society

- Possess a global mindset being aware of the latest advances in health care with the ability to apply them innovatively in a manner appropriate to the local setting

- Ability to network and collaborate with the community and other health care professionals
- Develop a culturally sensitive mindset possessing the ability to implement appropriate methods of healthcare
- Possess the ability to take leadership in the community
- Be socially responsible to the community and the country
- To become an inspiring role model to the immediate and larger society influencing change
- Capable of supporting the legal system within the medico legal sphere in the administration of justice
- Possess the ability to promote health and prevent spread of disease in the community by applying principles in community medicine

Scholarship

- Ability to accurately obtain a history from a patient, conduct relevant physical and mental state examinations, use laboratory investigations and imaging tests
- Capable of interpreting history, examination findings, laboratory data and develop patient management plans
- Ability to summarize and present clinical findings and data to others of the health care team
- Capable of making informed decisions regarding diagnostics and therapeutic interventions by obtaining directions from seniors, patient preferences and up to date scientific evidence
- Prescribe medicine and perform medical procedures specified as essential for a generalist
- Enable shared decision making through effective communication with the patients, their family members and the other health care professionals
- Contribute to the advancement of medicine through research using appropriate research methods
- Understand the importance of regularly updating their knowledge and engage in continuous professional development and continuous medical education training

Professionalism

- Ability to work in multidisciplinary teams effectively communicating and respecting each other
- Capability to communicate efficiently and effectively with patients, care givers, other health professionals and the community
- Creative and innovative ability when practicing health care in the local context
- Capacity to engage in critical thinking, reflective practice and change one's mindset and behavior when faced with problems
- Ability to persevere and endure amidst unresolved problems
- Accountability to, patients, caregivers, health care professionals and community, government other
- Effectively manage conflict between personal and professional responsibilities
- Self-awareness of personal and professional limitations and ability to engage in appropriate help seeking behavior
- Identify shortcomings within the established system and implement solutions
- Awareness and commitment to ethical principles in practicing medicine and conducting research
- Ability and enthusiasm to engage in postgraduate training and qualifications

Humane qualities

- Sensitivity and responsiveness to complex dimensions related to the patient populations which may include gender, age, culture, religion, disabilities and sexual orientation etc.
- Ability to show empathy to patients, care givers, other health care professionals and community
- Ability to explain and convey facts to the patients in language and terms that can be understood by specific patients
- Capable of providing time to the patient in decision making when he/she is in the midst of uncertainty
- Respect for patient's autonomy and privacy
- Ability to practice altruism in patient care

Contents

Preface

Since the inception of the Faculty in 1980, MBBS programme was on traditional lines where the course was arranged with the 2nd MBBS, 3rd MBBS and the Final MBBS examinations. Even within this traditional curriculum, many changes were made over the years in both teaching and evaluation. 15 Departments contribute for the programme of MBBS. Clinical training commences after the 2nd MBBS examination in which students receive hospital-based training supplemented by lectures.

With this booklet, we tried to guide the students on areas of competency they are expected to gain/ developed while going through different disciplines. The booklet contains learning objectives laid down by the Departments.

Chairperson
Internal Quality Assurance Cell
Faculty of Medicine
University of Ruhuna

Acknowledgement

We would like to thank many of our academic staff who has helped us in collection of learning objectives at Department level specially Heads of the Departments and members of Internal Quality Assurance Cell. Many have given us useful advice, helped to correct mistakes and gone through the document to make sure that the contents are up-to-date.

1. Department of Anatomy

Vision

The Department of Anatomy strives to achieve academic excellence through outstanding undergraduate and postgraduate clinically oriented Anatomy teaching programme and multidisciplinary research that will foster an intellectually vibrant environment within the department

Mission

The mission of the Department of Anatomy is to make a significant contribution to the advancement of the knowledge in the fields of Macroscopic Anatomy, Microscopic Anatomy, Developmental Anatomy, Neuroanatomy and Genetics through a comprehensive curriculum and teaching methods that utilizes innovative and advance technology in par with the accepted international norms

General Objectives

At the end of the course, students should be able to,

1. describe the gross anatomy of human body and understand the structural arrangement of its organs and systems
2. apply their basic anatomical knowledge in understanding and sorting out of common clinical conditions and procedures
3. outline the normal ultra-structural features of epithelia, tissues and organs of the human body
4. outline the normal embryological development of human body in stages and understand the embryological basis for common congenital abnormalities
5. outline the basics of human genetics and heredity

Learning objectives

At the end of each session, students should be able to

1.1 General Anatomy

1.1.1 define basic anatomical terms

1.1.2 define basic anatomical planes

1.1.3 spell correctly the names and anatomical terms printed in the dissection manual

1.1.4 define the tissue planes (skin, superficial fascia, deep fascia, muscles, bones, serous layers)

1.1.5 define anatomical descriptions of dermatomes and myotomes

1.1.6 define the classification of bones and joints with examples

1.1.7 state the basic structure of muscular system and fascial layers

1.1.8 state the basic structure of a spinal nerve

1.1.9 state the basic structure of vascular and lymphatic system

1.1.10 recognize 3d relations of anatomical structures by drawing diagrams

1.1.11 utilize anatomical knowledge to dissect a structure without damaging it using sharp and blunt dissection techniques

1.1.12 identify anatomical structures in dissected bodies, models & diagrams

1.2 Upper Limb

1.2.1 define the regions of the upper limb

1.2.2 outline the surface anatomy of the upper limb

1.2.3 outline the osteology upper limb using bones/ articulated skeleton

1.2.4 outline the fascial compartments of the arm and forearm

1.2.5 outline the neurovascular structures of the upper limb

1.2.6 outline the anatomical basis of testing of the muscles of upper limb

1.2.7 explain the anatomy of pectoral region and mammary gland

1.2.8 apply the anatomical knowledge of the mammary gland and pectoral region to clinical scenarios

1.2.9 define the boundaries of the axilla & list its contents

1.2.10 outline the course and relations of the axillary artery and vein including their branches and tributaries

1.2.11 illustrate schematically the formation of brachial plexus and its branches

1.2.12 identify the location and drainage pattern of the axillary lymph nodes

1.2.13 explain the anatomy of the scapular region

1.2.14 apply the anatomical knowledge of the arterial anastomoses around the scapula to its clinical implications

1.2.15 explain the anatomy of the shoulder joint

1.2.16 apply the anatomical knowledge of articulations of shoulder girdle, its muscular and ligamentous support with its clinical relevance

1.2.17 demonstrate the normal ranges of active and passive movements of shoulder joint

1.2.18 outline the attachments, functions and innervation of muscles in anterior & posterior compartments of the arm

1.2.19 outline the course and relations of the brachial artery and its branches

1.2.20 discuss the clinical significance of proximity of the axillary, radial & ulnar nerves to the humerus

1.2.21 outline the boundaries and the contents of cubital fossa and its clinical significance

1.2.22 identify the muscles originating from the medial & lateral epicondyles and supracondylar ridges of the humerus

1.2.23 outline the anatomical position, insertion, functions and innervation of the muscles originating from lower humerus

1.2.24 illustrate the arterial anastomoses around the elbow joint

1.2.25 identify the muscles originating from radius and ulna indicating their insertion, function and innervation

1.2.26 outline the course and distribution of arteries of forearm and hand

1.2.27 outline the surface marking and the attachments of flexor and extensor retinacula

1.2.28 illustrate the tendons, nerves and blood vessels passing superficial and deep to flexor retinaculum

1.2.29 apply the anatomical knowledge of the flexor retinaculum to its clinical relevance

1.2.30 outline the boundaries and contents of the "anatomical snuff-box" and its clinical significance

1.2.31 outline the anatomy of the intrinsic muscles of the hand including their attachments, innervation and functions

1.2.32 outline the palmar spaces of the hand with its clinical implication

1.2.33 demonstrate the movements of the thumb and fingers

1.2.34 apply the anatomical knowledge of the innervation of the thenar, hypothenar and other intrinsic and extrinsic muscles of the hand to its clinical significance

1.2.35 outline the anatomy of elbow, wrist, proximal & distal radio-ulnar and other joints of hand

1.2.36 demonstrate the normal range of active and passive movement of elbow and wrist joints

1.2.37 demonstrate the functional anatomy of pronation and supination

1.2.38 apply the anatomical knowledge to locate the arterial pulses of the upper limb and its clinical significance

1.2.39 analyze the clinical significance of fractures at different sites of the upper limb bones

1.2.40 analyze the motor and sensory deficiencies of the upper limb resulting from injury of brachial plexus and its branches at different sites

1.2.41 Apply the anatomical knowledge to identify significant landmarks of the upper limb using X-ray, CT and MRI images

1.3 Thorax

1.3.1 outline the boundaries of the thoracic cavity

1.3.2 outline the surface anatomy of the thorax

1.3.3 outline the components of the thoracic skeleton stating their important features

1.3.4 classify the thoracic vertebrae and ribs by describing their anatomical features

1.3.5 explain the different types of joints in the thoracic skeleton

1.3.6 outline the structure of the thoracic wall indicating their relationships and clinical significance

1.3.7 illustrate the anatomical arrangement of the thoracic cavity into mediastinum and pleural cavities

1.3.8 outline the surface markings of the pleural reflections and lobes of the lungs

1.3.9 explain the innervation of the thoracic wall and the pleura

1.3.10 apply the anatomical knowledge of the thoracic wall and pleura to its clinical significance

1.3.11 explain the different structures involved in different phases of respiration

1.3.12 demonstrate the structures that create the lung impressions with their relationship

1.3.13 illustrate lobes and fissures of the lungs

1.3.14 define the bronchopulmonary segments in each lung lobe with its clinical significance

1.3.15 outline the vasculature and lymphatic drainage of the lung

1.3.16 define the mediastinum

1.3.17 explain the contents of the superior mediastinum with their clinical relevance

1.3.18 explain the contents of the middle mediastinum with their clinical relevance

1.3.19 demonstrate the surface markings of the pericardium and heart valves

1.3.20 explain the gross anatomy of the pericardium

1.3.21 illustrate the chambers and valves of the heart

1.3.22 illustrate the origin, course, distribution of coronary vasculature

1.3.23 apply the anatomical knowledge of the heart to its clinical significance

1.3.24 outline the anatomy of the conducting system of the heart

1.3.25 outline the relations of the vagus, recurrent laryngeal and phrenic nerves

1.3.26 explain the contents of the posterior mediastinum with their clinical relevance

1.3.27 outline the anatomy of trachea and oesophagus and their relations

1.3.28 outline the lymphatic drainage of the thoracic contents

1.3.29 outline the arrangement of the autonomic nervous system in the thorax

1.3.30 outline the thoracic course and distribution of the phrenic, vagus and recurrent laryngeal nerves

1.3.31 outline the course and relations of the thoracic duct

1.3.32 outline the origin, course and connections of the azygos venous system with its clinical significance

1.3.33 demonstrate the components of the thoracic wall and the diaphragm on a normal chest radiograph

1.3.34 demonstrate the pulmonary vessel and bronchial shadows in the lung fields of a normal chest radiograph

1.3.35 apply the anatomical knowledge of the surface markings of the lungs and their fissures to relate an opacity shown in a chest radiograph to lung lobe

1.4 Abdomen

1.4.1 demonstrate the surface anatomy of the anterior abdominal wall

1.4.2 outline the anatomy of the rectus sheath and its contents

1.4.3 explain the muscles, innervation and vasculature of the anterior abdominal wall and inguinal canal with their clinical relevance

1.4.4 explain the actions of the anterior abdominal wall muscles

1.4.5 explain the anatomy of the male external genitalia and enumerate the contents of the spermatic cord

1.4.6 apply the anatomical knowledge of the male external genitalia to its clinical relevance

1.4.7 outline the arrangement of the peritoneum and the peritoneal cavity

1.4.8 illustrate the nerve supply of the visceral and parietal peritoneum with its clinical implication

1.4.9 explain the clinical relevance of peritoneal compartments, fossae, recesses and reflections

1.4.10 demonstrate the surface markings of the stomach, appendix, liver, gall bladder, spleen and kidney

1.4.11 identify the oesophagus, stomach, duodenum, jejunum, ileum, vermiform appendix, caecum, ascending, transverse, descending and sigmoid colon indicating their relations

1.4.12 identify the components of hepatobiliary system

1.4.13 explain the structure of the stomach, small and large intestine, liver, spleen, gall bladder, bile ducts and pancreas

1.4.14 outline the relations, blood supply, innervation, lymphatic drainage of the abdominal viscera

1.4.15 outline the formation, communications and relations of the portal vein

1.4.16 apply the anatomical knowledge of the portal vein and its communications with the clinical relevance

1.4.17 outline the position, structure, relations, blood supply, innervation, lymphatic drainage of the kidney and the suprarenal glands

1.4.18 apply the anatomical knowledge of the kidney and the suprarenal glands to its clinical relevance

1.4.19 outline the course, relations, blood supply, innervation of the abdominal ureter

1.4.20 apply the anatomical knowledge of the ureter to its clinical relevance

1.4.21 outline the attachments, relations, blood supply and innervation of the diaphragm

1.4.22 list the structures traverse to and from the abdomen in relation to the diaphragm with their vertebral levels

1.4.23 apply the anatomical knowledge of the diaphragm to its clinical relevance

1.4.24 outline the osteology of lumbar vertebrae

1.4.25 outline the structure of the muscles of the posterior abdominal wall and its fascia

1.4.26 list the areas of referred pain to sites of origin in the abdomen

1.4.27 outline the distribution of sympathetic and parasympathetic nerves in the abdomen

1.4.28 outline the arrangement of lymphatic system in the abdomen

1.4.29 apply the anatomical knowledge of the lymphatic system to its clinical relevance

1.4.30 outline the course, branches or tributaries, relations and communications of the aorta and inferior vena cava

1.4.31 apply the anatomical knowledge of the aorta and inferior vena cava to its clinical relevance

1.4.32 outline the lumbar sympathetic trunk and hypogastric plexus; the anterior and posterior vagal trunks

1.4.33 identify the formation, branches, relations and distribution of the lumbar plexus

1.4.34 identify the abdominal aorta and its branches in arteriograms

1.4.35 identify the bones forming the abdominal skeleton in radiographs

1.4.36 identify the various parts of the urinary tracts in pyelograms

1.4.37 identify the various parts of the gastro-intestinal tract in barium meals and barium enemas

1.4.38 identify the parts of the biliary system in cholecystograms

1.4.39 identify the abdominal organs and blood vessels visible in CT scans of the abdomen

1.4.40 apply the anatomical knowledge to identify significant landmarks of the abdomen using X-ray, CT and MRI images

1.5 Pelvis and perineum

1.5.1 demonstrate the surface anatomy of the regions of pelvis and perineum

1.5.2 outline the osteology of pelvis; hipbone, sacrum and coccyx

1.5.3 demonstrate the true and false pelvis in relation to the anatomical position of the body

1.5.4 list the criteria which help to distinguish the male and female bony pelvis indicating their clinical significance

1.5.5 illustrate the average dimensions of the pelvic inlet, mid cavity, outlet and obstetric measurements of the normal female true pelvis with their clinical relevance during childbirth

1.5.6 outline the arrangement of the pelvic fascia, pelvic peritoneum, peritoneal folds and relations of the recto-uterine/recto-vesical pouch

1.5.7 outline the pelvic viscera indicating their relationships, innervation, blood supply and lymphatic drainage in males and females

1.5.8 outline the arrangement of perineum; the urogenital region with fascia in the superficial and deep perineal spaces and the anal region

1.5.9 explain the position, boundaries, contents and related structures of the anal region

1.5.10 apply the anatomical knowledge of the anal region to its clinical relevance

1.5.11 identify and discuss the boundaries and contents of the ischio-rectal fossa with its clinical significance

1.5.12 compare and contrast the position, boundaries, contents and related structures of the urogenital region in males and females

1.5.13 apply the anatomical knowledge of the urogenital region to its clinical relevance

1.5.14 identify and describe the main anatomical features of female external genitalia

1.5.15 outline the cutaneous nerve supply, main blood supply and the lymphatic drainage of the of the structures of the perineal spaces and external genitalia

1.5.16 outline the anatomy and relative positions of the pelvic part of ureters and urinary bladder

1.5.17 apply the anatomical knowledge of the ureters and urinary bladder to its clinical relevance

1.5.18 outline the anatomy and relative positions of prostate, seminal vesicles and vas deferens

1.5.19 apply the anatomical knowledge of the prostate to its clinical relevance

1.5.20 compare and contrast the anatomy of male and female urethra with their clinical significance

1.5.21 outline the position, structure, relations, vasculature, innervations and lymphatic drainage of ovaries, uterine tubes, uterus and vagina

1.5.22 apply the anatomical knowledge of the ovaries, uterine tubes, uterus and vagina to their clinical relevance

1.5.23 outline the position, structure, relations, vasculature, innervations and lymphatic drainage of rectum, anal canal and anal sphincters

1.5.24 apply the anatomical knowledge of the rectum and anal canal to their clinical relevance

1.5.25 outline the anatomy of the muscles of the pelvic wall and floor

1.5.26 explain the organization of the pelvic floor muscles and pelvic fascia in supporting the uterus and pelvic viscera

1.5.27 identify the course, relations and distribution of arteries and veins of the pelvis

1.5.28 identify the main branches of the internal iliac artery and vein

1.5.29 identify the formation, position, branches, relations and distribution of the sacral plexus

1.5.30 outline the course, relations and distribution of the pudendal nerve and pudendal vessels with their clinical relevance

1.5.31 outline the general arrangement of sympathetic and parasympathetic nerves in the pelvis

1.5.32 describe the general arrangement of lymph nodes and lymphatic in the pelvis indicating their clinical relevance

1.5.33 explain the anatomy of the joints and ligaments of the pelvis and describe how these anatomical connections are related to the transmission of body weight in the erect posture and other clinical significance

1.5.34 identify the main features of the bony pelvis on a normal anteroposterior or lateral radiograph

1.5.35 identify the components of the female genital tract using HSG images

1.5.36 identify the components of the bladder using MCUG images

1.5.37 identify the components of the male urethra using urethrograms

1.5.38 apply the anatomical knowledge to identify significant landmarks of the pelvis and perineum using X-ray, CT and MRI images

1.6 Lower limb

1.6.1 define the regions of the lower limb

1.6.2 outline the surface anatomy of the lower limb

1.6.3 outline the osteology lower limb using bones and articulated skeleton

1.6.4 define the fascia of the lower limbs and describe its special features, attachments and functions

1.6.5 explain the fascial compartments of the thigh and leg

1.6.6 outline the neurovascular structures of the lower limb

1.6.7 outline the lymphatic drainage of the lower limb

1.6.8 explain the venous drainage of the lower limb

1.6.9 outline the anatomical basis of testing of the muscles of lower limb

1.6.10 explain the boundaries, muscles, nerves and vasculature of the gluteal region

1.6.11 apply the anatomical knowledge of the gluteal region to clinical relevance

1.6.12 define the boundaries of the femoral triangle and adductor canal

1.6.13 explain the anatomy of the femoral sheath and contents of the femoral triangle with their clinical relevance

1.6.14 outline the course and relations of the femoral artery and its branches

1.6.15 apply the anatomical knowledge of the adductor canal and its contents to their clinical relevance

1.6.16 list the nerve roots and divisions which make up the obturator, femoral, sciatic, tibial and common peroneal nerves

1.6.17 list the muscles of the anterior, posterior and the medial compartments of the thigh

1.6.18 outline the anatomical position, insertion, actions and innervation of the muscles of the thigh

1.6.19 apply the anatomical knowledge of the neurovascular structures of the compartments of the thigh to their clinical relevance

1.6.20 outline the boundaries and the contents of the popliteal fossa

1.6.21 apply the anatomical knowledge of popliteal fossa to its clinical relevance

1.6.22 explain the articulation of the hip joint and its muscular and ligamentous support

1.6.23 apply the anatomical knowledge of hip joint to its clinical relevance

1.6.24 compare and contrast the anatomy of the hip and the shoulder joint in view of adaptation to their function

1.6.25 demonstrate the normal range of active and passive movements of the hip joint

1.6.26 list the muscles in the anterior, posterior and lateral compartments of the leg

1.6.27 outline the anatomical position, insertion, actions and innervation of the muscles of the leg

1.6.28 apply the anatomical knowledge of the neurovascular structures of the compartments of the leg to their clinical relevance

1.6.29 apply the anatomical knowledge of the superficial and deep venous systems to their clinical relevance

1.6.30 explain the anatomical basis for compartment syndrome and fasciotomy

1.6.31 outline the anatomy of the arches of the foot, the factors supporting them and their functions

1.6.32 list the muscles of the dorsum and the sole of the foot, their innervation and action

1.6.33 apply the anatomical knowledge of lower limb for posture and locomotion

1.6.34 outline the line of the centre of gravity passes, in relation to hip, knee and ankle joints

1.6.35 outline the surface markings of the femoral, popliteal, posterior tibial, and dorsalis pedis arteries and the long and short saphenous veins

1.6.36 apply the anatomical knowledge to locate the arterial pulses of the lower limb and its clinical significance

1.6.37 analyze the clinical significance of fractures at different sites of the lower limb bones

1.6.38 analyze the motor and sensory deficiencies, deformities and dysfunctions of the lower limb resulting from injury of sciatic, femoral, obturator, common peroneal, tibial, deep and superficial peroneal nerves

1.6.39 explain the articulation, innervation, blood supply of the knee joint and its muscular and ligamentous support

1.6.40 describe the 'locking' and 'unlocking' mechanisms of the knee joint

1.6.41 outline the main bursae around the knee joint and its clinical relevance

1.6.42 illustrate the arterial anastomoses around the knee joint

1.6.43 apply the anatomical knowledge of the knee joint to its clinical relevance

1.6.44 explain the articulation and movements of the ankle and subtalar joints

1.6.45 outline the muscular and ligamentous support and its clinical relevance of ankle and subtalar joints

1.6.46 apply the anatomical knowledge to identify significant landmarks of the lower limb using X-ray, CT and MRI images

1.7 Head and neck

1.7.1 summarize the details of bones of the head and neck region

1.7.2 demonstrate the general form of each skull bone and identify its boundaries and special characteristics such as sinuses and vascular markings

1.7.3 relate the major foramina and fissures of the skull with the structures they transmit

1.7.4 name the parts of the 5 typical cervical vertebrae and 2 atypical cervical vertebrae

1.7.5 understand the articulations of cervical vertebrae particularly the axio-atlanto-occipital articulations

1.7.6 outline the joints between the skull and the atlas vertebra and between the atlas and the axis vertebrae

1.7.7 list the factors that influence the movements and the stability of these joints

1.7.8 summarize the movements between the other cervical vertebrae

1.7.9 apply the anatomical knowledge of the layers of the scalp to their clinical relevance

1.7.10 explain the pattern of organization of the muscles of facial expression and their general actions, nerve supply, with detail anatomy of the orbicularis oculi, orbicularis oris and buccinator muscles

1.7.11 explain the arrangement of the fascia of the neck with its clinical relevance

1.7.12 define the posterior triangle of the neck

1.7.13 explain the boundaries and contents of the posterior triangle with their clinical relevance

1.7.14 recall the arrangement of the groups of muscles around the cervical spine and the main action(s) of each group

1.7.15 demonstrate the attachments, action and nerve supply of sternocleidomastoid and trapezius muscle

1.7.16 demonstrate the clinical testing of the sternocleidomastoid and trapezius muscle

1.7.17 define the anterior triangle of the neck and its subdivisions

1.7.18 explain the boundaries and contents of the anterior triangle with their clinical significance

1.7.19 summarize the infrahyoid (strap) muscles, their nerve supply and actions

1.7.20 explain the thyroid gland with relevance to its, location, relations, blood supply and clinical anatomy

1.7.21 outline the location of the cervical groups of lymph nodes and the area of lymph drainage to each group

1.7.22 demonstrate a systematic method of examining the lymph nodes of the head and neck

1.7.23 interpret the anatomical principle of searching for primary site of infection or cancer (the drainage area) when a patient presents with enlarged lymph nodes

1.7.24 interpret the anatomical principle of looking for the regional lymph nodes when a patient presents with a primary lesion in a drainage area

1.7.25 recall the attachments, nerve supply and actions of the muscles attached to the hyoid bone

1.7.26 outline the origin, course and relations of the common carotid arteries

1.7.27 outline the course and termination of the external carotid artery and the area of distribution of each of its branches

1.7.28 outline the origin, course, termination and area of distribution of the internal carotid artery and location of the carotid body and sinus

1.7.29 outline the origin, course and area of distribution of the vertebral and basilar arteries

1.7.30 outline the surface marking of the subclavian, common carotid, internal carotid, external carotid and middle meningeal arteries

1.7.31 outline the formation, course and relations of the internal jugular vein

1.7.32 outline the course and connections of the anterior and posterior facial (or retromandibular) veins

1.7.33 outline the connections of the facial veins with the ophthalmic veins, veins of the pterygoid plexus and cavernous sinus

1.7.34 define the 'dangerous area' of the face

1.7.35 illustrate the arrangement of the intracranial venous sinuses

1.7.36 explain the location, extents, contents, connections and relations of the superior sagittal and cavernous sinuses with their clinical significance

1.7.37 list the cranial nerves, the foramina or fissures through which they pass

1.7.38 outline the course and distribution of each nerve in the head and neck region

1.7.39 outline the principal relations of cranial nerves v, vii, ix, x, xi, xii in different parts of their course

1.7.40 show the surface marking of the spinal accessory nerve in the neck

1.7.41 illustrate the greater occipital, lesser occipital and great auricular nerves and their approximate cutaneous distributions

1.7.42 summarize the cervical sympathetic chain with relevant to its relations in the neck and the general distribution of their postganglionic fibres

1.7.43 test the functions of the cranial nerves

1.7.44 outline the boundaries and the contents of the orbital cavity

1.7.45 explain the structures and the organization of the lacrimal apparatus with its clinical significance

1.7.46 identify the structure of the eye ball using anatomical models and dissected bull eye

1.7.47 test for dysfunction of the extra-ocular and intrinsic muscles of the eye

1.7.48 outline the position, surface marking, relations, nerve supply and the course and termination of the duct of the parotid, submandibular and sublingual salivary glands

1.7.49 explain the anatomical basis for bimanual examination of the submandibular gland

1.7.50 outline the anatomical basis for common nerves injured during surgical excision of parotid and submandibular glands

1.7.51 outline the temporomandibular joints with relevant to its movements, muscles acting, nerve supply and clinical significance

1.7.52 outline the muscles of the tongue with relevance to their nerve supply, attachments and actions, and effects of denervation

1.7.53 outline the parts and structure of the pharynx with special reference to attachments and action of the constrictor muscles and their clinical significance

1.7.54 summarize the mechanism of swallowing and anatomical basis for dysfunction of swallowing in denervation of pharyngeal muscles

1.7.55 outline the anatomy of tonsils (palatine, tubal, adenoids, lingual) with their clinical relevance

1.7.56 illustrate the structure of the lateral wall and the septum of nasal cavity and their nerve supply and blood supply

1.7.57 identify the structures opening into the nasal cavity through the lateral nasal wall with special reference to their clinical significance

1.7.58 outline the position, relations, nerve supply of the paranasal air sinuses with special consideration to the maxillary air sinus

1.7.59 outline the anatomical position, cartilages, muscles, mucus membrane and nerves of the larynx

1.7.60 identify the form of articulations at the crico-thyroid and crico-arytenoid joints, their movements and muscle involved in those movements

1.7.61 summarize the movements of the vocal cord in different phases of respiration and effects of denervation of the larynx

1.7.62 outline the arrangement of the three parts of the ear

1.7.63 summarize the position, relations, contents, communications and their clinical significance of the middle ear

1.7.64 outline the location and orientation of the semi-circular canals and cochlea

1.7.65 outline the differences between the adult and neonatal skull with its clinical relevance

1.8 Neuroanatomy

1.8.1 classify the nervous system

1.8.2 list the components of central nervous system (CNS) and peripheral nervous systems (PNS)

1.8.3 explain the light microscopic structure and function of neuron and neuroglia

1.8.4 outline the light microscopic appearance of a peripheral nerve in longitudinal and transverse sections with the arrangement of epineurium, perineurium and endoneurium

1.8.5 classify the neurons

1.8.6 compare and contrast the structure of sensory and sympathetic ganglia

1.8.7 outline the myelination of CNS and PNS

1.8.8 explain the structure of blood brain and blood CSF barriers and their clinical significance

1.8.9 explain the embryological development of the neural tube

1.8.10 explain the embryological development of forebrain, midbrain and hindbrain

1.8.11 outline the successive stages in the development of the alar and basal plates of the neural tube

1.8.12 outline the embryological development of the ventricular system

1.8.13 outline the congenital malformation of the brain, spinal cord and ventricular system

1.8.14 outline the positional changes of the spinal cord with age and its clinical significance

1.8.15 outline the size, position and enlargements of the spinal cord and the significance of its enlargements

1.8.16 outline the organization of meningeal coverings of the brain and spinal cord

1.8.17 outline the structure of the ventricular system and CSF circulation

1.8.18 recognize the components of the gray matter of the spinal cord: dorsal, ventral and lateral horns and the intermediate gray matter

1.8.19 list the cell groups in each gray matter component

1.8.20 recognize the position of the major components of the white matter of the spinal cord: the dorsal, lateral and ventral columns

1.8.21 recognize the organization of ascending and descending tracts within the spinal cord

1.8.22 identify the positions occupied by the ascending tracts in transverse sections and diagrams of the brain stem and spinal cord

1.8.23 explain the connections of each of these tracts in terms of the location of its cells of origin, course and termination

1.8.24 identify the cervical, thoracic, lumbar and sacral segments of the spinal cord by variations of size of the gray and white matter

1.8.25 explain the anatomical basis for signs and symptoms of the spinal cord lesions

1.8.26 correlate anatomy to the clinical features of complete and partial transection of the spinal cord, tabes dorsalis and syringomyelia

1.8.27 define upper motor neuron, lower motor neuron, final common pathway, pyramidal tract and extrapyramidal tract

1.8.28 describe the corticospinal tracts in greater detail than the others descending tracts

1.8.29 outline the clinical features of lower motor neuron lesions and upper motor neuron lesions

1.8.30 identify the components of the cerebellum

1.8.31 outline the basis of division of the cerebellum into anterior, posterior and Flocculonodular lobes

1.8.32 outline the basis of division of the cerebellum into median, paramedian and lateral lobes

1.8.33 list the layers of the cerebellar cortex and state which types of nerve cells and nerve cell processes are present in each layer

1.8.34 identify surface features of the cerebellum on the brain and the deep cerebellar nuclei on brain slices

1.8.35 outline the cerebellar connections and the tracts entering and/or leaving each cerebellar peduncle

1.8.36 explain the anatomical basis of the symptoms and signs of cerebellar lesions

1.8.37 identify histological features of the cerebellar cortex

1.8.38 list the cranial nerves

1.8.39 classify the cranial nerves

1.8.40 explain the location and functional components of cranial nerve nuclei

1.8.41 explain the anatomical basis of the effects of a lesion of each cranial nerve

1.8.42 identify the cranial nerves on the brain

1.8.43 identify the position of the nuclei on sections or in diagrams of the brain stem

1.8.44 outline the light microscopic features of olfactory epithelium

1.8.45 outline the olfactory pathways with central connections

1.8.46 illustrate the olfactory bulb, tract, striate and the primary olfactory cortex

1.8.47 outline the chief structural features of the retina, including the basic circuit of receptor, bipolar, ganglion, horizontal and amacrine cells

1.8.48 outline the significance of the macula lutea, fovea centralis and optic disc

1.8.49 outline the visual pathway with central connections

1.8.50 outline the brachium of superior colliculus, pretectal area, optic radiation to visual cortex (primary and secondary)

1.8.51 outline the anatomical basis of retinotopic representation of the visual field in the lateral geniculate nucleus and visual cortex

1.8.52 outline the anatomical basis of visual defects caused by lesions at various points along the visual pathway

1.8.53 outline the different pathways involved in the pupillary light reflex (direct and consensual)

1.8.54 outline the accommodation reflex

1.8.55 outline the pathways involved in conjugate eye movements in the horizontal plane and the connections of the vestibular nuclei with the conjugate gaze pathway

1.8.56 outline the location of nuclei, origin and course of the oculomotor nerve with central connections

1.8.57 explain the functional components of oculomotor nerve and its clinical significance

1.8.58 outline the location of nuclei, origin and course of the trochlear nerve with central connections

1.8.59 explain the functional components of trochlear nerve and its clinical significance

1.8.60 outline the location of nuclei, origin and course of the trigeminal nerve with central connections

1.8.61 explain the functional components of trigeminal nerve and its clinical significance

1.8.62 outline the location of nuclei, origin and course of the abducent nerve with central connections

1.8.63 explain the functional components of abducent nerve and its clinical significance

1.8.64 outline the location of nuclei, origin and course of the facial nerve with central connections

1.8.65 explain the functional components of facial nerve and its clinical significance

1.8.66 compare and contrast the effects of the lower motor and upper motor neuron lesions of facial nerve

1.8.67 outline the location of nuclei, origin and course of the vestibulocochlear nerve with central connections

1.8.68 explain the functional components of vestibulocochlear nerve and its clinical significance

1.8.69 outline the location of nuclei, origin and course of the glossopharyngeal nerve with central connections

1.8.70 explain the functional components of glossopharyngeal nerve and its clinical significance

1.8.71 outline the location of nuclei, origin and course of the vagus nerve with central connections

1.8.72 explain the functional components of vagus nerve and its clinical significance

1.8.73 outline the location of nuclei, origin and course of the accessory nerve (cranial and spinal parts) with central connections

1.8.74 explain the functional components of accessory nerve and its clinical significance

1.8.75 outline the location of nuclei, origin and course of the hypoglossal nerve with central connections

1.8.76 explain the functional components of hypoglossal nerve and its clinical significance

1.8.77 compare and contrast the effects of the lower motor and upper motor neuron lesions of hypoglossal nerve

1.8.78 outline the components of cerebrum

1.8.79 demonstrate the sulci, gyri and fissures of the cerebral cortex

1.8.80 divide the cortex into lobes (frontal, temporal, parietal and occipital) using the anatomical landmarks

1.8.81 outline the types of cortical neurons, the laminar structure of the neocortex and classification of the cortex based on laminar structure

1.8.82 identify the major bundles of association, commissural and projection fibres in the cerebral hemispheres

1.8.83 outline the functional areas of the cerebral cortex and the effects of destructive lesions of respective areas

1.8.84 outline the role of the association, supplementary and primary motor cortex in control of voluntary movement

1.8.85 explain what is meant by cerebral dominance

1.8.86 explain the location, components, connections, blood supply, effects of lesions of the internal capsule and its clinical significance

1.8.87 outline the extent of the diencephalon and its subdivisions; the thalamus, epithalamus, subthalamus and hypothalamus

1.8.88 outline the anatomical arrangement of the brainstem

1.8.89 explain the external features of brainstem; midbrain, pons and medulla

1.8.90 identify each of the components of the brainstem in diagrams and sections at different levels

1.8.91 identify the components and the arrangement of the basal ganglia

1.8.92 outline the connections of cerebral cortex, neostriatum, pallidum, thalamus and cerebral cortex

1.8.93 outline the arrangement and connections of substantia nigra-neostriatum-substantia nigra

1.8.94 outline the blood supply of the basal ganglia

1.8.95 list the functions of the basal ganglia

1.8.96 explain how the cerebral cortex, brain stem, spinal cord, cerebellum and basal ganglia regulate motor function

1.8.97 outline the anatomical basis for chorea, athetosis, hemiballismus, huntington's chorea and parkinson’s disease

1.8.98 list the structures included in the limbic system

1.8.99 identify the anatomy of the hippocampal formation, fornices and the amygdaloid nucleus

1.8.100 outline the position and course of the limbic pathways

1.8.101 list the arteries supplying the brain and spinal cord

1.8.102 identify the intracranial part of the internal carotid artery and its branches; the anterior choroidal, posterior communicating, middle cerebral, anterior cerebral arteries

1.8.103 explain the anatomical arrangement of circle of willis

1.8.104 identify the circulus arteriosus (of willis) and the following groups of central arteries: anteromedial, anterolateral (lateral striate) posterolateral and posteromedial

1.8.105 explain the course and distribution of the anterior, middle and posterior cerebral arteries

1.8.106 identify the vertebral artery and its branches the posterior spinal, anterior spinal and the posterior inferior cerebellar arteries

1.8.107 identify the basilar artery and its branches the labyrinthine, pontine, anterior inferior cerebellar, superior cerebellar and posterior cerebral arteries

1.8.108 outline the areas of brainstem and cerebellum supplied by the following arteries: posterior inferior cerebellar, inferior cerebellar, superior cerebellar and pontine

1.8.109 outline the consequences of obstruction or rupture of the internal carotid, anterior cerebral, middle cerebral, posterior cerebral, vertebral, basilar and posterior inferior cerebellar arteries

1.8.110 describe the intracranial course of the middle meningeal artery and vein, and the consequence of its rupture

1.8.111 identify the superior cerebral, superficial middle cerebral, superior and inferior anastomotic, basal, great cerebral and internal cerebral veins

1.8.112 identify the following venous sinuses: transverse, superior and inferior sagittal, sigmoid, straight, superior and inferior petrosal and cavernous and their interconnections

1.8.113 apply the anatomical knowledge to identify significant landmarks of the brain and cranial nerves using CT and MRI images

1.8.114 apply the anatomical knowledge to identify significant landmarks of the spinal cord using CT and MRI images

1.8.115 identify the vertebral, basilar, internal carotid and branches of circle of Willis in cerebral angiograms

1.9 Histology

1.9.1 make use of the light (optical) microscope correctly

1.9.2 compare the principles of other forms of microscopy (e.g. interference, phase contrast, dark field, fluorescence, electron, autoradiography)

1.9.3 list the steps of preparation of specimens for light microscopy using paraffin embedded sections and haematoxylin and eosin stains

1.9.4 show the usefulness and relevance of frozen sections, histochemical stains

1.9.5 tell the units used in measuring cell size and section thickness in light and electron microscopy

1.9.6 explain the light microscopic appearance of the cell

1.9.7 outline the electron microscopic appearance of a cell

1.9.8 relate structure of the cellular organelles to their function

1.9.9 define the epithelial tissue, its features and functions

1.9.10 classify epithelia on the basis of number of cell layers, shape of cells and surface specializations

1.9.11 identify photomicrographs, diagrams and sections of the specific types of epithelia in relation to their functions

1.9.12 explain the light microscopic appearance of the terminal bars, striated or brush border, cilia and stereocilia, goblet cells, and basement membrane

1.9.13 recall the electron microscopic appearance of microvilli, cilia and junctional complexes

1.9.14 define a gland

1.9.15 classify glands on the basis of the mode of secretion - exocrine, endocrine and mixed glands

1.9.16 classify glands on the basis of the product of secretion - mucous, serous and mixed glands

1.9.17 classify glands on the basis of the cellular mechanism of secretion - merocrine, apocrine and holocrine

1.9.18 classify glands on the basis of the duct system and shape of secretory part

1.9.19 identify photomicrographs, diagrams and sections of the specific types of glands

1.9.20 define connective tissues

1.9.21 outline the light microscopic appearance, physical, chemical, staining properties and functions of collagen, elastic, reticular fibres and ground substance

1.9.22 outline the light microscopic appearance and functions of fibroblasts, macrophages, plasma cells, mast cells and fat cells

1.9.23 classify connective tissues into loose and dense connective tissue with examples

1.9.24 identify the light microscopic appearance of the fibres and cells in connective tissues

1.9.25 identify chondroblast, chondrocyte, lacuna, matrix, perichondrium, in hyaline, elastic and fibrocartilages.

1.9.26 compare and contrast the structure and function of different types of cartilages

1.9.27 outline the appositional and interstitial growth of hyaline cartilage

1.9.28 classify bone on a histological basis; compact and spongy

1.9.29 identify periosteum, lacunae, osteocyte, osteoblast, canaliculi, lamellae, Haversian systems and endosteum in bone tissue

1.9.30 explain the structural changes in the process of development and growth of bone

1.9.31 explain the light microscopic appearance of compact bone, spongy bone and epiphyseal growth plate

1.9.32 classify muscle tissues

1.9.33 define the special terminology associated with muscle tissue

1.9.34 outline the light and the electron microscopic appearance of skeletal, smooth and cardiac muscles

1.9.35 compare and contrast the light microscopic structure of skeletal, cardiac and smooth muscles

1.9.36 explain the structural arrangement of skeletal muscle with its connective tissue layers; epimysium, perimysium and endomysium

1.9.37 relate the structure of muscle to its function

1.9.38 identify the light microscopic features of the different layers of the epidermis including the non- epidermal cells. E.g. pigment forming cells and their mechanism

1.9.39 outline the microscopic structure and arrangement of blood vessels and nerves of the dermis

1.9.40 outline the light microscopic appearance of the appendages of skin (sweat glands, hair follicles, sebaceous glands, nails)

1.9.41 compare and contrast the light microscopic appearance of thick and thin skin

1.9.42 relate the structure of the skin to its functions

1.9.43 outline the light microscopic appearance of the elastic artery, muscular artery, arteriole, capillaries

1.9.44 compare and contrast the light microscopic appearance of the elastic artery, muscular artery, arteriole, capillaries

1.9.45 outline the light microscopic appearance of venules, veins and vena cava

1.9.46 compare and contrast the light microscopic appearance of venules, veins and vena cava

1.9.47 outline the structure of microcirculation in relation to its function

1.9.48 list the components of respiratory system

1.9.49 explain the light microscopic appearance of respiratory epithelium

1.9.50 explain the light microscopic appearance of the trachea, bronchi, bronchioles and alveolar duct

1.9.51 explain the light microscopic appearance of the lung tissue and alveolar wall

1.9.52 relate the light microscopic structure of the respiratory system to its function

1.9.53 list the components of gastrointestinal system

1.9.54 outline the basic histological structural arrangement of the gastrointestinal system including the mucosa, submucosa muscularis propria and adventitia/serosa

1.9.55 explain the light microscopic structure of the lip, salivary glands and tongue

1.9.56 compare and contrast the light microscopic structure of different types of salivary glands

1.9.57 explain the light microscopic structure of the esophagus, stomach, duodenum, jejunum, ileum, colon, rectum, anal canal and appendix

1.9.58 identify the light microscopic structure of gastro esophageal and anorectal junctions

1.9.59 explain the light microscopic structure of the liver, gall bladder and pancreas (exocrine component)

1.9.60 relate the function of gastrointestinal organs to their histological structures

1.9.61 list the components of renal system

1.9.62 explain the light microscopic structure of the components of the kidney

1.9.63 compare and contrast the histological structure of proximal and distal convoluted tubules

1.9.64 explain the ultrastructure of the glomerular filter

1.9.65 explain the ultrastructure of juxtaglomerular apparatus

1.9.66 relate the histological features of different components of the kidney to their function

1.9.67 outline the blood supply of the kidney

1.9.68 explain the light microscopic appearance of the ureter, urinary bladder and urethra

1.9.69 define endocrine gland

1.9.70 list the different components of endocrine system

1.9.71 explain the light microscopic structure of the pituitary, thyroid, parathyroid, adrenal and endocrine pancreas

1.9.72 relate the cells of the glands to the hormones they secrete and their mode of secretion

1.9.73 outline the endocrine cells in gastro-intestinal system and other systems (testis, ovary, placenta and kidney)

1.9.74 list the components of immune system

1.9.75 outline the microscopic structure of lymphoblast, T lymphocyte, B lymphocyte, plasma cell in relation to their role in the immune system

1.9.76 explain the light microscopic appearance of lymph node, palatine tonsil, thymus and spleen

1.9.77 list the components of male reproductive system

1.9.78 explain the light microscopic structure of the testis, seminiferous tubules, epididymis, spermatic cord and accessory glands (prostate and seminal vesicles)

1.9.79 illustrate the process of spermatogenesis with different cell types in the seminiferous tubules

1.9.80 illustrate the light microscopic structure of the spermatozoon

1.9.81 outline the structure of corpora cavernosa, corpus spongiosum, penile erectile tissue, penile urethra

1.9.82 relate the light microscopic structure of the components of male reproductive system to their function

1.9.83 list the components of female reproductive system

1.9.84 explain the light microscopic structure of the ovary

1.9.85 outline the light microscopic features of follicles at various stages of development and corpus luteum

1.9.86 explain the light microscopic structure of uterine tubes, uterus, cervix and vagina

1.9.87 explain the light microscopic structure of endometrium and endocervix in relation to various phases of the menstrual cycle

1.9.88 explain the histological structure of breast (resting, proliferating and lactating) placenta and umbilical cord

1.10 Embryology

1.10.1 define the principles of gametogenesis

1.10.2 compare and contrast the events of gametogenesis in male and female

1.10.3 explain the female reproductive cycles with their clinical relevance

1.10.4 explain the processes of fertilization, cleavage, blastocyst formation and implantation occur during the first week of development

1.10.5 explain the process of bilaminar germ disc formation during the second week of development

1.10.6 explain the process of trilaminar germ disc formation (gastrulation) during the third week of development

1.10.7 list the structures derived from each of the three germ layers including neural crest cells

1.10.8 explain the embryological development from third to eight weeks and birth defects

1.10.9 define teratogens and their associated birth defects/ congenital malformations at different stages of gestation

1.10.10 explain the normal embryological development of the placenta and foetal membranes and multiple births as its variants

1.10.11 explain the characteristic changes/events occur during the fetal period

1.10.12 outline the formation of body cavities and serous membranes

1.10.13 explain the embryological development of the diaphragm and the embryological basis of its congenital abnormalities

1.10.14 explain the embryological development of the heart and the embryological basis of its common congenital abnormalities

1.10.15 explain the embryological development of the arterial system and venous system and the embryological basis of common congenital abnormalities of major arteries and veins

1.10.16 compare and contrast the adult and foetal circulations

1.10.17 outline the circulatory changes at birth

1.10.18 explain the embryological development of the larynx, trachea, bronchi and lungs and the embryological basis of their common congenital abnormalities

1.10.19 outline the establishment of the primitive gut tube

1.10.20 explain subsequent embryological development of the foregut, midgut and hindgut and their derivatives

1.10.21 explain the embryological basis of the embryological developmental variants and abnormalities of foregut, midgut and hindgut derivatives

1.10.22 outline the embryological development of accessory glands of the gastrointestinal system (hepatobiliary system, pancreas, salivary glands), spleen and the embryological basis their common congenital malformations

1.10.23 outline the fate of pronephros, mesonephros and metanephros derived from the intermediate mesoderm

1.10.24 outline the embryological development of the kidney, ureter, bladder, urethra and the embryological basis of common congenital abnormalities of the urinary system

1.10.25 outline the embryological development of the neurocranium, viscerocranium, mandible and the embryological basis of their common congenital malformations

1.10.26 outline the embryological development of the skeletal system and the embryological basis of its common congenital abnormalities

1.10.27 define primary and secondary ossification and their clinical significance

1.10.28 outline the embryological development of pharyngeal arches, pouches, clefts and their fate

1.10.29 explain the embryological development of the tongue and thyroid gland and the embryological basis of their common congenital abnormalities

1.10.30 outline the embryological development of the face, palate, nasal cavities and paranasal sinusus and the embryological basis of their congenital abnormalities

1.10.31 outline the embryological development of the eye and ear and the embryological basis of their congenital abnormalities

1.10.32 outline the origin of the gonads and primordial germ cells

1.10.33 explain the differentiation of the indifferent gonads into ovary and testis

1.10.34 outline the embryological development of the genital ducts and external genitalia

1.10.35 explain the embryological basis of developmental abnormalities of the male and female genital systems

1.10.36 outline the embryological development of the endocrine glands (pituitary, thyroid, parathyroid, adrenal, endocrine pancreas) and the embryological basis of their common congenital abnormalities

1.11 Genetics

1.11.1 define Mendel's laws of inheritance

1.11.2 outline the structure of DNA

1.11.3 outline the DNA replication and transmission of genetic information from one generation to the next

1.11.4 explain the cell cycle and its different phases

1.11.5 outline the main differences between mitosis and meiosis

1.11.6 interpret the final products of each type of cell division

1.11.7 outline the structure and the types of chromosomes

1.11.8 demonstrate the human karyotype and the principles & methods involved in preparing a karyotype

1.11.9 classify the aneuploidy numerical abnormalities of chromosomes (trisomy, monosomy, non-disjunction)

1.11.10 explain the genetic basis and karyotype in Down syndrome, Edward syndrome, Patau syndrome, Klinefelter syndrome and Turner syndrome

1.11.11 outline the structural abnormalities of DNA (translocation, duplication, deletion and insertion)

1.11.12 interpret the Down syndrome due to nondisjunction and translocation

1.11.13 outline the mechanism of protein synthesis

1.11.14 define the 'genetic code'

1.11.15 illustrate the structure and organization of a gene

1.11.16 define mutation and the mutagens
1.11.17 list the common mutagens
1.11.18 list the different types of mutations
1.11.19 explain different types of mutations and their effects on the protein synthesis
1.11.20 outline the molecular basis of common genetic disorders
1.11.21 outline the patterns of inheritance
1.11.22 identify the main differences between autosomal and sex-linked inheritance patterns
1.11.23 explain the characteristics of autosomal dominant and recessive disorders
1.11.24 explain the characteristics of X-linked dominant, X-linked recessive and Y-linked disorders
1.11.25 explain the basis of mitochondrial genetic disorders
1.11.26 explain the genetic basis of sex determination, sexual differentiation and its disorders
1.11.27 explain the genetic basis for carcinogenesis
1.11.28 explain the genetic basis of inborn errors of metabolism
1.11.29 construct a three-generation pedigree chart
1.11.30 analyze a simple pedigree and state the type of inheritance
1.11.31 interpret the basic principals involved in genetic counselling
1.11.32 outline the genetic basis for assisted reproductive technology
1.11.33 outline the molecular basis of DNA extraction
1.11.34 outline the basis of gel electrophoresis
1.11.35 define the recombinant DNA technology, restriction endonuclease, restriction fragment length polymorphism (RFLP), Multiple ligation probe amplification (MLPA), clone, vector, sequence library and probe
1.11.36 outline the basis of polymerase chain reaction (PCR), Sanger sequencing, next generation sequencing (NGS)
1.11.37 outline the human genome project
1.11.38 outline the common genetic disorders
1.11.39 outline the genetic basis of prenatal screening

2. Department of Biochemistry

Vision

The department of Biochemistry aspires to be a center of excellence dedicated to disseminate knowledge of Biochemistry through education, research and continuous professional development.

Mission

The mission of the department of Biochemistry is,

- To impart knowledge and skills in Biochemistry to medical students to prepare them to practice medicine of the highest standard in the future.
- To create an intellectually stimulating environment for postgraduate students carry out research in diverse areas.

General objectives

The student will be able to achieve following learning outcomes

1. Apply knowledge gained on structure-function relationships and metabolism of biomolecules to explain the biochemical basis of disease and therapeutic intervention.
2. Select the appropriate biochemical investigation/s for diagnosis, prognosis and monitoring of diseases
3. Interpret the biochemical test results in a clinical setting.
4. Apply on basic principles and techniques in molecular biology for biomedical applications.
5. Relate principles of nutrition to assess the nutritional status and suggest recommendations for different stages of the life cycle and for diseases.

Learning objectives

At the end of each session, students should be able to

2.1 Cell structure and function

2.1.1 explain briefly the structure of a typical cell (hepatocyte) as seen in an electron micrograph

2.1.2 state the structure in relation to function of

a) cell membrane
b) mitochondria
c) lysosomes
d) golgi bodies
e) endoplasmic reticulum
f) nucleus
g) peroxisome
h) cytoskeleton

2.2 pH and buffers

2.2.1 define the term pH

2.2.2 identity that body fluids, secretions and urine have different pH ranges

2.2.3 state the physiological pH of blood

2.2.4 list the major buffer systems in the body to regulate blood pH

2.2.5 state the principles of a typical buffer system

2.2.6 explain briefly how the following buffer systems operate in the body: HCO-3/H2CO3, phosphate, protein buffer system

2.3 Carbohydrates

2.3.1 State the biological importance of carbohydrates

2.3.2 Identify the important mono, di and polysaccharides in the body

2.3.3 Monosaccharides

2.3.3.1 recall the isomerism of monosaccharides

2.3.3.2 recognize pyranose and furanose ring structures of monosaccharides

2.3.3.3 identify the α and β anomers of monosaccharides

2.3.3.4 recognize the difference between anomers and epimers

2.3.3.5 identify the epimers of glucose, mannose and galactose

2.3.3.6 explain the effect of bases and acids on monosaccharides

2.3.3.7 identify the importance of benedict's test and Molisch's test

2.3.3.8 identify that monosaccharides undergo mutarotation in aqueous solutions

2.3.3.9 explain briefly the glycoside formation and ester formation in monosaccharides

2.3.3.10 state the importance of monosaccharide derivatives; amino sugars, sugar alcohols, sugar acids and sugar esters

2.3.3.11 state the medical importance of monosaccharides

2.3.4 Disaccharides

2.3.4.1 recognize the differences in glycosidic linkages of important disaccharides; lactose, maltose, sucrose

2.3.4.2 identify reducing and non-reducing disaccharides based on their chemical nature

2.3.4.3 state the importance of disaccharides in diagnosis and therapy

2.3.5 Polysaccharides

2.3.5.1 state the difference between homopolysaccharides and heteropolysaccharides

2.3.5.2 state the medical importance of polysaccharides

2.3.6 Glycoproteins

2.3.6.1 list the predominating sugars present in glycoproteins

2.3.6.2 state the types of carbohydrate-peptide linkages found in glycoproteins

2.3.6.3 state the importance of lectins in human body

2.3.6.4 explain the structural features and importance of bacterial cell wall peptidoglycan

2.3.6.5 explain the importance of major glycoproteins found in human body with relevant examples

2.3.7 Proteoglycans and glycosaminoglycans

2.3.7.1 state the different types of polysaccharide-polypeptide chain linkages of proteoglycans

2.3.7.2 state the common structural features of glycosaminoglycans

2.3.7.3 state the importance of major glycosaminoglycans found in humans

2.3.7.4 describe the functions of glycosaminoglycans and proteoglycans

2.3.7.5 identify the major types of mucopolysaccharidoses

2.3.8 Glycolipids

2.3.8.1 state the importance of glycolipids in animal tissues

2.4 Amino acids and proteins

2.4.1 describe the general structure of an amino acid

2.4.2 recognize that only L – amino acids are present in proteins

2.4.3 state how different side groups (R-) confer different properties to amino acids

2.4.4 list the nutritionally essential amino acids and state why they become nutritionally essential

2.4.5 explain how amino acids may have positive, negative or zero net charge

2.4.6 recognize that an amino acid does not exist as R – C– COOH at any pH

NH2

H

2.4.7 describe the isoelectric pH (pI) of an amino acid

2.4.8 recognize that the solubility and melting points of amino acids reflect the ionic character

2.4.9 briefly explain how amino acids function as buffers

2.4.10 state the common reactions of carboxyl and amino groups of amino acids

2.4.11 describe the ninhydrin reaction as a common color reaction of amino acids and its importance

2.4.12 Peptides

2.4.12.1 describe how peptide bonds are formed

2.4.12.2 state the characteristics of the peptide bond

2.4.12.3 sketch the structure of reduced glutathione and discuss its importance

2.4.13 Protein

2.4.13.1 state the differences between simple and complex proteins

2.4.13.2 list the differences between globular and fibrous proteins

2.4.13.3 state the four orders of protein structure and describe them

2.4.13.4 discuss the different levels of organization of proteins in relation to insulin, collagen and elastin

2.4.13.5 state the importance of the proteins; insulin, collagen elastin

2.4.13.6 explain the unique features of the structure of collagen in relation to its function

2.4.13.7 identify the importance of chaperons in protein folding and give examples of protein misfolding in disease states

2.4.13.8 recognize that peptides and protein are polyelectrolytes

2.4.13.9 recognize that pH and pK values of dissociating groups determine the net charge of proteins

2.4.13.10 state the principle of paper electrophoresis

2.4.13.11 state the major serum protein fractions

2.4.13.12 explain how the electrophoretic technique could be used to separate serum proteins

2.4.13.13 state the differences between albumin and globulin regarding their solubility properties

2.4.13.14 explain the term denaturation

2.4.13.15 list the denaturing agents of protein and state their effects

2.5 Lipids

2.5.1 state the general properties of lipids and their biological importance

2.5.2 state the different classes of lipids

2.5.3 identify the amphipathic nature of fatty acids, phospholipids, sphingolipids and cholesterol

2.5.4 identify the structure of a fatty acid

2.5.5 identify the Δ and ω conventions used in nomenclature of fatty acids

2.5.6 recognize the structures and systematic names of saturated fatty acids; palmitic and stearic acids and unsaturated fatty acids; oleic, linoleic, linolenic, arachidonic, eicosapentaenoic and docosahexaenoic acids

2.5.7 recognize that all naturally occurring fatty acids have cis double bonds and that trans bonds are produced during hydrogenation of fats

2.5.8 explain how chain length and degree of unsaturation affect the melting & boiling points of fatty acids

2.5.9 explain the term ‘essential fatty acid’ with examples

2.5.10 state the physical and biological properties of triglycerides

2.5.11 define the terms: rancidity and peroxidation

2.5.12 state the three groups of membrane lipids

2.5.13 define a phospholipid

2.5.14 recognize the structures of phosphoglycerides; phosphotidic acid, phosphatidylcholine/ ethanolamine/ inositol/ serine/ cardiolipin

2.5.15 state physical properties of phospholipids

2.5.16 state functions of phospholipids

2.5.17 describe different types of phospholipases involved in degradation of phospholipids

2.5.18 recognize that inherited defects in phospholipases result in diseases such as Niemann pick and Tay sachs disease

2.5.19 identify that membrane phospholipids are the precursors of eicosanoid compounds; Prostanoids (prostaglandins, thromboxanes, prostacyclins) and leukotrienes

2.5.20 identify the importance of eicosanoids

2.5.21 discuss the biomedical importance of dipalmitoyllecithin in relation to respiratory distress syndrome

2.5.22 recognize the structure of sphingolipid and its derivatives: sphingomyelin/ ceramide/ cerebrosides, glycolipids and gangliosides

2.5.23 state that gangliosides are important recognition sites on cell membranes

2.5.24 recognize the structure of cholesterol

2.5.25 state physical properties and biomedical importance of cholesterol.

2.5.26 describe how amphipathic lipids are involved in the formation of micelles, emulsions, bilayers, liposomes and biological membranes

2.6 Nucleotides and nucleoproteins

2.6.1 list the components of a nucleoside and a nucleotide and identify the differences in their nomenclature

2.6.2 recognize the differences in the numbering system of purine /pyrimidine bases and sugar units

2.6.3 list the purine and pyrimidine nucleotides found in DNA and RNA

2.6.4 list the diverse functions of nucleotides

2.6.5 state the importance of synthetic nucleotide analogues as chemotherapeutic agents

2.6.6 Polynucleotides

2.6.6.1 identify that mononucleotides are linked by 3' → 5' phosphodiester bonds to form polynucleotides

2.6.6.2 recognize that polynucleotides are bidirectional molecules

2.6.6.3 recognize that the individual characteristics of polynucleotides are derived from the primary structure

2.6.6.4 explain the structure of DNA

2.6.6.5 recognize that double stranded DNA exists in different forms. (DNA A to E & Z)

2.6.6.6 recognize that that there can be structures other than the double helix for DNA (DNA triple helix and tetraplex)

2.6.6.7 identify the importance of DNA as a molecule that contains genetic information and as a molecule that provides a template for replication & transcription

2.6.6.8 identify that DNA is organized into chromosomes and discuss the structure of nucleosomes

2.6.6.9 identify that there are three major classes of RNA & discuss the structural differences of DNA and RNA

2.6.6.10 state the functions of different RNAs

2.6.6.11 identify that there is a group of RNAs that are not directly involved in protein biosynthesis and list them

2.7 Enzymes

2.7.1 define the term “enzyme”

2.7.2 explain the term “active site” and “allosteric site” of an enzyme

2.7.3 explain

- Holoenzyme
- Apoenzyme
- Coenzyme and prosthetic group

2.7.4 list the six classes of enzymes and identify that there is an enzyme commission number for each enzyme

2.7.5 describe the mechanism of enzyme action

2.7.6 state the relationship between the rate of reaction and concentration of enzyme and substrate

2.7.7 explain how the following factors affect enzyme activity

- pH
- Temperature
- Electrolytes

2.7.8 define the term “unit of enzyme activity”

2.7.9 explain the principles involved in measuring the activity of an enzyme

2.7.10 define km and relate it to the affinity of a substrate to an enzyme

2.7.11 explain “competitive”, “noncompetitive” and irreversible inhibition

2.7.12 describe clinical applications of competitive inhibitors such as neostigmine, sulpha drugs and methotrexate

2.7.13 explain the action of lactam antibiotics (penicillin, amoxicillin) as enzyme inhibitors

2.7.14 explain the major regulatory mechanisms of enzyme activity

- Allosteric regulation
- Covalent modification
- Feedback regulation
- Induction and repression of enzyme synthesis.

2.7.15 explain the term “iso enzyme”

2.7.16 state the role of lactate dehydrogenase isoenzyme as a diagnostic tool

2.8 Transport across cell membrane

2.8.1 identify the importance of fluidity of the plasma membrane for the transport of molecules

2.8.2 list the mechanisms available for the transport of small and macro molecules across the cell membrane

2.8.3 explain the mechanism and the significance of simple diffusion

2.8.4 explain the significance of mediated transport mechanisms

2.8.5 distinguish the difference between carrier mediated and channel mediated transport systems

2.8.6 explain the term “Active Transport”

2.8.7 identify the difference between direct and indirect active transport systems

2.8.8 explain briefly the action of Na+-K+ ATPase system

2.8.9 describe the biochemical basis for the

a) use of cardiac glycosides in the treatment of heart failure
b) use of oral rehydration therapy in the treatment of diarrhea

2.8.10 identify that there are ion channel diseases caused due to mutations of channel proteins

2.9 Biological oxidoreduction

2.9.1 identify that the respiratory chain is the major pathway through which O2 is utilized in the body

2.9.2 identify that ATP is not stored in a cell and it is synthesized depending on the requirement

2.9.3 recall that energy released from the oxidation of carbohydrate, fat and protein is made available in mitochondria as reducing equivalents

2.9.4 identify that electron transport chain is coupled to oxidative phosphorylation

2.9.5 identify that oxidative phosphorylation provides most of the energy captured in metabolism

2.9.6 identity that redox carriers are grouped into respiratory chain complexes in the inner mitochondrial membrane

2.9.7 list the components of the electron transport chain and electron carrying molecules

2.9.8 state the sites of entry of reducing equivalents (NADH & FADH2) into the electron transport chain

2.9.9 outline the pathway of electron transport in mitochondria in terms of transfer of electrons from reducing equivalents

2.9.10 indicate the complexes at which ATP is synthesized during electron transport

2.9.11 state the significance of O2 as the terminal electron acceptor in the electron transport chain

2.9.12 state the mechanism of action of inhibitors of electron transport chain

2.9.13 state the mechanism of 2,4 dinitrophenol as an uncoupling agent in oxidative phosphorylation

2.9.14 explain the function of uncoupler protein (UCP- 1) involved in cold induced thermogenesis in brown adipose tissue

2.9.15 state the respiratory control of oxidative phosphorylation

2.9.16 state the significance of respiratory chain in cardiomyocytes, hepatocytes and brain cells

2.10 Digestion and absorption

2.10.1 describe the terms digestion and absorption

2.10.2 explain the digestive process in the oral cavity

2.10.3 state the functions of saliva

2.10.4 explain the mechanism of gastric acid secretion and “alkaline tide”

2.10.5 state the functions of gastric juice

2.10.6 state the enzymatic components of the exocrine pancreatic secretion and describe their functions

2.10.7 describe the role of intestinal secretions in the digestion process

2.10.8 state the components of bile and describe its functions

2.10.9 describe enterohepatic circulation of bile acids

2.10.10 describe the action of bacteria on food with respect to

- fermentation

- putrefaction

2.10.11 describe the beneficial effects of probiotics

2.10.12 explain the mechanisms involved in the absorption of end products of digestion of main nutrients,

- Carbohydrates
- Protein
- Lipids

2.10.13 state the factors involved in the digestion and absorption of vitamins and minerals (will be discussed in detail under the sections on 'vitamins' and 'mineral metabolism')

2.10.14 describe the mechanism involved in the absorption of water and electrolytes

2.10.15 explain the biochemical basis for the common malfunctions or the diseases, associated with digestion and absorption

- formation of gall stones
- achlorhydria
- lactose intolerance
- pancreatitis

2.11 Vitamins

2.11.1 state the importance and classification of vitamins

2.11.2 describe the difference between fat soluble and water-soluble vitamins

2.11.3 recognize the different compounds related to vitamin A and its provitamin

2.11.4 explain how vitamin A is absorbed, transported in plasma and mobilized from storage sites

2.11.5 describe the functions of vitamin A and clinical effects of vitamin A deficiency

2.11.6 state the therapeutic indications of retinol, retinal and retinoic acid

2.11.7 state the effects of hypervitaminosis related to vitamins A & D

2.11.8 state the importance of vitamin D and its provitamins

2.11.9 explain the metabolism and regulation of the metabolism of vitamin D

2.11.10 state the functions of vitamin D and explain the effects of vitamin D deficiency

2.11.11 describe the significance of vitamin E as an anti-oxidant

2.11.12 state the clinical indications of vitamin K deficiency

2.11.13 describe the role of vitamin K in post translational modification of blood clotting factors

2.11.14 state the significance of thiamin in carbohydrate metabolism

2.11.15 state the causes of thiamin deficiency and its clinical manifestations

2.11.16 state the biological importance and clinical manifestations of riboflavin deficiency

2.11.17 state the biological importance, clinical indications and deficiency diseases of niacin

2.11.18 identify that tryptophan can be converted to niacin

2.11.19 state the importance of pyridoxine as a coenzyme

2.11.20 state the role of biotin and pantothenic acid as vitamins

2.11.21 describe the mechanism of action of methotrexate and sulfonamides in relation to synthesis of folic acid

2.11.22 identify the role of folic acid as a carrier of activated one-carbon units to various biochemical targets

2.11.23 identify the importance of folate supplementation during pregnancy

2.11.24 describe the absorption of vitamin B12 and clinical indications of vitamin B12 deficiency

2.11.25 describe “folate trap” hypothesis

2.11.26 identify the importance of vitamin C in the absorption of iron, as a general water-soluble antioxidant and in collagen synthesis

2.11.27 state the dietary sources rich in each of the above-mentioned vitamin

2.12 Introduction to metabolism

2.12.1 describe the term “intermediary metabolism”

2.12.2 identify the biomedical importance of metabolism

2.12.3 identify that there are anabolic and catabolic pathways

2.12.4 state what is meant by the term “metabolic intermediate” or “metabolite”

2.12.5 give examples of linear, cyclic and spiral metabolism pathways

2.12.6 explain the energy relationship between catabolic and anabolic pathways

2.12.7 identify that catabolic pathways converge to few end products and biosynthetic processes diverge to yield many products

2.12.8 describe the principal mechanisms involved in the regulation of metabolism with regard to

- enzyme compartmentalization
- allosteric modification
- reversible covalent modification

- changing of enzyme concentration: induction and repression of enzymes

2.13 Carbohydrate metabolism

2.13.1 list the major pathways available for the oxidation and synthesis of glucose in the body

2.13.2 identify that it is only the hepatocytes that all the above mentioned metabolic pathways take place at a significant rate

2.13.3 Glycolysis

2.13.3.1 state the tissues that utilize glucose as the major/sole source of energy

2.13.3.2 recognize that glycolysis is the major pathway for utilization of glucose by the cells and the process occurs in the cytosol

2.13.3.3 describe the two phases of glycolysis

2.13.3.4 describe the importance of glucokinase regulatory protein (GK-RP)

2.13.3.5 list the differences between hexokinase and glucokinase

2.13.3.6 state the products formed in anaerobic and aerobic glycolysis

2.13.3.7 explain when/why glycolysis functions under anaerobic and aerobic conditions in different tissues

2.13.3.8 explain the importance of 2,3-bisphosphoglycerate formed in glycolysis

2.13.3.9 explain briefly the regulation of glycolysis

2.13.3.10 state the net energy production of glycolysis under anaerobic and aerobic conditions

2.13.3.11 explain the effect of arsenate, sodium fluoride and iodoacetate on glycolysis

2.13.3.12 explain the consequences of deficiency of hexokinase and pyruvate kinase

2.13.3.13 identify that glycolysis is the main pathway for the metabolism of fructose, galactose and other carbohydrates

2.13.4 Oxidation of pyruvate to acetyl-CoA

2.13.4.1 outline the process of oxidation of pyruvate to acetyl-CoA

2.13.4.2 state the enzymes and coenzymes required for pyruvate dehyrogenase complex

2.13.4.3 state the mechanisms available for the regulation of pyruvate dehydrogenase enzyme complex

2.13.4.4 identify that sparing of carbohydrate during starvation is regulated by pyruvate dehydrogenase enzyme complex

2.13.4.5 explain the effects of arsenite, mercuric ions, dietary deficiency of thiamin and inherited deficiency of pyruvate dehydrogenase on the oxidation of pyruvate to acetyl-CoA

2.13.4.6 explain the biochemical basis for the administration of an infusion of glucose and vitamin B to a nutritionally deprived alcohol user

2.13.5 Citric acid cycle

2.13.5.1 recognize that the TCA cycle occurs in the mitochondrion and it is the final, common pathway for the oxidation of carbohydrates, protein and lipids

2.13.5.2 outline the sequence of reactions of the TCA cycle

2.13.5.3 describe the importance of the B- group vitamins in the TCA cycle

2.13.5.4 recall the relationship between the TCA cycle and the respiratory chain

2.13.5.5 state the energy yield in the oxidation of a glucose molecule via glycolysis and the TCA cycle

2.13.5.6 state the other metabolic roles of TCA cycle (amphibolic role) in addition to oxidation (gluconeogenesis, transamination, deamination and lipogenesis)

2.13.5.7 explain the effects of arsenite and fluoroacetate on the activity of TCA cycle

2.13.5.8 state how the activity of the TCA cycle is regulated

2.13.6 Pentose phosphate pathway

2.13.6.1 recognize that the pentose phosphate pathway is an alternative route for the oxidation of glucose and occurs in the cytosol

2.13.6.2 state the two phases of the pathway

2.13.6.3 state the importance of NADPH and ribose 5-phosphate generated in this pathway

2.13.6.4 recognize that it is not necessary to have a completely functioning pentose phosphate pathway for a tissue to synthesize ribose 5-phosphate

2.13.6.5 explain the relationship between the pentose phosphate pathway and the glutathione cycle

2.13.6.6 explain the importance of the HMP pathway for the hepatocytes, erythrocytes, phagocytes, lactating mammary gland and to the tissues of the eye

2.13.6.7 explain the occurrence of haemolysis in glucose 6-phosphate dehydrogenase deficiency if antimalarial drugs and sulphonamides administered

2.13.7 Uronic acid pathway

2.13.7.1 state the important products formed in uronic acid pathway

2.13.7.2 state why ascorbic acid cannot be synthesized in humans by this pathway

2.13.8 Fructose metabolism

2.13.8.1 state the food and beverages rich in fructose

2.13.8.2 identify the differences between glycolysis and fructose metabolism in the liver

2.13.8.3 explain the metabolic consequences of ingesting high amount of fructose for a prolonged period of time

2.13.9 Galactose metabolism

2.13.9.1 state the food items rich in galactose

2.13.9.2 outline the sequence of reactions of galactose metabolism pathway in the liver

2.13.9.3 state the products that can be synthesized from galactose

2.13.9.4 state why galactose is not essential in the diet

2.13.9.5 state the enzyme deficiencies that could occur in galactose metabolism pathway

2.13.9.6 explain the biochemical significance of administering galactose free diets to infants in the enzyme deficiencies of galactose metabolism pathway

2.13.9.7 distinguish the consequences between galactokinase and galactose 1-phosphate uridyl transferase deficiencies

2.13.10 Glycogen metabolism

2.13.10.1 state the differences of glycogenolysis in the liver with that of the muscle

2.13.10.2 explain how cAMP integrates the regulation of glycogenesis and glycogenolysis in the liver

2.13.10.3 recognize that enzyme deficiencies in glycogen metabolism lead to glycogen storage diseases

2.13.11 Gluconeogenesis

2.13.11.1 list the major tissues, substrates and energy sources of gluconeogenesis

2.13.11.2 outline the sequence of reactions of gluconeogenesis

2.13.11.3 explain briefly the importance of reciprocal regulation of glycolysis and gluconeogenesis

2.13.12 Regulation of blood glucose concentration

2.13.12.1 identify that regulation of blood glucose concentration is primarily under hormone control

2.13.12.2 list the major hormones involved in the regulation of blood glucose concentration in the fed and in the fasting states

2.13.12.3 identify the importance of hepatic glucose metabolism in the regulation of blood glucose concentration

2.13.12.4 recognize that blood glucose is derived from the diet, glycogenolysis and gluconeogenesis

2.13.12.5 describe the terms hypo - and hyperglycaemia

2.13.12.6 identify the importance of expressing blood / plasma glucose concentration

a) in relation to the previous meal taken (fasting, post-prandial)
b) as random blood glucose concentration.

2.13.12.7 identify that serum/ plasma glucose concentration is expressed as mg/dL or mmol/L

2.13.12.8 state the fasting and post-prandial plasma glucose concentrations of a healthy individual

2.13.12.9 explain briefly how blood glucose concentration is regulated

a) after a meal
b) in an overnight fast
c) in a prolonged fast

2.13.12.10 explain the occurrence of hypoglycaemia in

a) acute alcohol toxicity
b) the impairment of fatty acid oxidation
c) a pre-mature and low birth weight neonates
d) a large baby of a diabetic mother

2.14 Metabolism of amino acids and proteins

2.14.1 Metabolism of amino acids

2.14.1.1 state the major amino acids involved in the inter-organ nitrogen exchange in the fed and the fasting state

2.14.1.2 state what is meant by protein turnover and the amino acid pool

2.14.1.3 explain the biochemical significance of transamination, deamination and decarboxylation reactions in amino acid metabolism

2.14.1.4 explain the biochemical significance of transdeamination reaction

2.14.1.5 state how the carbon skeletons of the amino acids are used to obtain energy and how amino acids are used to synthesize glucose or fatty acids

2.14.1.6 list the glucogenic and ketogenic amino acids

2.14.1.7 explain how amino acid nitrogen is converted to urea and how it is excreted from the body

2.14.1.8 state the factors that influence the plasma urea concentration

2.14.1.9 state the causes and consequences of hyperammonaemia

2.14.1.10 state the three fold basis used in the treatment of urea cycle enzyme deficiencies and explain the biochemical basis of each

2.14.1.11 explain the occurrence of hyperammonaemia and imbalance in amino acid metabolism in severe liver disease

2.14.1.12 explain the biochemical basis for the use of lactulose, metronidazole, rifaximin and L-ornithine L- aspartate (LOLA) in chronic liver disease

2.14.1.13 state the precursors for the synthesis of nitric oxide, polyamines, catacholamines, creatine and creatinine and state their biochemical importance

2.14.1.14 explain the biochemical significance of estimating serum urea and creatinine concentrations as first line tests in assessing renal function

2.14.2 Biosynthesis of proteins

2.14.2.1 identify that that DNA is the chemical basis of heredity and recognize that it is organized into genes

2.14.2.2 explain how genetic information flows from DNA to RNA (transcription) and to protein (translation)

2.14.2.3 explain the importance of post-transcriptional and post-translational modifications

2.14.2.4 state the differences between eukaryotic and prokaryotic protein biosynthesis

2.14.2.5 state the characteristic features of the genetic code

2.14.2.6 state the biochemical basis for the differences in the action of an antibiotic with respect to protein biosynthesis in mammalian cells and in bacteria

2.14.2.7 explain briefly the molecular mechanisms involved in the inhibitory action of diphtheria toxin on protein biosynthesis of humans

2.14.3 Mutations

2.14.3.1 explain the term ‘mutation’ on the basis of chemical change in DNA

2.14.3.2 explain briefly the term ‘point mutation’

2.14.3.3 define transition, transversion and deletion or insertion of a nucleotide in a gene

2.14.3.4 recall that all mutations do not give rise to defective proteins

2.14.3.5 list the common causes of mutations

2.14.3.6 explain ‘silent mutation’ and ‘missense mutations’ by giving examples

2.14.3.7 state the consequences of premature termination of protein biosynthesis in relation to missense mutation and deletion or insertion of a nucleotide from a gene

2.15 Lipid metabolism

2.15.1 list the major lipid groups present in the body

2.15.2 identify that lipids are obtained from the diet and synthesized in the body as well

2.15.3 Biosynthesis of fatty acids

2.15.3.1 name the major organs of fatty acid biosynthesis in the body

2.15.3.2 identify that acetyl-CoA is the principle building block of fatty acids and free palmitate is the end product

2.15.3.3 identify that ketone bodies, cholesterol, acetyl choline etc. are also synthesized from the same precursor

2.15.3.4 name the vitamins involved in fatty acid biosynthesis

2.15.3.5 identify that the major pathway of *de novo* synthesis of fatty acids occurs in the cytosol

2.15.3.6 identify that fatty acid synthase is a multi enzyme complex

2.15.3.7 identify that the major source of NADPH for lipogenesis is the pentose phosphate pathway

2.15.3.8 explain the role of citrate in the integration of carbohydrate and lipid metabolism

2.15.3.9 identify that two carbon units are added to the growing fatty acid chain at a time

2.15.3.10 explain the regulation of acetyl CoA carboxylation activity by allosteric effector and covalent modification

2.15.3.11 explain why some polyunsaturated fatty acids cannot be synthesized in mammals and are nutritionally essential

2.15.3.12 name the essential fatty acids and their sources

2.15.3.13 identify how palmitate, the primary product of fatty acid synthesis can be further elongated in the endoplasmic reticulum and mitochondria

2.15.3.14 identify how polyunsaturated fatty acids are synthesized by a combination of chain elongation and desaturation reactions

2.15.3.15 explain how fatty acid synthesis is altered during fed and fasting states.

2.15.4 Adipose tissue and lipid metabolism

2.15.4.1 recall that triacylglycerols are the main storage form of fatty acids

2.15.4.2 state the precursors of TG synthesis in the (a) intestinal mucosal cell (b) adipocyte (c) hepatocyte (d) mammary gland

2.15.4.3 explain the role of adipose tissue as the major energy store in the body

2.15.4.4 explain the mechanism by which TG store in the adipose tissue is hydrolysed in times of need such as fasting/starvation

2.15.4.5 explain the mechanisms of regulation of hormone-sensitive lipase activity

2.15.4.6 explain how insulin integrates carbohydrate and lipid metabolism in adipose tissue

2.15.4.7 state the importance of brown adipose tissue

2.15.5 Fatty acid oxidation

2.15.5.1 identify that fatty acids are transported in the blood as free fatty acids bound to albumin

2.15.5.2 identify that oxidation of fatty acids occur in the mitochondria

2.15.5.3 identify the role of specialized pathways of and ω oxidation of fatty acids

2.15.5.4 identify the vitamins taking part as cofactors in β oxidation

2.15.5.5 recall that fatty acids are activated before being catabolized

2.15.5.6 explain the roles of CPT I & CPT II in the β oxidation pathway

2.15.5.7 identify that a cyclic reaction sequence generates FADH2 and NADH

2.15.5.8 recall that oxidation of a fatty acid with an odd number of carbon yields propionyl CoA

2.15.5.9 identify that fatty acid oxidation results in the production of more energy than other carbohydrates or protein

2.15.5.10 recall that peroxidation of lipid yields free radicals that may cause cancer, inflammatory diseases, atherosclerosis and aging

2.15.6 Ketogenesis

2.15.6.1 name ketone bodies

2.15.6.2 explain the importance of ketone bodies as fuel in extrahepatic tissues

2.15.6.3 explain the biochemical basis for the occurrence of ketogenesis in fasting, starvation, administration of high fat diet, low carbohydrate diet, uncontrolled diabetes mellitus

2.15.7 Phospholipids

2.15.7.1 identify the precursors required for the synthesis of phospholipids

2.15.7.2 state the functions of phospholipids

2.15.7.3 describe the involvement of phospholipids in the synthesis of eicosanoids namely prostaglandins, prostacyclins, thromboxanes and leukotrienes

2.15.7.4 state the basic functions of eicosanoids

2.15.7.5 explain the biochemical basis for the use of aspirin, NSAID (indomethacine) and steroid drugs as inhibitors of eicosanoid biosynthesis

2.15.8 Lipoproteins

2.15.8.1 identify that lipids are transported in blood as lipoproteins

2.15.8.2 name different lipoproteins present in blood

2.15.8.3 identify that major classes of lipoproteins are classified according to their density

2.15.8.4 identify the different apoproteins attached to lipoproteins

2.15.8.5 state the methods available for the separation of lipoproteins

2.15.8.6 explain the origin and function of lipoproteins

2.15.8.7 explain how postprandial lipaemia occurs and how it is cleared from blood

2.15.8.8 describe the functions of lipoprotein lipase, pancreatic lipase, lecithin cholesterol acyl transferase (LCAT/PCAT) and acyl-CoA cholesterol acyl transferees (ACAT).

2.15.9 Cholesterol

2.15.9.1 recall the structure of cholesterol

2.15.9.2 recall that cholesterol is derived both from the diet and from biosynthesis in the body

2.15.9.3 state the precursor and the sites of synthesis of cholesterol

2.15.9.4 identify the energy source, importance of NADPH and regulating enzymes in the biosynthesis of cholesterol

2.15.9.5 explain how cholesterol biosynthesis is regulated at the cellular level by the regulation of HMG-CoA reductase

2.15.9.6 explain the mechanisms by which blood cholesterol level is regulated

2.15.9.7 state the functions of cholesterol

2.15.9.8 state how cholesterol is excreted from the body

2.15.9.9 name the bile acids and explain the functions of bile acids/salts in the digestion and absorption of lipids

2.15.9.10 recall how altered composition of bile leads to the formation of gall stones

2.15.9.11 state the composition of gall stones

2.15.10 Clinical significance of lipid metabolism

2.15.10.1 explain the term hyperlipoproteinaemia

2.15.10.2 explain the interrelationship between defective LDL receptor gene and hypercholesterolaemia

2.15.10.3 state how the altered activity of lipoprotein lipase (clearing factor lipase) leads to dislipidaemia in diabetes mellitus

2.15.10.4 state the risk factors in the development of atherosclerosis and coronary heart disease

2.15.10.5 explain the biochemical mechanism for the development of atherosclerosis in dyslipidaemia

2.15.10.6 state different methods used for the diagnosis of lipid disorders

2.15.10.7 interpret lipid profile of a patient giving biochemical reasons and give the probable diagnosis

2.15.10.8 explain the dietary and life style modifications that you would advise to the patient

2.15.10.9 explain the biochemical basis for the dietary advice that is given in dislipidaemias

2.15.10.10 explain the mechanism of action of the following agents in hypercholesterolaemia; fibrates, nicotinic acid, statins, sitosterol, antioxidants and fish oil

2.16 Food and diet

2.16.1 state the importance of a mixed diet

2.16.2 define the term “balanced diet”

2.16.3 state the components of the balanced diet

2.16.4 identify the importance of food pyramids

2.16.5 Cereals

2.16.5.1 list the cereals commonly consumed in Sri Lanka

2.16.5.2 state the nutrients supplied by rice, wheat, maize and millet

2.16.5.3 state the effect of processing methods on the nutrient content of rice

2.16.5.4 state how milling changes the nutritive value of wheat flour

2.16.5.5 identify that a significant proportion of proteins is supplied to the diet by rice

2.16.6 Pulses

2.16.6.1 list the pulses commonly consumed in Sri Lanka

2.16.6.2 state the major nutrients supplied by pulses.

2.16.7 Starchy roots and tubers

2.16.7.1 list the starchy roots and tubers commonly consumed in Sri Lanka

2.16.7.2 state the major nutrients supplied by starchy roots and tubers

2.16.8 Vegetables

2.16.8.1 list the vegetables commonly consumed in Sri Lanka

2.16.8.2 state the major nutrients that are added to the diet by vegetables

2.16.8.3 compare the biological value of plant proteins with those of foods with animal origin

2.16.8.4 state the significance of consuming green leaves along with a source of fat

2.16.9 Fruits

2.16.9.1 list the fruits commonly consumed in Sri Lanka

2.16.9.2 state the major nutrients supplied by fruits

2.16.10 Seeds and nuts

2.16.10.1 list the seeds and nuts commonly consumed in Sri Lanka

2.16.10.2 state the major nutrients supplied by seeds and nuts

2.16.11 Eggs

2.16.11.1 state the nutritive value of an egg

2.16.11.2 state why “whole-egg protein” is used as a reference protein

2.16.11.3 explain why iron supplements should not be given along with a meal containing eggs

2.16.12 Meat and meat products

2.16.12.1 state the meat and meat products commonly consumed in Sri Lanka

2.16.12.2 state the nutritive value of meat and meat products

2.16.12.3 compare the nutritive value of animal protein with that of plant protein

2.16.12.4 state the advantages of including meat and meat products in the diet

2.16.13 Fish and other sea foods

2.16.13.1 list the different types of fish commonly used in Sri Lanka

2.16.13.2 state the nutritive value of fish

2.16.13.3 compare the nutritive value of fish with that of meat

2.16.13.4 state the disadvantages of eating raw fish

2.16.13.5 state the common methods used in processing of fish and their effects in nutritive value

2.16.14 Milk and dairy products

2.16.14.1 state the nutritive value of milk and dairy products

2.16.14.2 recall that breast milk is the most complete single food for the new born

2.16.14.3 compare the nutritive value and composition of breast milk with that of cow milk

2.16.14.4 state the significance of bifidus factor in breast milk

2.16.14.5 state why clotting is important for the digestion and absorption of milk

2.16.14.6 state the importance of breast feeding of the newborn

2.16.14.7 identify that breast milk contains low content of calcium and phosphorus

2.16.14.8 state the importance of high calcium / phosphorus ratio in breast milk

2.16.14.9 identify that the nutritive value of breast milk depends on the maternal nutritional status

2.16.14.10 state the effects of processing on the nutritive value of dairy products

2.16.14.11 state how pasteurized milk differs from sterilized milk

2.16.14.12 state why buffalo milk is preferred to cow milk for making curd

2.16.15 Effect of processing and cooking

2.16.15.1 state the qualities of a food that are changed by the processing methods

2.16.15.2 state why some vegetables are discoloured during boiling

2.16.15.3 state the effects of processing methods on meat and fish

2.16.15.4 state why deep frying of vegetables, meat and fish is preferable to shallow frying

2.16.16 Toxic substances in food

2.16.16.1 state the natural toxic substances commonly found in pulses, starchy roots and fish

2.16.17 Other important areas of concern

2.16.17.1 state the difference between food allergies and food intolerance

2.16.17.2 state the adulterants and additives found in processed food and beverages

2.16.17.3 identify the myths and beliefs about food

2.16.17.4 state nutritional aspects of consumption of fast food and high fructose beverages on human health

2.16.17.5 state food safety principles in handling, preparation, and storage of food

2.17 Principles of nutrition

2.17.1 state the importance of nutrition for a healthy life of a person

2.17.2 state the characteristics of an essential nutrient

2.17.3 state the difference between micronutrients and macronutrients

2.17.4 state the basic components of a diet

2.17.5 explain the term “recommended dietary allowance (RDA)”

2.17.6 list the sources of energy in a dietcalculate the energy density of a food

2.17.7 explain basal metabolism and basal metabolic rate (BMR)

2.17.8 identify that BMR is expressed as kcal/kg/day

2.17.9 state the factors that affect BMR

2.17.10 calculate the BMR of an individual using Haris Benedict’s equation

2.17.11 state different types of physical activities

2.17.12 state what is meant by “activity factor”

2.17.13 explain the term “total energy requirement”

2.17.14 calculate the total energy requirement of a healthy adult

2.17.15 explain the importance of carbohydrates, proteins and lipids in the diet

2.17.16 describe glyceamic index of a food and its significance in the glycaemic control of an individual

2.17.17 explain the importance of fiber in the diet

2.17.18 explain the term nitrogen balance

2.17.19 recognize that nitrogen balance could be negative, positive or at equilibrium

2.17.20 state the nitrogen balance at different physiological and clinical conditions

2.17.21 list the factors that determine the nitrogen balance of an individual

2.17.22 explain the parameters used to assess the quality of proteins: amino acid score, net protein utilization, biological value of a protein

2.17.23 state what is meant by safe level of intake of proteins

2.17.24 calculate the protein requirement of an individual

2.17.25 explain how requirements of nutrients vary during infancy, childhood, adolescence, pregnancy and lactation

2.17.26 calculate the additional protein requirement of a lactating women

2.17.27 describe the methods that are used to assess the nutritional status of infants, children and adults

2.17.28 explain the term “malnutrition”

2.17.29 state the biochemical basis/ clinical manifestation for obesity, protein energy malnutrition and nutritional anaemia

2.17.30 describe enteral and parenteral nutrition

2.17.31 explain the biochemical basis for the dietary advice given in response to a trauma, burns, chronic liver disease, chronic renal disease, diabetes mellitus, cancer, obesity, malnutrition, nutritional anaemia

2.18 Haemoglobin

2.18.1 describe the structure-function relationship of haemoglobin

2.18.2 list the haem containing compounds other than haemoglobin

2.18.3 state the structural and functional differences between haemoglobin and myoglobin

2.18.4 state the approximate concentration of different haemoglobin in a normal individual and state their structural difference

2.18.5 identify the presence of different types of haemoglobin during intrauterine life

2.18.6 describe the importance of HbF during foetal life

2.18.7 state the difference between oxygenation and oxidation of haemoglobin

2.18.8 describe the structural changes resulting from oxygenation and deoxygenation of haemoglobin

2.18.9 compare the oxygen dissociation curves for haemoglobin and myoglobin

2.18.10 list the main factors that affect the affinity of haemoglobin for oxygen and their effect on oxygen -haemoglobin dissociation curve

2.18.11 describe the “Bohr effect”

2.18.12 describe how CO2 is transported in blood

2.18.13 describe the buffering action of haemoglobin

2.18.14 state the causes of congenital and acquired methaemoglobinaemia and biochemical principles involved in the management of acquired methaemoglobinaemia

2.18.15 identify the presence of enzyme systems to maintain very low level of methaemoglobin in blood in a normal individual

2.18.16 identify the inherited disorders of haemoglobin synthesis or structure

2.18.17 explain the biochemical basis of sickle cell anaemia

2.18.18 identify the main types of thalassaemia

2.18.19 explain why α-thalassemia is not compatible with life

2.18.20 explain the biochemical basis for the clinical manifestations, haematological and radiological features in β-thalassemia major

2.18.21 identify that there is a variation in concentration of different types of haemoglobin in β- thalassemia major and minor

2.18.22 outline the sequence of reactions in the synthesis of haem

2.18.23 describe how haem biosynthesis is regulated

2.18.24 describe the characteristic properties of porphyrins and their precursors

2.18.25 explain briefly the biochemical basis of photosensitivity and neurological symptoms in porphyria

2.18.26 state the causes for acquired porphyrias

2.19 Bilirubin metabolsim

2.19.1 identify that the bilirubin is produced daily both from erythropoietic and non-erythropoietic sources

2.19.2 list the non-erythropoietic sources of bilirubin

2.19.3 describe the pathway of catabolism of haemoglobin to bilirubin

2.19.4 state how bilirubin is transported to the liver for conjugation and the effects of drugs on this transport mechanism

2.19.5 explain how bilirubin is taken up by the hepatocyte and transported to the smooth endoplasmic reticulum for conjugation

2.19.6 outline the process involved in the conjugation of bilirubin in hepatocytes

2.19.7 list the factors that regulate glucuronyl transferase activity

2.19.8 describe how conjugated bilirubin is secreted from hepatocytes and excreted in bile

2.19.9 describe the process of formation of stercobilinogen and urobilinogen

2.19.10 describe the enterohepatic circulation of urobilinogen

2.19.11 explain briefly the terms: total bilirubin, unconjugated bilirubin (indirect reacting bilirubin) and conjugated bilirubin (direct reacting bilirubin)

2.19.12 state the normal range of serum bilirubin concentration

2.19.13 define the terms: hyperbilirubinaemia, jaundice and icterus

2.19.14 explain the biochemical basis for the development of hyperbilirubinaemia in (a) prehepatic jaundice (b) hepatic jaundice (c) post-hepatic jaundice

2.19.15 list the common causes for (a) prehepatic jaundice (b) hepatic jaundice (c) post-hepatic jaundice

2.19.16 interpret the serum bilirubin concentration in a laboratory report

2.19.17 explain the significance of the analysis of serum and/or urine for bilirubin, urobilinogen to differentiate (a) prehepatic jaundice (b) hepatic jaundice (c) post-hepatic jaundice

2.19.18 state how bilirubin is excreted by the foetus

2.19.19 explain how the bilirubin metabolism in the neonate differs from that in the adult and distinguish the differences between physiological jaundice from pathological jaundice in the neonate

2.19.20 explain the biochemical basis for the development of “bilirubin encephalopathy or kernicterus” in the neonate

2.19.21 state the factors associated with the development of bilirubin encephalopathy and explain their mode of action

2.19.22 state the therapeutic options available for the management of neonatal jaundice and briefly explain their biochemical basis

2.19.23 explain how early feeding of infant is important in the prevention of physiological jaundice in neonate

2.20 Hormone action and signal transduction

2.20.1 recall the chemical diversity of hormones

2.20.2 identify that hormones are classified by the location of the receptor and the nature of the signal generated to mediate its action in the cell

2.20.3 state the factors that determine the concentration of a hormone at the target cell and the factors that determine the response of the target cell to the hormone

2.20.4 state how receptor proteins differ from the transport proteins in plasma

2.20.5 explain the general mechanism of action of group-I hormones

2.20.6 explain briefly the mechanism of action of thyroid hormones and corticosteroids

2.20.7 state why vitamins A (retinoic acid) and D (1, 25-dihydroxycholecalciferol) are included in group 1 hormones

2.20.8 state the second messengers produced by group II hormones

2.20.9 identify that many group II hormones function through G-protein coupled receptors (GPCR) and state the biomedical importance of G-proteins

2.20.10 identify that neurotransmitters, chemokines, prostanoids and light sensitive compounds also function through G-protein coupled receptors (GPCR) at their target tissues

2.20.11 state the different classes of G-proteins (guanine nucleotide binding proteins)

2.20.12 explain how the intracellular concentration of cAMP is altered in the presence of Gs (stimulatory) or Gi (inhibitory) proteins

2.20.13 explain how cAMP mediates hormone action

2.20.14 state the hormones that stimulate or inhibit adenylyl cyclase

2.20.15 explain the importance of G-protein in the action of cholera toxin

2.20.16 state the second messengers produced by catecholamines when they bind to different α- and β- adrenergic receptors

2.20.17 explain how cGMP mediate hormone action as a second messenger

2.20.18 state the compounds that increase the intracellular concentration of cGMP

2.20.19 explain how Ca2+ mediate hormone action as second messengers

2.20.20 discuss the importance of calmodulin

2.20.21 explain the action of metabolites of phosphoinositides as second messengers in hormone action

2.20.22 give examples of hormones that function via metabolites of phosphoinositides

2.20.23 state the hormones that function through tyrosine kinase cascades

2.20.24 briefly explain how insulin modulates a variety of intracellular functions through tyrosine kinase cascades

2.21 Chemistry of neurotransmitters

2.21.1 recognize that neurotransmitters are the chemical messengers of the nervous system and they are signaling molecules

2.21.2 state the target cells of neurotransmitters

2.21.3 state the different classes of neurotransmitters

2.21.4 identify that most of the neurotransmitters are hydrophilic in their chemical structure

2.21.5 identify that hydrophilic neurotransmitters bind to specific receptors in the plasma membrane of the target cells to transmit the neuronal signal

2.21.6 list the three major classes of receptors used by hydrophilic neurotransmitters and state their specific characteristics

2.21.7 identify that excitatory neurotransmitters cause depolarization and inhibitory neurotransmitters cause hyperpolarization of the target cell membrane

2.21.8 state how acetylcholine is synthesized and deactivated

2.21.9 explain the action of acetylcholine at the neuromuscular junction

2.21.10 explain how acetylcholine functions through stimulatory G-protein (G5), inhibitory G-protein (Gi) and Gq protein in relaying the neuronal signal to the target cell

2.21.11 state the actions of the neurotoxins; snake venom toxins, tetrodotoxin (from puffer fish and porcupine fish), saxitoxin (from Dinoflagellates)

2.21.12 state the different catecholamines and briefly explain how they elicit their functions at target tissues

2.21.13 identify that nitric oxide is a gas which functions as a neurotransmitter

2.21.14 explain briefly the synthesis and functions of nitric oxide as a neurotransmitter

2.21.15 state the different mechanisms available for the rapid removal and deactivation of neurotransmitters from the synapse

2.22 Metabolism of nucleotides

2.22.1 identify the metabolic requirement of nucleotides for rapidly dividing cells

2.22.2 state the term

a) de novo biosynthesis
b) salvage reactions

2.22.3 state the metabolic precursors involved in the synthesis of purine and pyrimidine nucleotides

2.22.4 state the significance of folate in the biosynthesis of nucleotides

2.22.5 recognize the key enzymes and important intermediates in the de novo biosynthesis, salvage, interconversions and degradation pathways of nucleotides

2.22.6 identify the major control points and describe the regulation of nucleotide biosynthesis

2.22.7 describe the abnormalities in purine metabolism involved in gout and inherited immunodeficiency diseases

2.22.8 describe the biochemical basis for the usage of following drugs:

a) Allopurinol in gout
b) Methotrexate in cancer
c) 3'- Azido - 3'- deoxythymidine (AZT) in AIDS

2.23 Diabetes mellitus

2.23.1 state the classification of diabetes mellitus

2.23.2 state the differences in pathophysiology of type 1 and type 2 diabetes mellitus

2.23.3 explain the metabolic derangements that occur in the metabolism of carbohydrate, protein and lipid in diabetes mellitus

2.23.4 explain the biochemical basis for the development of hyperglycaemia in diabetes mellitus

2.23.5 list the biochemical investigations used to diagnose diabetes mellitus

2.23.6 use current guidelines to diagnose diabetes mellitus, impaired fasting glycaemia, impaired glucose tolerance and gestational diabetes mellitus

2.23.7 list the criteria for the screening of diabetes mellitus

2.23.8 explain the biochemical basis for the common clinical features of diabetes mellitus

2.23.9 list the types of acute and chronic complications that develop in a patient with diabetes mellitus

2.23.10 explain the biochemical basis for the development of acute complications and their clinical manifestations in diabetes mellitus

2.23.11 explain the biochemical basis for the development of chronic complications and their clinical manifestations in diabetes mellitus

2.23.12 explain briefly the biochemical basis of the principles used in the management of diabetic ketoacidosis and non-ketotic hyperosmolar hyperglycaemic coma

2.23.13 outline the principles of management and prevention of hypoglycaemic coma in diabetes mellitus

2.23.14 define the goals of glycaemic control in non-pregnant adults

2.23.15 list the biochemical tests used to monitor the glycaemic control in patients with diabetes mellitus and explain their biochemical basis

2.23.16 identify that the estimation of HbA1c is the gold standard to monitor the glycaemic control

2.23.17 list the biochemical tests used to monitor the chronic complications of diabetes mellitus and explain their biochemical basis

2.23.18 state the complications and management criteria of gestational diabetes mellitus

2.24 Recombinant DNA technology

2.24.1 identify the biomedical importance of recombinant DNA technology

2.24.2 outline the basic steps involved in recombinant DNA technology

2.24.3 explain the role of restriction enzymes in recombinant DNA technology

2.24.4 distinguish the difference between sticky ends and blunt ends

2.24.5 define the term “gene cloning”

2.24.6 list the different types of vectors used in gene cloning

2.24.7 state the natural function of plasmids in bacteria

2.24.8 describe the use of plasmids in the process of gene cloning

2.24.9 list the methods used in the insertion of foreign DNA into a cell

2.24.10 state the role of antibiotic resistant genes in the selection of recombinant bacterial colonies

2.24.11 distinguish the difference between genomic library and cDNA library

2.24.12 explain how cDNA library is made

2.24.13 describe the in-situ hybridization technique

2.24.14 describe the process of PCR

2.24.15 state the importance of PCR in recombinant DNA technology

2.24.16 list genetically engineered pharmaceutical products used in medicine

2.24.17 describe briefly the molecular basis of RFLP technique

2.24.18 explain how PCR, RFLP and gel electrophoresis are used in

a) prenatal diagnosis
b) forensic medicine

2.24.19 explain the principle of gene therapy

2.24.20 state the goals of Human Genome Project

2.25 Clinical enzymology

2.25.1 state the factors that affect the serum enzyme activity (or concentration)

2.25.2 state the mechanism of entry of enzyme into the blood and their clearance

2.25.3 identify the information that can be revealed by the serum enzyme activity (or concentration)

2.25.4 identify that the variation of distribution of enzyme at the (a) organ level (b) tissue level (c) cellular level (d) sub-cellular level

2.25.5 explain the use of different enzyme assays to localize tissue involved

2.25.6 identify that the combination of enzyme assays are important in the clinical diagnosis

2.25.7 identify the significance of estimating the isoenzymes in the diagnosis of diseases

2.25.8 state the clinically important enzyme (or proteins) assays that are used in the diagnosis of diseases associated with (a). liver-acute hepatitis, cirrhosis, cholestasis (b). heart-acute myocardial infarction (c). bone (d). skeletal muscles (e). Prostate-prostate carcinoma (f). pancreas-acute pancreatitis (g). erythrocytes-haemolysis

2.25.9 explain the use of enzymes in the diagnosis and prognosis of cancers

2.25.10 explain the chronological sequence of enzyme or intracellular protein released in acute myocardial infarction

2.25.11 state the principle of enzyme-based assays

2.25.12 explain how enzymes are used as

a) diagnostic reagents in
   - enzyme-labeled immunoassays (ELISA)
   - enzyme-based assay to estimate plasma glucose
   - test strips (immobilized enzymes)

b) therapeutic agents
   - use of streptokinase (urokinase, tissue plasminogen activator) in acute myocardial infarction
   - replacement enzymes in inborn errors of metabolism

2.26 Plasma proteins

2.26.1 state the functions of plasma

2.26.2 list the principal groups of proteins in plasma

2.26.3 state the difference between plasma and serum

2.26.4 state the approximate concentrations of albumin and globulins in serum

2.26.5 state the important proteins present in α_{1-}, α_{2-} , β- and γ- globulin fractions

2.26.6 describe the functions of albumin, C-reactive protein, α_1-antitrypsin, haptoglobin, transferrin, ceruloplasmin and complement proteins

2.26.7 recognize that the concentrations of plasma proteins are altered in disease conditions

2.26.8 explain the significance of estimating albumin and C-reactive protein concentrations in serum

2.26.9 explain the importance of estimating serum α- fetoprotein concentration as a tumour marker

2.26.10 describe the term ‘acute phase protein’

2.26.11 list the acute phase proteins and briefly describe their functions

2.26.12 state what is meant by immune response, humoral antibody response and cell mediated-response

2.26.13 explain briefly the structure- function relationship of immunoglobulin

2.26.14 state the chemical nature of an antigen

2.26.15 describe the functions of immunoglobulins A, G, M, and E

2.26.16 state the principle of electrophoresis

2.26.17 recognize that serum is the preferred sample for electrophoresis in clinical laboratories

2.26.18 identify the serum protein bands in an electrophoretogram

2.26.19 recognize the difference between serum and plasma electrophoretograms

2.26.20 recognize the importance of a densitometer scan of an electrophoretogram

2.26.21 identify the changes in serum protein electrophoretograms in paraproteinaemia, nephrotic syndrome and in α_{1-} antitrypsin deficiency

2.26.22 describe the term 'paraproteinaemia'

2.26.23 describe the coexistent features of paraproteinaemia; immune paresis and the appearance of Bence-Jones proteins in urine

2.26.24 describe the importance of carrying out serum and urine protein electrophoresis in paraproteinaemia

2.27 Mineral metabolism

2.27.1 recognize the importance of mineral elements for the normal functioning of the body

2.27.2 list the principal and micro-nutrient elements

2.27.3 Iodine

2.27.3.1 state the dietary sources rich in iodine

2.27.3.2 describe the process involved in the synthesis and secretion of thyroid hormones; T3, T4 and reverse T3

2.27.3.3 recognize the importance of thyroglobulin in relation to the thyroid hormone synthesis

2.27.3.4 describe the circulation of thyroid hormones and thyronine compounds in serum

2.27.3.5 describe the regulation of thyroid hormones in the body

2.27.3.6 state the clinical features and aetiological factors of hyper and hypothyroidism

2.27.3.7 interpret the results of thyroid function tests and explain their biochemical basis

2.27.4 Calcium and phosphate

2.27.4.1 state the functions of calcium in the body

2.27.4.2 state the dietary sources rich in calcium

2.27.4.3 list the factors that affect calcium absorption to the body

2.27.4.4 state the distribution of calcium in plasma

2.27.4.5 recognize the significance of the measurement of serum albumin concentration in the estimation of the serum total calcium concentration

2.27.4.6 describe the regulation of serum calcium concentration

2.27.4.7 state how calcium is excreted from the body

2.27.4.8 state the importance of phosphate to the human body

2.27.4.9 recall that calcium and phosphate concentrations in serum are reciprocally regulated mainly by the parathyroid hormone

2.27.5 Iron

2.27.5.1 state the dietary sources rich in iron

2.27.5.2 state the distribution of iron in the body

2.27.5.3 identify that the requirement of iron varies in different age groups and in specific physiological conditions

2.27.5.4 describe the process of iron metabolism; intestinal absorption, transport, storage and loss of iron from the body

2.27.5.5 state the causes of iron deficiency and clinical features of anaemia

2.27.5.6 state the causes of iron overload and the biochemical basis for the use of chelating agents

2.27.5.7 explain the biochemical significance of investigations that are used in disorders of iron metabolism and their interpretation

2.27.6 Magnesium

2.27.6.1 state the dietary sources rich in magnesium

2.27.6.2 state the importance of magnesium as a micro-nutrient element

2.27.7 Zinc

2.27.7.1 describe the importance of zinc as a micro-nutrient element and a dietary source

2.27.7.2 explain briefly the absorption and homeostasis of zinc

2.27.7.3 state the clinical features of zinc deficiency

2.27.8 Copper

2.27.8.1 describe the importance of copper as a micro-nutrient element and a dietary source

2.27.8.2 explain briefly the disorders related to copper metabolism; Menke’s syndrome and Wilson’s disease

2.27.8.3 state the methods available for the diagnosis and treatment of copper toxicity

2.27.9 Fluorine

2.27.9.1 describe the importance of fluorine as a micro-nutrient element and a dietary source

2.27.9.2 recall the importance of fluoridation of community water supplies

2.27.9.3 explain briefly how excessive consumption leads to dental fluorosis and osteosclerosis

2.27.10 Selenium

2.27.10.1 explain briefly the importance of selenium as a micro-nutrient element, its dietary sources and the clinical features associated with its toxicity

2.27.11 Chromium

2.27.11.1 explain briefly the importance of chromium as a micro-nutrient element and its dietary sources

2.28 Inborn errors of metabolism

2.28.1 briefly explain the term “Inborn Errors of Metabolism (IEM)”

2.28.2 recall why inborn errors are common in the offspring of consanguineous marriages

2.28.3 identify that abnormal functions are due to the defects of enzymes or non-enzyme proteins

2.28.4 state the basic principle that explains the relationship between causes-consequences of IEM

2.28.5 state the principle of treatment in IEM

2.28.6 state why early detection is essential in some IEM

2.28.7 Inborn errors of amino acids metabolism

2.28.7.1 explain the pathway of methionine and homocystein metabolism

2.28.7.2 explain briefly the biochemical basis for the development of homocysteinuria and clinical significance of homocysteinuria

2.28.7.3 explain briefly the biochemical basis for the clinical features developed in (a). phenylketonuria (PKU) (b). tyrosinosis/ tyrosinaemia (c). alkaptonuria (d). albinism

2.28.8 Inborn errors of carbohydrate metabolism

2.28.8.1 identify that abnormalities in carbohydrate metabolism leads to diseases which may impair the muscle function and blood glucose regulation

2.28.9 Inborn errors of lipid metabolism

2.28.9.1 recall that hypercholesterolaemia and hyperlipoproteinaemia could be hereditary

2.28.9.2 state how hyperlipidaemia is caused by (a). defective LDL receptor gene or (b). lipoprotein lipase enzyme deficiency (completed in lipid metabolism lectures)

2.28.10 Inborn errors of lysosomal metabolism

2.28.10.1 identify that deficiencies in lysosomal enzyme activities lead to a group of diseases resulting the accumulation of degradation intermediates

2.28.11 Inborn errors of digestion and absorption

2.28.11.1 recall the primary lactase deficiency (completed in digestion and absorption lectures)

2.28.12 Inborn errors of erythrocyte function

2.28.12.1 recall the consequences of deficiency of glucose 6-phosphate dehydrogenase, hexokinase and pyruvate kinase (completed in carbohydrate metabolism lectures)

2.28.12.2 recall how methaemoglobin reductase deficiency leads to methaemoglobinaemia (completed in haemoglobin lectures)

2.28.13 Inborn errors of porphyrin metabolism

2.28.13.1 identify that there is a group of diseases known as hereditary porphyrias (completed in haemoglobin lectures)

2.28.14 Inborn errors of mineral metabolism

2.28.14.1 recall the enzyme defects and the biochemical basis for the clinical manifestation that occurs in haemochromatosis and Wilson's disease (completed in mineral metabolism lectures)

2.28.15 Inborn errors of purine metabolism

2.28.15.1 recall the enzyme defects and the biochemical basis for the clinical manifestations in severe combined immunodeficiency syndrome, xanthinuria, primary and secondary hyperuricaemia
(completed in nucleotide metabolism lectures)

3. Department of Physiology

Vision

To be the best centre of excellence in generating and delivering medical physiology knowledge in Sri Lanka

Mission

To contribute significantly to the advancement of scientific and medical knowledge by providing excellent teaching and training for the medical undergraduates and postgraduate students

General objectives

At the end of the course, students should

1. acquire knowledge and skills on the normal function of different systems in the human body
2. be able to apply their knowledge of the basic principles that underlie the function of different systems in the body to clinical practice
3. be able to use the knowledge acquired in physiology as a basis of further learning for postgraduate degrees in the field of Medicine

Learning objectives

At the end of each session, students should be able to

3.1 Measurements: Normal range/reference range in biology and measurements

3.1.1 describe the concept of normal distribution in a population

3.1.2 derive the normal range using mean and SD

3.1.3 describe the normal range in biology

3.1.4 describe concept of reference range and its use in clinical practice

3.1.5 describe concept of error and different types of errors

3.1.6 describe the concept of true value

3.2 Body fluids

3.2.1 Body fluid compartments

3.2.1.1 name the different fluid compartments of the body

3.2.1.2 state the approximate volume and proportion of fluid in each compartment in relation to total body water in a healthy adult male

3.2.1.3 state the effect of age, sex and body fat content on total body water

3.2.1.4 describe the principle of measuring the volume of body fluid compartments

3.2.1.5 state suitable marker substances to measure each body fluid compartment

3.2.1.6 state the limitations of measuring interstitial fluid, ICF and ECF

3.2.1.7 state the major constituents of each compartment stated in section 1

3.2.1.8 state the important differences of composition in intracellular fluid, interstitial fluid and plasma

3.2.2 Transport across cell membrane

3.2.2.1 name the mechanisms of transporting solutes and solvents across cell membrane

3.2.2.2 describe each mechanism stated above

3.2.2.3 describe the different types of transporters found in the cell membrane giving examples

3.2.2.4 explain how the resting membrane potential is established and maintained

3.2.2.5 explain the terms ‘osmolality’ of extra cellular compartment and ‘tonicity’

3.2.3 Tissue fluid formation (Starling forces)

3.2.3.1 list the factors determining the rate of tissue fluid formation

3.2.3.2 write the Starling forces equation

3.2.3.3 describe how Starling forces equation can be applied at the arteriolar end and the venular end of a capillary

3.2.3.4 define oedema

3.2.3.5 state different classifications of oedema

3.2.3.6 describe the mechanism of development of oedema in heart failure, venous obstruction, hypoprotenemia, cirrhosis, insect bite, acute renal failure,

vasodilatation, pregnancy and lymphatic obstruction using the knowledge on Starling forces

3.2.4 **Dehydration**

3.2.4.1 describe the water balance in the body

3.2.4.2 make a fluid balance table for an adult male

3.2.4.3 state the various presentations of disturbances of water balance

3.2.4.4 state causes of excessive fluid loss from gastrointestinal system, respiratory system, urinary system and skin

3.2.4.5 classify dehydration according to (a) severity and (b) natraemic status

3.2.4.6 describe the clinical features of dehydration (symptoms and signs)

3.2.4.7 explain the principles of fluid replacement in dehydration.

3.2.4.8 state the constituents of ORS

3.2.4.9 describe the role of intestinal Sodium-Glucose Co-Transporter in the mechanism of action of ORS

3.2.5 **Objectives of practicals**

3.2.5.1 **Intravenous (IV) fluids and oral rehydration solutions**

3.2.5.1.1 list different kinds of oral rehydration solutions (ORS) available in the market

3.2.5.1.2 list other kinds of homemade liquids available for oral rehydration

3.2.5.1.3 state the important features of ORS

3.2.5.1.4 state the limitations of ORS

3.2.5.1.5 state the compositions of

a) “Jeewanie”

b) Normal saline

c) IV dextrose solution

3.2.5.1.6 state the tonicity of blood and above IV fluids

3.2.5.1.7 state why 0.9% NaCl and 5% dextrose are considered isotonic solutions

3.2.5.1.8 state what changes take place to volume of body fluid compartments after infusion of normal saline, 5% dextrose, colloidal solution (plasma)

3.2.5.1.9 state other solutions and products available for fluid replacement

3.3 Cardiovascular system

3.3.1 Structure of the heart

3.3.1.1 state the chambers of heart and the vascular connections and the valves related to them

3.3.1.2 describe the three layers of heart and pericardium and their physiological relevance

3.3.1.3 describe the arrangement of coronary circulation

3.3.1.4 describe the arrangement of pacemaker and the conducting system

3.3.1.5 describe the nerve supply of the heart

3.3.2 Electrical properties of the cardiac muscle

3.3.2.1 describe the ionic basis of generation of action potentials in cardiac muscle cells and pacemaker cells

3.3.2.2 explain what is absolute refractory period and relative refractory period in relation to action potential of the cardiac muscle

3.3.2.3 briefly describe the properties/behavior of different types of ion channels involved in generation of action potentials in cardiac muscle (e.g. voltage-gated Na^+ channels/rapidly opening or slow opening)

3.3.2.4 explain the effect of sympathetic and parasympathetic stimulation on the heart rate, using the effect on pacemaker potentials

3.3.2.5 describe the spread of cardiac excitation in the heart

3.3.3 Excitation-contraction coupling

3.3.3.1 explain how an action potential that occurs on the myocardial cell membrane results in contraction of the muscle

3.3.3.2 explain how T-tubular system helps to travel action potential in the surface of the cell to the interior of cell

3.3.3.3 explain the role of Ca^{2+} and role of different types of proteins in cardiac muscle contraction

3.3.3.4 state the sources of Ca^{2+} for cardiac muscle contraction

3.3.3.5 explain the mechanical response of cardiac muscle to an action potential using a diagram

3.3.3.6 explain why cardiac muscle cannot be tetanized

3.3.4 **Mechanical events of the cardiac cycle**

3.3.4.1 explain what is meant by cardiac cycle

3.3.4.2 calculate the length of the cardiac cycle using the heart rate

3.3.4.3 state the two phases of the cardiac cycle (systole and diastole)

3.3.4.4 explain the importance of diastolic period for ventricular filling and coronary blood flow

3.3.4.5 explain the sequence of mechanical events that take place starting from the action of primer pumps (atrial contraction)

3.3.4.6 define stroke volume, end diastolic volume of left ventricle, end systolic volume of left ventricle and ejection fraction

3.3.4.7 state the relative effects on duration of systole and diastole when the heart rate increases

3.3.4.8 state the timing of events on left and right sides of the heart

3.3.5 **Pressure changes in atria, ventricles, large arteries and veins (including JVP)**

3.3.5.1 describe the pressure changes that occur in left and right atria during cardiac cycle

3.3.5.2 describe the pressure changes that occur in left and right ventricles during cardiac cycle

3.3.5.3 draw and explain the pressure-volume curve of the left ventricle

3.3.5.4 compare the pressures changes that occur in chambers in the left side of the heart and those of right side of the heart

3.3.5.5 describe the pressure changes that occur as the blood flows through the systemic vascular tree

3.3.5.6 describe the role of arterioles in regulation of peripheral resistance

3.3.5.7 describe the pressure changes that occur along the pulmonary vascular tree

3.3.5.8 explain the pressure changes that occur in ASD, VSD and PDA

3.3.5.9 describe the pressure changes in the internal jugular vein and relate them to the events in the cardiac cycle

3.3.5.10 explain the changes that occur in the jugular venous pulse wave in different disease conditions

3.3.5.11 state few conditions in which jugular venous pressure is altered

3.3.6 **Arterial pulse**

3.3.6.1 explain the pulse wave

3.3.6.2 explain why pulse wave is damping as it goes along the vascular tree from aorta to capillaries

3.3.6.3 state the sites where arterial pulse could be felt

3.3.6.4 state features that are observed during examination of pulse

3.3.6.5 state the normal range of the pulse rate

3.3.6.6 state causes of sinus tachycardia

3.3.6.7 state the causes of sinus bradycardia

3.3.6.8 explain what is pulse deficit

3.3.6.9 state different types of rhythm abnormalities of pulse and examples for each of them

3.3.6.10 explain what is sinus arrhythmia

3.3.6.11 state different characters that can be observed in arterial pulse (slow rising pulse, collapsing pulse, bisferience pulse, pulsus alternans, pulsus bigeminus) and their significance

3.3.6.12 explain what is paradoxical pulse (pulsus paradoxus) giving examples

3.3.7 **Heart sounds and murmurs**

3.3.7.1 name the four heart sounds

3.3.7.2 describe the mechanisms of generation of heart sounds

3.3.7.3 state auscultatory areas and relate them to surface anatomy

3.3.7.4 describe the qualities of first and second heart sounds

3.3.7.5 describe reasons for splitting of heart sounds

3.3.7.6 define a murmur

3.3.7.7 describe mechanism of generation of a murmur

3.3.7.8 list the characteristics that should be noted when auscultating a murmur

3.3.7.9 describe different types of murmurs heard in different valvular lesions and Shunts

3.3.7.10 describe the features of a functional murmur

3.3.7.11 name the sounds generated in other parts of the vascular system

3.3.8 **Starling's law of heart and myocardial contractility**

3.3.8.1 explain the relationship between the initial muscle fibre length and the force of contraction of a cardiac muscle fibre (Starling's law)

3.3.8.2 apply the Starling's law to the ventricle and explain the relationship between the ventricular end diastolic volume and the stroke volume

3.3.8.3 explain the concept of myocardial contractility

3.3.8.4 list the factors that increase the myocardial contractility and decrease the myocardial contractility

3.3.9 **Cardiac output**

3.3.9.1 define cardiac output

3.3.9.2 define cardiac index

3.3.9.3 state the distribution of cardiac output throughout the body

3.3.9.4 explain the different methods used to measure cardiac output;

a) an electromagnetic flow meter on aorta (in experimental animals)
b) Doppler technique combined with echocardiography
c) the Fick principle
d) indicator dilution method

3.3.9.5 state the factors affecting cardiac output (Cardiac output = Stroke Volume × Heart rate where stroke volume = EDV - ESV). Therefore, student should be able to explain that the factors affecting heart rate, end diastolic volume or end systolic volume could affect the cardiac output giving examples

3.3.9.6 explain the relationship between heart rate and the cardiac output

3.3.9.7 list the conditions that

a) increase the cardiac output
b) decrease the cardiac output

3.3.9.8 describe possible changes in cardiac output with the changes in body posture

3.3.10 **Blood pressure measurement**

3.3.10.1 state what is systolic blood pressure

3.3.10.2 state what is diastolic blood pressure

3.3.10.3 state what is pulse pressure

3.3.10.4 state what is meant by blood pressure

3.3.10.5 explain why 1/3 of pulse pressure is added to diastolic pressure when calculating mean blood pressure

3.3.10.6 write the equation that show the relationship between blood pressure, cardiac output and total peripheral resistance

3.3.10.7 state the two different methods involved in measuring blood pressure when using a mercury or aneroid sphygmomanometer (palpation method and auscultatory method)

3.3.10.8 explain how Korotkoff sounds are used in measurement of blood pressure in the auscultatory method

3.3.10.9 explain the procedure of measurement of blood pressure (advice given to the patient, how patient is placed, how the sphygmomanometer is placed, selection of the cuff and its application, how palpation method and auscultation method is used)

3.3.11 **Cardiovascular regulation – introduction**

3.3.11.1 list main organs/tissues in cardiovascular system which are regulated

3.3.11.2 list main methods/modes of regulation of these organ and tissue

3.3.11.3 describe clinical significance of regulation of cardiovascular system

3.3.12 **Cardiovascular regulation - local regulation**

3.3.12.1 list main mechanism of regulating local blood flow

3.3.12.2 describe myogenic theory & metabolic theory

3.3.12.3 list substance act on blood vessels, their effects and the source

3.3.12.4 describe main substances release from endothelium and other tissues for blood flow regulation

3.3.13 **Cardiovascular regulation - Systemic regulation**

3.3.13.1 list component involved in systemic regulatory mechanisms of blood flow

3.3.13.2 describe systemic cardiovascular regulation by hormones and other substances

3.3.13.3 describe cardiovascular regulation by nervous system

3.3.13.4 describe response of heart for increased and decrease demand of cardiac output

3.3.13.5 describe the role of vasomotor area dorsal vagal nuclei

3.3.13.6 list the input and output to vasomotor area

3.3.13.7 describe local autonomic reflex arc that alter vasomotor tone and heart rate to blood pressure changes

3.3.13.8 describe the role of baroreceptors and chemoreceptor

3.3.13.9 describe cardiovascular changes associated with *Valsalva manoeuvre*

3.3.14 **Electrocardiography**

3.3.14.1 describe the basis of recording ECG

3.3.14.2 describe Einthoven's triangle

3.3.14.3 describe the limb leads and chest leads

3.3.14.4 relate sequence of cardiac excitation and ECG wave pattern

3.3.14.5 draw a left ventricular lead and label waves and segments

3.3.14.6 interpret the waves in each lead

3.3.14.7 calculate heart rate from ECG recording

3.3.14.8 identify the ECGs with

a) Normal sinus rhythm
b) Sinus arrhythmia
c) Sinus bradycardia
d) Sinus tachycardia

3.3.14.9 describe the features of a normal ECG

3.3.14.10 describe cardiac axis

3.3.14.11 describe how to calculate cardiac axis using ECG

3.3.14.12 describe ECG changes in heart blocks, AF, atrial flutter, ventricular arrhythmias, hyper and hypokalaemia

3.3.15 Alteration in cardiovascular physiology in heart failure

3.3.15.1 define heart failure

3.3.15.2 state causes of heart failure

3.3.15.3 state pathophysiological changes in heart failure

3.3.15.4 describe compensatory physiological responses to heart failure

3.3.15.5 describe vicious cycle of cardiac deterioration and physiological response

3.3.15.6 describe changes in pressure volume loop in cardiac failure

3.3.15.7 describe changes in Frank Starling curve in heart failure

3.3.15.8 compare the clinical features of LVF with RVF

3.3.15.9 compare systolic failure with diastolic failure

3.3.16 Alteration in cardiovascular physiology in hypertension

3.3.16.1 describe the factors affecting arterial pressure

3.3.16.2 define hypertension

3.3.16.3 classify hypertension

3.3.16.4 describe physiologic changes in hypertension

3.3.16.5 describe pathophysiology of hypertension

3.3.16.6 describe the complications of hypertension

3.3.16.7 describe ECG changes in hypertension

3.3.16.8 describe principles of management of hypertension

3.3.17 **Shock**

3.3.17.1 state different types of shock

3.3.17.2 describe clinical features of shock

3.3.17.3 explain why BP is not a good indicator to assess compensated shock

3.3.17.4 describe immediate and long-term compensatory mechanisms of shock

3.3.17.5 describe basic principles of management of shock

3.3.17.6 describe physiological basis of refractory shock

3.3.17.7 brief account on fainting

3.3.18 **CVS changes during exercises, postural changes and change of gravitational effect**

3.3.18.1 describe mechanisms that increase blood flow within skeletal muscle

3.3.18.2 describe systemic changes due to generalized sympathetic activation during exercise

3.3.18.3 describe value of muscle pump and thoracic pump

3.3.18.4 describe changes in cardiovascular variables during exercise

3.3.18.5 describe adaptation seen in endurance training

3.3.18.6 CVS adjustments to postural changes, moving against or towards the earth surface (g effect)

3.3.19 **Cerebral circulation**

3.3.19.1 describe the cerebral blood supply (Arterial supply and the venous drainage) and its anatomical significance

3.3.19.2 describe the unique anatomic features of the cerebral circulation

3.3.19.3 describe the innervations of cerebral blood vessels

3.3.19.4 define the term “Blood brain barrier” and its’ significance

3.3.19.5 describe the penetration properties of various substances like CO2, glucose into brain and their significance

3.3.19.6 list a few transporters available for the transport of other substances

3.3.19.7 describe the function of P- glycoprotein

3.3.19.8 describe circumventricular organs and their physiological significance

3.3.19.9 describe physiological significance of Area Postrema in vomiting

3.3.19.10 describe the functions of the blood brain barrier and its’ physiological significance

3.3.19.11 describe the method used for measurement of cerebral blood flow

3.3.19.12 describe key features of dynamics of cerebral blood flow

3.3.19.13 describe the role of intracranial pressure for the regulation of cerebral blood flow

3.3.19.14 describe the changes that occur in the cerebral blood flow under various conditions of gravity

3.3.19.15 describe the autoregulation of cerebral blood flow

3.3.19.16 describe the local variations in cerebral blood flow to various areas of the brain

3.3.19.17 describe oxygen consumption by brain

3.3.19.18 describe glucose consumption by brain

3.3.20 **Coronary circulation**

3.3.20.1 describe the anatomy of coronary circulation with regard to arterial supply and venous drainage

3.3.20.2 describe the pressure gradients and flow through coronary arteries to various areas of the cardiac muscle during the cardiac cycle

3.3.20.3 describe the relationship between heart rate and the left ventricular blood flow

3.3.20.4 describe the differences in right ventricular blood flow compared to left ventricular blood flow

3.3.20.5 describe the other pathological conditions which affect the coronary blood flow and their physiologic mechanism

3.3.20.6 quantify the coronary blood flow under resting conditions

3.3.20.7 compare myocardial blood flow differences during systole & diastole

3.3.20.8 describe the methods available to measure the regional blood flow of the heart

3.3.20.9 describe the changes that occur in the coronary blood flow with changes in cardiac oxygen consumption and the factors that affect such change

3.3.20.10 describe the autoregulation of cardiac blood flow

3.3.20.11 describe how products of metabolism affect coronary blood flow

3.3.20.12 describe what is meant by “reactive hyperaemia” of heart and the proposed mechanism of such “reactive hyperaemia”

3.3.20.13 describe the neural factors which regulate the coronary blood flow

3.3.20.14 describe how neural factors help in selective preservation of coronary blood flow in situations of low systemic blood pressure

3.3.20.15 describe angina & myocardial infarction and main features of each

3.3.20.16 describe the mechanism of angina in hypertension and in aortic stenosis

3.3.21 **Feto- placental circulation**

3.3.21.1 describe the importance of placenta to the fetus

3.3.21.2 describe the structure of the placenta

3.3.21.3 compare the process of gas exchange at placenta with what happens at the lung

3.3.21.4 compare the circulatory circuits of the fetus, newborn and the adult

3.3.21.5 describe the important features of the fetal circulation

3.3.21.6 state the saturation of fetal blood in systemic veins, portal vein and the Inferior vena cava

3.3.21.7 describe the key features of fetal respiration

3.3.21.8 describe the importance of different oxygen affinities of fetal haemoglobin and adult haemoglobin

3.3.21.9 describe the circulatory changes that occur in the fetus immediately after birth

3.3.22 **Cutaneous circulation**

3.3.22.1 important features of cutaneous circulation and their physiologic significance

3.3.22.2 describe the white reaction

3.3.22.3 describe the triple response

3.3.22.4 describe reactive hyperaemia of skin

3.3.22.5 describe generalized circulatory responses of the skin

3.3.23 **Objectives of practicals**

3.3.23.1 **Blood flow**

3.3.23.1.1 look for the features of arterial occlusion (absence of pulse, pallor and paraesthesia)

3.3.23.1.2 recognize the appearance of peripheral cyanosis

3.3.23.1.3 recognize the appearance of reactive hyperaemia and its features

3.3.23.1.4 demonstrate the presence of valves in superficial veins (maneuver- temporary occlusion of blood vessels)

3.3.23.2 **JVP**

3.3.23.2.1 draw a normal JVP pattern

3.3.23.2.2 describe the correct position for observing JVP

3.3.23.2.3 describe how a JVP tracing is obtained using a transducer

3.3.23.2.4 identify the waves in JVP tracing using simultaneous ECG

3.3.23.2.5 able to state the possible abnormalities in a JVP tracing and explain the possible mechanism/s and causes

3.3.23.3 **Measurement of BP**

3.3.23.3.1 identify different types (mercury, aneroid and digital) of sphygmomanometers

3.3.23.3.2 describe how consent is obtained for the measurements

3.3.23.3.3 palpate for radial pulse

3.3.23.3.4 state the correct positions for measurement of blood pressure

3.3.23.3.5 state the suitable size of the cuff for a given individual

3.3.23.3.6 apply sphygmomanometer cuff correctly

3.3.23.3.7 record systolic blood pressure by palpatory method

3.3.23.3.8 palpate branchial pulse and place diaphragm of the stethoscope for recording blood pressure

3.3.23.3.9 record blood pressure by auscultatory method

3.3.23.3.10 state the possible errors that can occur during blood pressure measurement

3.3.23.3.11 inform the measurements to the subject after recording is completed

3.3.23.4 **ECG**

3.3.23.4.1 recognize ECG recording paper

3.3.23.4.2 state the standard paper speed and amplitude, calibration of an ECG recording

3.3.23.4.3 state where the electrodes are placed for recording of ECG

3.3.23.4.4 identify the different waves in an ECG tracing

3.3.23.4.5 identify important intervals and segments

3.3.23.4.6 calculate the heart rate and measure the PR interval

3.3.23.4.7 identify ventricular hypertrophy in an ECG

3.3.23.4.8 recognize sinus rhythm, sinus arrhythmia, tachycardia and bradycardia in an ECG

3.3.23.4.9 recognize important rhythm abnormalities (atrial fibrillation, atrial flutter, different grades of heart block, ventricular tachycardia, and ventricular ectopics) in an ECG tracing

3.3.23.4.10 recognize ECG changers of ischaemic heart disease (ST elevation, ST depression, Q waves and T inversion)

3.3.23.4.11 recognize ECG abnormalities in electrolyte disturbances (Hypokalaemia, hyperkalaemia and hyper calcaemia)

3.3.23.5 **Phonocardiogram**

3.3.23.5.1 surface mark the auscultatory areas of the precordium

3.3.23.5.2 identify the parts of the stethoscope and their uses

3.3.23.5.3 recognize 1st and 2nd heart sound using stethoscope

3.3.23.5.4 recognize the diastolic and systolic period using stethoscope

3.3.23.5.5 describe how cardiophonography is done

3.3.23.5.6 recognize 1st and 2nd heart sound in a phonocardiogram

3.3.23.5.7 recognize murmur/s in a phonocardiogram and interpret them

3.3.23.5.8 state 3 causes for systolic murmur, 3 causes for diastolic murmur and 1 cause for continuous murmur

3.3.23.6 **Examination of CVS**

3.3.23.6.1 look for dependent edema, clubbing, cyanosis and pallor

3.3.23.6.2 palpate seven arterial pulses (carotid, brachial, radial, femoral, poplitial, posterior tibial and dorsalis pedis) and recognize the quality of normal arterial pulse

3.3.23.6.3 measure the pulse rate

3.3.23.6.4 recognize the normal rhythm of pulse

3.3.23.6.5 recognize the quality of vessel wall on palpation

3.3.23.6.6 describe the features that has to look during inspection of precordium

3.3.23.6.7 describe how to look for liver dullness

3.3.23.7 **Valsalva Manoeuvre**

3.3.23.7.1 describe how the Valsalva Manoeuvre is performed

3.3.23.7.2 describe the heart rate changers during and immediately after the procedure

3.3.23.7.3 describe the blood pressure changers during and immediately after the procedure

3.3.23.7.4 detect heart rate changers that can be seen in an ECG recording obtained during and immediately after the procedure

3.3.23.7.5 describe the abnormal responses in relation to heart rate and blood pressure

3.3.23.7.6 describe the clinical significance of an abnormal response

3.3.23.7.7 state conditions that can give an abnormal response

3.3.23.7.8 state few other tests that are useful in assessing autonomic dysfunction

3.4 Respiratory System

3.4.1 Respiration and ventilation

3.4.1.1 compare the respiratory mechanisms during expiration and inspiration

3.4.1.2 compare gas composition from external air to alveoli

3.4.1.3 compare how increased and decreased compliance of lung influence respiration

3.4.1.4 explain influence of surface tension for alveoli function and advantage of surfactant

3.4.1.5 describe different lung volumes & indices use to measure lung function

3.4.1.6 describe physiological significance of dead space

3.4.1.7 describe the ventilation (V) and perfusion (P)

3.4.1.8 compare differences in V/P ratio and how it influences on gas exchange

3.4.2 **Gas exchange**

3.4.2.1 list the components of diffusion barrier

3.4.2.2 describe the mechanism of gas exchange across diffusion barrier

3.4.2.3 explain the phrases diffusion limited and perfusion limited

3.4.2.4 explain diffusion capacity of alveolar capillary membrane

3.4.3 **Gas transport**

3.4.3.1 state partial pressure of oxygen in arterial blood and venous blood

3.4.3.2 describe the mechanisms of transport of oxygen in blood

3.4.3.3 describe the factor/s that affects the soluble fraction of oxygen in blood

3.4.3.4 draw oxygen haemoglobin dissociation curve

3.4.3.5 describe the factors that affect the haemoglobin dissociation curve

3.4.3.6 state partial pressure of carbon dioxide in arterial blood and venous blood

3.4.3.7 describe the mechanisms of transport of carbon dioxide in blood

3.4.3.8 describe the factor/s that affects the soluble fraction of carbon dioxide in blood

3.4.3.9 explain the phrase chloride shift

3.4.3.10 describe the role of respiratory system in the H^+ homeostasis

3.4.4 **Respiratory adjustments during exercise**

3.4.4.1 describe the changes in ventilation during exercises

3.4.4.2 describe the changes in respiratory rate, ventilation and changes in blood chemistry during acclimatization to altitude

3.4.4.3 describe the changes in the respiratory system and blood in people living in altitude

3.4.4.4 describe the changes in blood gas during deep sea diving

3.4.4.5 describe the effects of rapid ascending from deep sea

3.4.4.6 explain the methods of treating the complications of rapid ascend from deep sea diving

3.4.4.7 describe the basis for oxygen therapy in different clinical conditions

3.4.5 **Respiratory adjustments in diseases**

3.4.5.1 describe the changes in respiration in metabolic acidosis

3.4.5.2 describe the changes in respiration in alkalosis

3.4.5.3 define the term hypoxia

3.4.5.4 describe the types of hypoxia

3.4.5.5 explain the different mechanisms of hypoxic hypoxia by giving examples

3.4.5.6 define cyanosis

3.4.5.7 state two types of cyanosis

3.4.5.8 explain the mechanism and causes for each type of cyanosis given above

3.4.5.9 describe effects of hypocapnea and hypercapnea

3.4.6 **Regulation of respiration**

3.4.6.1 describe the neural activities (respiratory center and other centres) in the brain stem to regulate the respiration

3.4.6.2 compare spontaneous respiration and voluntary respiration

3.4.6.3 describe the influences following on the respiratory centre

a) higher centers
b) O_2 partial pressure of arterial blood through chemoreceptors
c) CO_2 partial pressure of arterial blood through chemoreceptors
d) hypoxia and hypercapnea directly
e) different receptors in respiratory system through vagus nerve
f) propriceptors

3.4.7 **Defense mechanisms of respiratory system**

3.4.7.1 describe the physical barriers in respiratory system

3.4.7.2 describe the adaptations in respiratory system to filter inspiratory air

3.4.7.3 explain the role of cilia and mucus in defense mechanism

3.4.7.4 explain the role of macrophages, lymphoid tissue in defense mechanism

3.4.7.5 describe the adaptation of immune system in respiratory system for its protection

3.4.7.6 explain how cough and sneezing is useful as protective reflexes

3.4.8 **Abnormal physiology in pulmonary disease**

3.4.8.1 explain the alteration in pulmonary functions (lung volumes, lung capacities, partial pressure of gases) in following conditions

a) bronchial asthma
b) pulmonary emphesema
c) lung fibrosis
d) interpret lung function test report in above conditions

3.4.9 **Oxygen treatment, hypercapnoea and hypocapnoea**

3.4.9.1 describe different modes of treatment with oxygen

3.4.9.2 describe different conditions where oxygen treatment is useful

3.4.9.3 describe effects, risks and benefits of oxygen treatment in healthy individuals and in different types of respiratory failure

3.4.9.4 describe oxygen toxicity

3.4.9.5 describe hyperbaric oxygen treatment

3.4.9.6 describe causes and effects of hypercapnea and hypocapnoea

3.4.10 **Other respiratory anomalies**

3.4.10.1 physiological effects of respiratory anomalies such as asphyxia, drowning, Cheyne-Strokes Respiration, sleep apnea, pulmonary embolization and pulmonary hypertension

3.4.11 **Objectives for practices**

3.4.11.1 **Lung function test**

3.4.11.1.1 identify the Ventilometer

3.4.11.1.2 describe the procedure of obtaining FVC, FEV_1, PEFR and FEV_1/ FVC

3.4.11.1.3 refer a normogram and recognize abnormal results of lung function reports

3.4.11.1.4 recognize restrictive lung disease from a lung function report

3.4.11.1.5 recognize obstructive airway disease from a lung function report

3.4.11.1.6 state the names of other lung function tests

3.4.11.2 **Peak flow meter**

3.4.11.2.1 identify a peak flow meter

3.4.11.2.2 measure peak expiratory flow rate (PEFR) using a peak flow meter

3.4.11.2.3 refer a normogram to find out the normal range of PEFR

3.4.11.2.4 state the clinical uses of PEFR measurements

3.4.11.3 **Examination of respiratory system**

3.4.11.3.1 describe how to look for orthopnoea

3.4.11.3.2 palpate for trachea

3.4.11.3.3 measure chest expansion

3.4.11.3.4 inspect and palpate or apex beat

3.4.11.3.5 recognize vesicular and bronchial breathing

3.4.11.3.6 look for chest deformities and chest movements

3.4.11.3.7 identify the parts of stethoscope and there uses

3.4.11.4 **Pulse oximeter**

3.4.11.4.1 identify the instrument

3.4.11.4.2 use it and get the readings

3.4.11.4.3 know the clinical uses

3.4.11.4.4 interpret abnormal readings

3.5 Gastro intestinal tract

3.5.1 **Introduction**

3.5.1.1 describe basic anatomy (nerve plexuses, muscles) of the GI tract to understand its function

3.5.1.2 list the major forms of motility in the gastrointestinal tract and their roles in digestion and excretion

3.5.1.3 explain the electrical basis of gastrointestinal contractions and the role of basic electrical activity in governing motility patterns

3.5.1.4 describe how gastrointestinal motility changes during fasting

3.5.1.5 basic principles of GIT regulations

3.5.1.6 understand the Brian –gut axis

3.5.1.7 describe the GIT immune systems

3.5.2 **Mouth and oesophagus**

3.5.2.1 state the digestive processes occurring in the mouth

3.5.2.2 state the functions of oral cavity and related structures

3.5.2.3 sate the composition and functions of saliva

3.5.2.4 describe the regulation of salivary secretion

3.5.2.5 describe the deglutition

3.5.2.6 describe the peristalsis in oesophagus

3.5.2.7 describe the parts and regulation of lower oesophageal sphincter

3.5.2.8 explain the mechanism of causation of achalasia cardia, gastroesophageal reflux diseases (GORD)

3.5.2.9 explain the principles of treatment for achalasia cardia and GORD

3.5.3 **Stomach**

3.5.3.1 describe the functions of the stomach

3.5.3.2 describe the functions of the cells in the gastric glands

3.5.3.3 describe the functions of compounds in gastric juice

3.5.3.4 describe the steps in H^+ formation in the stomach

3.5.3.5 describe the regulation of H^+ secretion in the stomach

3.5.3.6 describe cephalic, gastric, intestinal influences on gastric secretion

3.5.3.7 list the enzymes secreted by the stomach

3.5.3.8 describe how inactive enzymes secretion is regulated in the stomach

3.5.3.9 explain how stomach wall is protected from H^+ and enzymes

3.5.3.10 describe the basis for peptic ulcer formation

3.5.3.11 explain the principles of peptic ulcer treatment

3.5.3.12 describe the motility patterns that occur in the stomach

3.5.3.13 describe the emptying of stomach

3.5.3.14 describe the regulation of motility of the stomach

3.5.3.15 explain the effects of gastectomy

3.5.4 **Vomiting**

3.5.4.1 define term vomiting

3.5.4.2 describe neural pathways leading to the initiation of vomiting in response to various stimuli

3.5.4.3 describe act of vomiting

3.5.4.4 describe complication of vomiting

3.5.4.5 describe nausea, motion sickness, and anticipatory nausea and vomiting

3.5.5 **Small intestine**

3.5.5.1 describe motility patterns in small intestine

3.5.5.2 describe functions and regulations of intestinal secretions

3.5.5.3 describe the digestion and absorption at small intestine

3.5.5.4 describe peristalsis rush, paralytic ileus and malabsorption syndrome

3.5.6 **Exocrine pancreas**

3.5.6.1 state the volume and composition of the pancreatic juice

3.5.6.2 describe the role of enteropeptidase in activating trypsinogen

3.5.6.3 describe the role of trypsin in activating pancreatic proenzymes

3.5.6.4 describe the regulation of secretion of pancreatic juice

3.5.6.5 describe the role of trypsin inhibitor in protecting pancreas from undergoing damage due to release of small amounts of trypsin

3.5.6.6 describe the role of phospholipase-A2 in acute pancreatitis

3.5.7 **Liver and biliary system**

3.5.7.1 describe briefly the lobular and acinar structure which is important for understanding of function of the biliary system

3.5.7.2 list the main functions of the liver

3.5.7.3 state the volume and main constituents of bile

3.5.7.4 describe entero-hepatic circulation

3.5.7.5 list primary and secondary bile acids and their sites of formation

3.5.7.6 state the actions of bile salts

3.5.7.7 describe regulation of bile secretion

3.5.7.8 explain the terms ‘cholagaugs’ and ‘choleretics’

3.5.7.9 describe the functions of gallbladder

3.5.7.10 describe the effects of cholecystectomy

3.5.8 **Intestinal hormones**

3.5.8.1 list the hormones involved in gastro intestinal system

3.5.8.2 describe the basic structure, site of secretion, regulation of secretion and actions of GIT hormones

3.5.9 **Large intestine**

3.5.9.1 list the parts of large intestine and describe its arrangement

3.5.9.2 describe the motility patterns of large intestine

3.5.9.3 describe the colonic motor response for a meal

3.5.9.4 describe the absorptive function of large intestine

3.5.9.5 describe the role of microbiota

3.5.9.6 describe the compounds in faeces

3.5.9.7 describe the congenital megacolon

3.5.10 **Defecation**

3.5.10.1 draw a diagram of rectum, anus and sphincters

3.5.10.2 describe the reflex arc of the defecation

3.5.10.3 state the trigger for the defecation

3.5.10.4 describe the control of defecation reflex

3.5.10.5 explain the terms constipation and diarrhea

3.5.10.6 describe the gastro-colic reflex

3.5.11 **Malabsorption**

3.5.11.1 describe the mechanism/s of malabsorption in gastrectomy, pancreatic deficiency, biliary obstruction, atrophy of intestinal epithelium

3.5.11.2 describe the features and effects of steotorrhea

3.6 Blood and immunity

3.6.1 **Video on thalassemia and discussion**

3.6.1.1 to familiarize students with the next few lectures (Haemopoiesis, Erythropoiesis, Hb) in relation to the video

3.6.1.2 show the relevance of subsequent lectures to the clinical/patients

3.6.2 **Haemopoiesis**

3.6.2.1 list the cellular components of blood

3.6.2.2 describe the sites of haemopoesis during foetal life, newborn and in adults

3.6.2.3 describe the haemopoiesis

3.6.2.4 list haemopoietic factors that stimulate the different stages of haemopoiesis

3.6.2.5 explain the term extramedullary haemopoiesis

3.6.2.6 describe the steps in the formation of

a) red cells
b) lymphocytes
c) neutrophils
d) eosinophils
e) basophils
f) monocytes
g) platelets

3.6.2.7 state the sites of lymphocyte formation other than the bone marrow

3.6.2.8 list the requirements (microenvironment, stem cells) haemopoiesis

3.6.2.9 list the different types of white cells found in peripheral blood

3.6.2.10 compare and identify different type of white cells

3.6.2.11 identify each type of white blood cells

3.6.2.12 state the functions of each type of white blood cells

3.6.2.13 state conditions in which cell count is increased and decreased

3.6.2.14 effects of abnormal haemopoiesis

3.6.3 **Erythropoiesis**

3.6.3.1 describe the steps in erythropoiesis

3.6.3.2 describe the regulation of erythropoiesis

3.6.3.3 list nutritional requirements for erythropoiesis

3.6.3.4 state the life span of red cells

3.6.3.5 describe the shape of red cells and its advantages in relation to its functions

3.6.3.6 describe how haematological indices are measured and derived

3.6.3.7 able to recognize abnormal haematological indices

3.6.3.8 state conditions with abnormal red cell morphology and production

3.6.4 **Physiological and pathological variations in Hb concentration**

3.6.4.1 describe changes in Hb level in different ages, with sex, neonatal jaundice

3.6.4.2 describe changes in Hb level in different conditions; e.g. smoking, high altitude, pregnancy

3.6.4.3 define the term anaemia

3.6.4.4 describe the haematological features that are common to all types of anaemias

3.6.4.5 classify anaemia

a) depending on the causes
b) on morphological features of RBC

3.6.4.6 describe the biochemical, haematological and basic clinical features including prevention (when applicable) of anaemia due to

a) iron deficiency
b) B_{12} deficiency
c) folic acid deficiency
d) bone marrow suppression
e) anaemia due to chronic renal failure
f) excessive haemolysis
g) sideroblastic anaemia

3.6.4.7 list the investigations that are done in the management of a patients who is suspected of having anaemia

3.6.4.8 state the reasons for performing the tests listed above

3.6.4.9 arrive at a diagnosis by analyzing the given data of a patient with anaemia

3.6.4.10 define polycythaemia

3.6.4.11 state the different types of polycythaemia

3.6.4.12 state the causes for secondary polycythemia

3.6.4.13 describe the haematological features of polycythaemia

3.6.4.14 state the reasons for development of polycythaemia rubra vere

3.6.5 **Blood groups**

3.6.5.1 explain the basis of blood grouping

3.6.5.2 define the terms agglutinins and agglutinogens

3.6.5.3 state the blood groups that are routinely tested in blood banks in Sri Lanka

3.6.5.4 describe the inheritance of ABO and Rh systems

3.6.5.5 describe the steps in blood grouping for ABO and Rh systems

3.6.5.6 name 5 other blood group systems

3.6.5.7 describe the hemolytic disease of newborn (causes, mechanism, features, principals of management and prevention)

3.6.5.8 state indications for transfusion of blood and blood products

3.6.5.9 state the basis of direct testing before blood transfusion

3.6.5.10 state the complications of blood transfusion with reasons

3.6.6 **Rh incompatibility and haemolytic disease of newborn**

3.6.6.1 describe the mechanism of Rh incompatibility and ABO incompatibility in newborns

3.6.6.2 describe the features of haemolytic disease of newborn

3.6.6.3 state the consequence of haemolytic disease of newborn

3.6.6.4 state the methods available for prevention of Rh incompatibility

3.6.6.5 state the principles of treating haemolytic disease of newborn

3.6.7 **Plasma proteins**

3.6.7.1 list the different fractions of plasma proteins

3.6.7.2 describe the functions of different plasma proteins

3.6.7.3 describe site/s of formation of albumin, fibrinogen, gamma-globulin

3.6.7.4 state causes for hypoalbuminaemia

3.6.8 **Platelets**

3.6.8.1 describe the steps in platelet formation

3.6.8.2 recognize a blood report with low platelet count

3.6.8.3 describe the structure of platelets and relate it to its function

3.6.8.4 describe the functions of platelets in relation to haemostasis

3.6.8.5 describe the defects of haemostasis that occur due abnormalities in platelets count and function

3.6.8.6 state the reasons for reduction of platelet count

3.6.8.7 describe why anti-platelet drugs are used in ischemic heart diseases

3.6.8.8 describe the basis of functions of antiplatelet drugs

3.6.8.9 role of von Willebrand factor in platelet function

3.6.9 **Video on haemphilia and discussion about video**

3.6.9.1 familiarize with the next few lectures (haemostasis, anticlotting mechanisms and fibrinolytic system) in relation to the video

3.6.9.2 show the relevance of subsequent lectures to the clinical/patients

3.6.10 **Haemostasis**

3.6.10.1 state three major processes occurring in haemostasis

3.6.10.2 describe the platelet response

3.6.10.3 describe vascular response

3.6.10.4 describe the clotting mechanism using the clotting cascade

3.6.10.5 describe the disorders of coagulation with special reference to

a) haemophilia A & B
b) liver disease
c) vitamin K deficiency

3.6.10.6 list screening test for clotting defects and explain the physiological basis of each test

3.6.10.7 list other tests available for investigations and explain the physiological basis of each test

3.6.11 **Anticlotting mechanisms and fibrinolytic system**

3.6.11.1 name different types of anti-clotting mechanism operative in the body

3.6.11.2 describe briefly the different anti-clotting mechanisms

3.6.11.3 describe the rationale of using of anti-platelets drugs, anti-coagulants and streptokinase in treating different disease conditions

3.6.12 **Immunity**

3.6.12.1 explain the term immunity

3.6.12.2 classify the immune mechanisms

3.6.12.3 state the components of immune system

3.6.12.4 name the structures / mechanisms in the following organ systems that provide innate immunity

a) respiratory system
b) gastrointestinal system
c) skin
d) genito-urinary system

3.6.12.5 names the white cells that have a direct function in innate immunity

3.6.12.6 define the terms – antigen, antibody and adjuvant

3.6.12.7 explain the basic structure of an antibody

3.6.12.8 list different types of antibodies and describe their role in immune response

3.6.12.9 list antigen presenting cells

3.6.12.10 describe the role of macrophage in immune response

3.6.12.11 describe the role of lymphocytes in immune response

3.6.12.12 list the different subtypes of lymphocytes and describe their functions

3.6.12.13 describe the role of following cells in immune response

a) neutrophils
b) eosinophils
c) basophils

3.6.12.14 describe briefly the role of complement system in immune response

3.6.12.15 explain following different types of immune responses

a) primary and secondary immune responses
b) humoral and cellular immune response
c) immune response to bacterial infections
d) immune response to viral infections

3.6.12.16 describe theories of T and B cell selection

3.6.12.17 describe memory cell transformation

3.6.12.18 explain the recognition of self by the immune system

3.6.12.19 describe the different types of immunological hypersensitivity reactions

3.6.12.20 describe the basic immunological defect/s in immunity in the following states

a) HIV infection
b) bone marrow suppression

3.6.13 Objectives of practicals

3.6.13.1 White cell count

3.6.13.1.1 identify the haemocytometer (counting chamber)

3.6.13.1.2 identify the micro pipette

3.6.13.1.3 state the composition of white cell diluting fluid

3.6.13.1.4 list the functions of white cell diluting fluid

3.6.13.1.5 describe the steps in obtaining venous blood for the test

3.6.13.1.6 identify the white cell counting area of the counting chamber under the microscope

3.6.13.1.7 count the white cells in the appropriate areas of the counting chamber under the microscope

3.6.13.1.8 calculate the white cell count after counting and express it SI units

3.6.13.1.9 describe the possible errors that occur in the process of counting white cells

3.6.13.1.10 list the other method available for the counting of total white cell number

3.6.13.2 Red cell count

3.6.13.2.1 identify the pipette used in red cell count

3.6.13.2.2 list the functions of red cell diluting fluid

3.6.13.2.3 describe the steps in obtaining venous blood

3.6.13.2.4 identify the haemocytometer (Counting chamber)

3.6.13.2.5 identify the red cell counting area of the counting chamber under the microscope

3.6.13.2.6 calculate the red cell count after counting and express it in SI units

3.6.13.2.7 describe the possible errors that occur during the process of “Red cell count”

3.6.13.2.8 list other methods available for counting red cells

3.6.13.3 Packed cell volume

3.6.13.3.1 state the alternative names of PCV

3.6.13.3.2 describe the procedure of obtaining venous blood for the procedure

3.6.13.3.3 describe the procedure of obtaining capillary blood for the procedure

3.6.13.3.4 state the suitable anticoagulant/s used for the test

3.6.13.3.5 describe the procedure for estimating the PCV

a) by Capillary method

b) by Wintrobe method

3.6.13.3.6 identify the Wintrobe tube and Capillary tube

3.6.13.3.7 identify the centrifuge used for the capillary method

3.6.13.3.8 use the scale in estimating PCV by capillary method

3.6.13.3.9 obtain the reading for the PCV

3.6.13.3.10 interpret the results obtained

3.6.13.3.11 list 5 conditions with abnormal PCV band describe their clinical significance

3.6.13.3.12 state the advantages and disadvantages of

a) Capillary method over Wintrobe method

b) Wintrobe method over Capillary method

3.6.13.3.13 calculate MCV, MCH and MCHC using values obtained in practicals for red cell count and PCV

3.6.13.3.14 define polycythaemia

3.6.13.3.15 classify polycythaemia

3.6.13.3.16 describe causes of polycythaemia

3.6.13.4 **Bleeding time**

3.6.13.4.1 state the indication for assessment of bleeding time

3.6.13.4.2 describe the procedure of performing bleeding time by

a) Duke method

b) Ivy's method

3.6.13.4.3 state the normal range for bleeding time

3.6.13.4.4 state the reasons for prolonged bleeding time

3.6.13.4.5 state the clinical significance of the prolonged bleeding time

3.6.13.4.6 state the other haematological investigations that are useful in a patient with prolonged bleeding time

3.6.13.5 **Whole blood clotting time**

3.6.13.5.1 state few situations in which clotting time will be done in clinical practice

3.6.13.5.2 describe the procedure of performing clotting time

3.6.13.5.3 state the normal range for clotting time

3.6.13.5.4 state the reasons for prolonged clotting time

3.6.13.5.5 state the clinical significance of the prolonged clotting time

3.6.13.5.6 state the other hematological investigations

3.6.13.6 **Erythrocyte sedimentation rate (ESR)**

3.6.13.6.1 identify the Westergren tube

3.6.13.6.2 state the anticoagulant used for ESR

3.6.13.6.3 state the proportion of the blood/ anticoagulant used for the test

3.6.13.6.4 describe the procedure of performing ESR

3.6.13.6.5 describe the factors affecting the rate of sedimentation of red cells

3.6.13.6.6 get the ESR reading and express it correctly

3.6.13.6.7 state the normal range of ESR

3.6.13.6.8 state

a) two conditions with low ESR
b) three conditions with moderately high ESR
c) three conditions with very high ESR

3.6.13.6.9 state the clinical significance of high ESR

3.6.13.6.10 state other tests that can be used instead of ESR

3.6.13.7 **Osmotic fragility of red cells**

3.6.13.7.1 describe the basis behind osmotic fragility test

3.6.13.7.2 describe the procedure of the osmotic fragility test

3.6.13.7.3 recognize the point at which the haemolysis is completed

3.6.13.7.4 state the normal value(range) for red cell fragility

3.6.13.7.5 interpret the obtained results referring to normal curve

3.6.13.7.6 list conditions with abnormal osmotic fragility test results

3.6.13.7.7 explain the reasons for above abnormalities

3.6.13.7.8 identify abnormal osmotic fragility curves and give examples for them

3.6.13.7.9 explain the importance of performing this test

3.6.13.8 **Blood grouping**

3.6.13.8.1 describe the basis behind blood grouping

3.6.13.8.2 state the routinely assessed blood groups in blood bank

3.6.13.8.3 state the genotypes of ABO and Rh blood groups

3.6.13.8.4 describe the procedure of blood grouping

3.6.13.8.5 detect clumped blood in a test tube or on a glass slide

3.6.13.8.6 recognize clumped blood under the microscope

3.6.13.8.7 state situations where blood grouping will be useful in clinical practice

3.6.13.9 **Estimation of hemoglobin**

3.6.13.9.1 explain the principle behind the estimation of Hb percentage

3.6.13.9.2 be able to describe the Cyanomethaemoglobin method (using drabkins solution and colorimeter) in estimating Hb%

3.6.13.9.3 identify the pipette used in the test

3.6.13.9.4 state the suitable anticoagulant/s used for the test

3.6.13.9.5 know the normal range for Hb% in health

3.6.13.9.6 describe the clinical significance of abnormal Hb%

3.6.13.9.7 list the other methods of estimating Hb%

3.6 Renal Physiology

3.7.1 Introduction

3.7.1.1 briefly explain why the development of an excretory organ like kidneys was needed during evolutionary process

3.7.1.2 describe the structure of the kidney and nephrons and relate it to its function

3.7.1.3 compare the structure and functions of cortical nephron to a medullary nephron

3.7.1.4 list the functions of the kidney

3.7.1.5 state the functions of renal nerves

3.7.1.6 describe the arrangement of blood vessels in relation to a nephron.

3.7.1.7 describe the regulation of renal blood flow.

3.7.2 Tubular functions

3.7.2.1 explain the three main tubular functions: glomerular filtration/ tubular reabsorption /tubular secretion

3.7.2.2 describe the arrangement of a glomerulus with special emphasis on functional adaptations

3.7.2.3 state the approximate glomerular filtration rate of a healthy adult male

3.7.2.4 state the factors affecting the GFR and how they affect it

3.7.2.5 state the factors causing contraction and relaxation of mesangeal cells

3.7.2.6 calculate the net filtration pressure at the glomerulus using the knowledge on Starling forces

3.7.2.7 explain the effect of afferent and efferent arteriolar tone on glomerular filtration

3.7.2.8 explain the term filtration fraction

3.7.2.9 discuss on filterability of substances (in relation to molecular size and charge)

3.7.2.10 define renal clearance

3.7.2.11 state examples of substances with renal clearance equal to GFR (inulin), renal plasma flow (PAH) or zero (Glucose) in a healthy person

3.7.2.12 explain how the GFR is calculated using the renal clearance of inulin or creatinine

3.7.2.13 explain how the effective renal plasma flow, actual renal plasma flow and renal blood flow is calculated using the renal clearance of PAH

3.7.2.14 calculate

a) actual renal plasma flow using the effective renal plasma flow
b) renal blood flow using the actual renal plasma flow
c) the renal clearance of inulin using the relevant data

3.7.2.15 explain the terms

a) transport maximum
b) renal threshold

3.7.2.16 describe the relationship between the followings

a) plasma glucose concentration and the amount of glucose reabsorbed
b) plasma glucose concentration and the amount of glucose excreted
c) plasma inulin concentration and the amount of inulin excreted
d) plasma inulin concentration and the inulin clearance
e) plasma glucose concentration and the glucose clearance
f) plasma PAH concentration and the PAH clearance

3.7.2.17 state the osmolality of filtrate / tubular fluid at different sites of the nephron

3.7.2.18 describe the fate of substances filtered into the glomerulus

3.7.2.19 describe the mechanisms of reabsorption at PCT

3.7.2.20 describe the mechanisms of electrolyte reabsorption at TAL

3.7.2.21 describe the mechanisms of electrolyte reabsorption at DCT

3.7.2.22 describe the mechanisms of electrolyte reabsorption at CT

3.7.2.23 describe the mechanisms of glucose reabsorption at PCT

3.7.2.24 explain tubulo- glomerular feedback

3.7.2.25 explain glomerulo-tubular balance

3.7.3 Countercurrent mechanism

3.7.3.1 explain the following processes

a) countercurrent multiplier system
b) countercurrent exchanger system

3.7.3.2 describe the features of countercurrent system in the nephron

3.7.3.3 describe the role of thick ascending limb of the nephron in countercurrent multiplier mechanism in the kidney

3.7.3.4 state the role of countercurrent systems of the kidney

3.7.3.5 describe the role of vasa recta in countercurrent mechanism

3.7.3.6 explain how this osmotic gradient helps in reabsorption of water from the collecting ducts with the help of ADH (and produces concentrated urine conserving water)

3.7.4 Water conservation/ excretion by the kidney

3.7.4.1 describe the mechanism of water reabsorption in different parts of the nephron

3.7.4.2 name the water channels found in the nephron

3.7.4.3 state the approximate percentage of water absorption by

a) proximal convoluted tubule
b) loop of Henle
c) distal convoluted tubule
d) collecting ducts

3.7.4.4 describe the mechanism of water reabsorption at CT

3.7.4.5 explain the role of countercurrent mechanism in the water reabsorption

3.7.4.6 explain the role of antidiuretic hormone in the water reabsorption

3.7.4.7 explain the role of urea in water reabsorption

3.7.4.8 explain the role of aldosterone in water reabsorption

3.7.4.9 describe water balance

3.7.4.10 explain the thirst mechanism for regulating water intake

3.7.4.11 describe the consequences of ADH release

3.7.4.12 explain tubular handling of water

3.7.4.13 describe how disturbances in water balance occurs

3.7.4.14 describe water dieresis

3.7.4.15 describe water intoxication

3.7.5 Regulation of Na^+ and K^+ by the kidney

3.7.5.1 describe the fate of filtered Na^+ in PCT, LH, DCT and CT

3.7.5.2 describe the factors affecting Na^+ reabsorption by the kidney

3.7.5.3 describe the fate of filtered K^+ in the PCT, LH, DCT and CT

3.7.5.4 describe the factors affecting K^+ reabsorption / secretion by the kidney

3.7.5.5 describe the role of aldosterone in Na^+ reabsorption

3.7.5.6 describe the effect of blood pH on K^+ excretion

3.7.6 Acidification of urine

3.7.6.1 state the normal range of pH of body fluids

3.7.6.2 describe threats to maintenance of pH within the above range

3.7.6.3 describe the buffer systems that help to maintain the pH of the body fluids

3.7.6.4 describe the systems that help to maintain acid-base balance of the body (respiratory system and kidney)

3.7.6.5 describe how H^+ are secreted in the proximal tubule, distal tubule and collecting ducts

3.7.6.6 describe the fate of H^+ in the tubular fluid

3.7.6.7 explain what is limiting pH

3.7.6.8 state the buffer systems in the tubular fluid

3.7.6.9 state the relative importance of each of the buffer systems in different parts of the nephron

3.7.7 Acid-base balance

3.7.7.1 state the different ways of handling H^+ generated in the body

3.7.7.2 list the buffers available in body fluids and tubular fluid of the nephron

3.7.7.3 describe the role of respiratory system in acid base balance

3.7.7.4 describe the mechanisms of acid excretion by proximal tubular cells of the nephron

3.7.7.5 describe the mechanisms of acid excretion by distal tubular cells and collecting duct cells of the nephron

3.7.7.6 explain the role of NH_3 in H^+ excretion

3.7.7.7 describe the changes in H^+, HCO_3^-, CO_2 in

a) metabolic acidosis
b) metabolic alkalosis
c) respiratory acidosis

d) respiratory alkalosis

3.7.7.8 describe the compensatory changes that occur in conditions stated in 7 above

3.7.7.9 state causes for acid base disturbances stated in 7 above

3.7.7.10 describe briefly about renal tubular acidosis

3.7.7.11 state examples of disease conditions for each type of above conditions

3.7.7.12 explain 'anion-gap' and its changes in various disease conditions

3.7.8 Endocrine functions of the kidney

3.7.8.1 Renin-angiotensin system

3.7.8.1.1 describe the juxtaglomerular apparatus by drawing a diagram

3.7.8.1.2 describe the structure, distribution and metabolism of rennin

3.7.8.1.3 describe the regulation of rennin synthesis and secretion

3.7.8.1.4 describe relationship between rennin, angiotensinogen and angiotensin II

3.7.8.1.5 describe the actions of angiotensin II and angiotensin III

3.7.8.2 Erythropoietin

3.7.8.2.1 describe the structure and site of production of erythropoietin

3.7.8.2.2 describe the regulation of erythropoietin synthesis and secretion

3.7.8.2.3 role of erythropoietin in relation to haemopoiesis

3.7.8.2.4 state the causes of erythropoietin deficiency anaemia

3.7.8.3 1,25-dihydroxy cholecalciferol

3.7.8.3.1 describe the steps of 1,25-dihydroxycholecalciferol formation

3.7.8.3.2 describe the role of kidney in the formation of 1,25-dihydroxy cholecalciferol

3.7.8.3.3 state the renal conditions that give rise to deficiency of 1,25-dihydroxy cholecalciferol

3.7.9 Diuretics

3.7.9.1 define the terms Diuresis and Diuretic

3.7.9.2 list the different classes of diuretics

3.7.9.3 name the site of action in the nephrone of each class of diuretics

3.7.9.4 describe the mode of action of various classes of diuretics briefly

3.7.9.5 describe in detail, the mechanism of action of

a) Water dieresis

b) Osmotic dieresis

3.7.9.6 describe the impact of osmotic diuretics on other electrolytes handled by the nephron

3.7.9.7 compare the potency of various diuretics in correlation with the glomerular-filtration rate

3.7.9.8 describe the uses of commonly used diuretics in clinical practice

3.7.9.9 explain the side effects of diuretics dependent upon the mechanism of action of diuretic

3.7.10 Alteration of physiology in renal disorders

3.7.10.1 list possible physiological alterations in renal diseases

3.7.10.2 describe the physiological mechanism for each of these changes

3.7.10.3 describe possible sequence of event of physiological changes in renal damage

3.7.10.4 describe difference between chronic renal failure and acute renal failure

3.7.11 Function and dysfunction of bladder

3.7.11.1 describe neuronal connection important for bladder function

3.7.11.2 describe mechanism of bladder emptying

3.7.11.3 describe alteration of physiology in common abnormalities in micturition

3.7.12 Objectives for Practical

3.7.12.1 Urine specific gravity

3.7.12.1.1 identify Urinometer

3.7.12.1.2 obtain the reading for the specific gravity of urine using a Urinometer

3.7.12.1.3 calculate the temperature correction for the reading obtained in 2

3.7.12.1.4 state the advantages/ disadvantages of specific gravity

3.7.12.1.5 state the normal range for urine specific gravity

3.7.12.1.6 list condition in which urine specific gravity is low

3.7.12.1.7 list conditions/ situations in which urine specific gravity is high

3.7.12.2 Urine and serum osmolality

3.7.12.2.1 describe the principles behind osmolality measurements

3.7.12.2.2 describe the

a) normal values for the osmolality of urine
b) normal values for the osmolality of serum

c) the advantages/ disadvantages of osmolality measurements over specific gravity measurements
d) condition/ s in which urine osmolality is higher than normal
e) condition/ s in which urine osmolality is lower than normal
f) condition/ s in which serum osmolality is higher than normal
g) condition/ s in which serum osmolality is lower than normal

3.7.12.2.3 describe the procedure of the water deprivation test and interpretation of results

3.8 Endocrine

3.8.1 Introduction to endocrinology and hypothalamo-pitutary axis

3.8.1.1 explain what a hormone is

3.8.1.2 state different types of hormone (polypeptides, steroids and amino acid derivatives) and the basic differences between them in relation to synthesis, storage, receptors and action

3.8.1.3 explain the role of hypothalamus in regulation of internal environment due to the changes in external environment explain the role of the hypothalamus in regulation of hormone secretion

3.8.1.4 name the hormones secreted by the hypothalamus

3.8.1.5 explain the phrases Hypothalamo-pituitary axis, pituitary hypothalamo tract and pituitary hypothalamo portal system

3.8.1.6 describe the negative feedback regulation of hormonal regulation using hypothalamo-pituitary-target endocrine gland (e.g. thyroid) axis

3.8.1.7 explain the changes in hormone concentration at different level when hypothalamo-pituitary-target endocrine gland axis is interrupted

3.8.2 Pituitary gland

3.8.2.1 name the hormones secreted by the anterior pituitary

3.8.2.2 describe the regulation of secretion of

a) growth hormone
b) ACTH
c) TSH
d) FSH
e) LH
f) prolactin

3.8.2.3 describe the actions of hormones stated in section 3.8.2.2

3.8.2.4 describe the features of growth hormone deficiency

3.8.2.5 describe the features of growth hormone excess

a) in childhood

b) in adulthood

3.8.2.6 describe the features of prolactinoma

3.8.2.7 name the hormones secreted by the posterior pituitary

3.8.2.8 describe the regulation of ADH

3.8.2.9 describe the regulation of oxytocin

3.8.2.10 describe the actions of ADH

3.8.2.11 describe the actions of oxytocin

3.8.2.12 state the types diabetes incipidus and features of each type

3.8.2.13 describe the features of the syndrome of inappropriate ADH secretion

3.8.2.14 describe the features of Sheehan syndrome

3.8.2.15 describe features of damage to pituitary stalk

3.8.3 **Thyroid physiology**

3.8.3.1 describe structure of a thyroid follicle in relation to the activity of the gland

3.8.3.2 name principal hormones secreted by the thyroid gland

3.8.3.3 describe the steps in formation of thyroid hormones

3.8.3.4 describe the regulation of thyroid hormone secretion

3.8.3.5 explain hypothalamo- pituitary axis in relation to the regulation of thyroid hormones

3.8.3.6 describe the effects of TSH on thyroid gland

3.8.3.7 describe how thyroid hormones are transported in the circulation

3.8.3.8 state the factors affecting the concentration of thyroid binding proteins

3.8.3.9 interpret the thyroid hormone concentration in relation to the changes in thyroid binding protein concentration

3.8.3.10 describe the actions of thyroid hormones

3.8.3.11 describe the effect of thyroid hormone on

a) effects secondary to calorigenesis

b) cardiovascular system

c) nervous system

d) skeletal muscle

e) carbohydrate metabolism
f) cholesterol metabolism
g) growth

3.8.3.12 describe the physiological basis for the clinical features of following conditions
a) hypothyroidism (myxoedema and cretinism)
b) hyperthyroidism including Graves disease

3.8.3.13 interpret the results of the thyroid hormone assay

3.8.3.14 define the term goiter

3.8.3.15 classify goiter according to the features of the gland and relate them to causes for goiters

3.8.4 Bone metabolism and calcium homeostasis

3.8.4.1 Bone metabolism

3.8.4.1.1 state two types of bones depending on their metabolic activity

3.8.4.1.2 name the cells found in the bone tissues

3.8.4.1.3 state the functions of bone tissues

3.8.4.1.4 describe the calcium distribution in the body

3.8.4.1.5 state the factors that alters the calcium iron concentration in plasma

3.8.4.1.6 describe the functions of calcium in the body

3.8.4.1.7 describe the effects of hypocalcaemia

3.8.4.1.8 describe how plasma calcium is equilibrate with bone tissue, kidney and calcium absorption in the gut

3.8.4.1.9 describe the distribution of phosphate in the body

3.8.4.1.10 describe how plasma phosphate equilibrate with kidney, bone and gut

3.8.4.1.11 briefly describe the bone growth and development

3.8.4.1.12 name cells involve in bone growth and bone remodeling

3.8.4.1.13 state three hormones mainly involved in calcium homeostasis

3.8.4.1.14 state the other hormones that have an effect on calcium homeostasis

3.8.4.2 Parathyroid hormone

3.8.4.2.1 state the site of secretion

3.8.4.2.2 describe briefly about the formation of hormone

3.8.4.2.3 state the factors that stimulates secretion

3.8.4.2.4 state the factors that inhibit the secretion

3.8.4.2.5 describe the regulation of parathyroid hormone

3.8.4.2.6 state the actions of parathyroid hormone

3.8.4.2.7 describe the causes, features and principles of treatment for

a) primary hyperparathyroidism
b) secondary hyperparathyroidism
c) tertiary hyperparathyroidism

3.8.4.2.8 describe the causes, features and principles of treatment for hypoparathyroidism

3.8.4.3 1, 25-dihydroxycholecalcoferol (active vitamin D)

3.8.4.3.1 describe the steps in formation of 1, 25-dihydroxycholecalciferol

3.8.4.3.2 state the factors that stimulate conversion 25-hydroxycholecalciferol to 1,25-dihydroxycholecalciferol

3.8.4.3.3 describe the actions of 1, 25-dihydroxycholecalciferol

3.8.4.3.4 describe the physiological basis of vitamin D metabolism and causation of rickets and osteomalacia

3.8.4.4 Calcitonin

3.8.4.4.1 state the site of secretion

3.8.4.4.2 state the factors that stimulate the calcitonin secretion

3.8.4.4.3 state the actions of calcitonin

3.8.4.4.4 describe the role of calcitonin on bone homeostasis

3.8.4.5 Disorders of bone metabolism

3.8.4.5.1 describe the physiological basis of following conditions

a) osteogenesis imperfecta
b) osteoporosis
c) osteopterosis
d) Pagets disease of bones

3.8.4.6 Other hormones involved in bone metabolism

3.8.4.6.1 describe the effects on bone metabolism due to abnormal secretion of following hormones and describe possible mechanisms for those effects

a) Cortisol
b) Growth hormone
c) Insulin

d) Thyroxin
e) Androgens
f) oestrogens

3.8.5 Endocrine pancreas and diabetes mellitus

3.8.5.1 name hormones secreted by the pancreas
3.8.5.2 describe the steps of synthesis of insulin
3.8.5.3 describe the stimulators and inhibitors of insulin secretion
3.8.5.4 describe how insulin increase the glucose transport into insulin sensitive cells
3.8.5.5 list the actions of insulin (rapid, intermediate and delayed)
3.8.5.6 list different types of glucose transporters on cell membrane and their roles
3.8.5.7 describe the stimulators and inhibitors of glucagon secretion
3.8.5.8 describe the regulation of glucagon secretion
3.8.5.9 describe the actions of glucagon
3.8.5.10 describe how insulin:glucagon molar ratios would affect the metabolism
3.8.5.11 describe the stimulators and inhibitors of somatostatin
3.8.5.12 describe the regulation of somatostatin
3.8.5.13 describe the actions of somatostatin
3.8.5.14 describe the stimulators and inhibitors of pancreatic polypeptide secretion
3.8.5.15 describe the regulation of pancreatic polypeptide secretion
3.8.5.16 describe the actions of pancreatic polypeptide
3.8.5.17 define diabetes mellitus
3.8.5.18 state the diagnostic criteria for diabetes mellitus
3.8.5.19 name the types of diabetes mellitus
3.8.5.20 state the features of different types of diabetes mellitus
3.8.5.21 describe the basis of the management of diabetes mellitus
3.8.5.22 describe the acute complications of diabetes mellitus and principle of their management
3.8.5.23 describe the chronic complications of diabetes mellitus

3.8.6 Adrenal cortex

3.8.6.1 state the three layers of the adrenal cortex
3.8.6.2 name three main hormones secreted by adrenal cortex
3.8.6.3 describe the hypothalamo-pituitary-adrenocortical axis
3.8.6.4 state the inhibitors and stimulators of cortisol secretion

3.8.6.5 describe the regulation of cortisol secretion

3.8.6.6 describe the actions of cortisol

3.8.6.7 describe the functions of glucocorticoids

3.8.6.8 describe the features (obesity, thin skin, diabetes mellitus, plethora) of Cushing's syndrome that can be explain on the physiological basis

3.8.6.9 describe the features (hypotension, hyponatremia, hyperkalemia) of Addison's disease that can be explained on physiological basis

3.8.6.10 state the inhibitors and stimulators of aldosterone secretion

3.8.6.11 describe the regulation of aldosterone

3.8.6.12 describe the actions of aldosterone

3.8.6.13 describe the functions of mineralocorticoids

3.8.6.14 describe the features (hypertension) of Conns syndrome that can be explained physiologically

3.8.6.15 state the inhibitors and stimulators of adrenal androgen

3.8.6.16 describe the regulation of adrenal androgen

3.8.6.17 describe the actions of adrenal androgen

3.8.6.18 describe the functions of adrenal androgen

3.8.6.19 describe the features (hypertension, shock, virilization of female) of adrenogenital syndrome that can be explained on physiological basis

3.8.7 Adrenal medulla

3.8.7.1 name the hormones secreted by adrenal medulla

3.8.7.2 describe the regulation of the secretion of adrenal medullary hormones

3.8.7.3 describe the role of hypothalamus in secretion of adrenomedullary hormones

3.8.7.4 describe the actions of adrenalin, noradrenalin and dopamine

3.8.7.5 describe the effects of adrenalin and noradrenalin on cardiovascular system

3.8.7.6 describe the effects of adrenal medullary hyperfunction

3.8.8 Other endocrine organs

3.8.8.1 Erythropoietin

3.8.8.1.1 state the sites of secretion

3.8.8.1.2 state the factors that stimulate secretion

3.8.8.1.3 state the action of erythropoietin

3.8.8.1.4 state the clinical significance of the hormone

3.8.8.2 Renin

3.8.8.2.1 state the site of secretion

3.8.8.2.2 state the factors that stimulate secretion

3.8.8.2.3 state the action of renin

3.8.8.2.4 describe the rennin angiotensin system

3.8.8.2.5 describe the actions of angiotensin II

3.8.8.2.6 describe the modulation of rennin angiotensin system in the treatment of hypertension

3.8.8.3 ANP

3.8.8.3.1 state the sites of secretion

3.8.8.3.2 state the factors that stimulate the secretion of ANP

3.8.8.3.3 state the actions of ANP

3.8.8.4 Melatonin

3.8.8.4.1 state the sites of secretion

3.8.8.4.2 state the factors that stimulate the secretion of ANP

3.8.8.4.3 state the actions of ANP

3.9 Reproduction

3.9.1 Sex differentiation and development

3.9.1.1 describe the chromosomal basis for sex differentiation

3.9.1.2 describe the chromosomal pattern in Turners syndrome and Klinefelter's syndrome

3.9.1.3 describe the role 5 alpha reductase in the development of male reproductive organs

3.9.1.4 define puberty

3.9.1.5 describe the changes that occur during puberty in males and in females

3.9.1.6 describe the mechanism of onset of puberty

3.9.1.7 describe the relation of leptin to the onset of puberty

3.9.1.8 describe features and causes for precocious puberty

3.9.1.9 describe the secondary sexual characteristics

3.9.1.10 define menopause

3.9.1.11 describe features, reason and hormonal changes that occur during menopause

3.9.1.12 define the term andropause and describe its features

3.9.2 **Male reproductive system**

3.9.2.1 describe genetic basis of sexual development

3.9.2.2 compare the mechanism of determining male gender with that of female gender

3.9.2.3 describe functions of testis

3.9.2.4 compare function of Sertoli with Leydig cells

3.9.2.5 describe blood testis barrier

3.9.2.6 describe countercurrent mechanism of testis

3.9.2.7 describe process of spermatogenesis

3.9.2.8 describe the process of maturation of a sperm

3.9.2.9 describe the mechanism of erection & ejaculation

3.9.2.10 compare influences of FSH and LH on male reproductive function

3.9.2.11 describe functions of male sex hormones

3.9.2.12 list common abnormalities of male reproductive system

3.9.3 **Female reproductive system**

3.9.3.1 describe the genetic basis of female sexual development

3.9.3.2 describe oogenesis

3.9.3.3 describe how female sex hormone secretion is regulated

3.9.3.4 describe the physiological effects of estrogen and progesterone

3.9.3.5 describe the regulation of ovarian functions.

3.9.3.6 describe the female reproductive cycles (ovarian, uterine, menstrual, breast, vaginal, cervical)

3.9.3.7 describe the effects of ovarian hormones on female genitalia, breasts, CNS, endocrine organs, secondary sexual characteristics

3.9.3.8 disorders related to female reproductive system

3.9.4 **Puberty, menopause, testicular dysfunction**

3.9.4.1 describe the definition of puberty

3.9.4.2 describe the pubertal changes of a boy

3.9.4.3 describe the pubertal changes of girl (thelarche, pubarche and menarche)

3.9.4.4 describe precautious puberty

3.9.4.5 describe delayed puberty

3.9.4.6 describe Menopause

3.9.4.7 describe postmenopausal changes of a woman

3.9.4.8 describe testicular dysfunctions related to undescended testis and male hypogonadism

3.9.5 **Human sexuality**

3.9.5.1 describe the physiology of human sexuality

3.9.5.2 describe the sexual deviation and abnormal sexual behavior

3.9.6 **Human sexuality response**

3.9.6.1 describe the stages of human sexual response

3.9.6.2 describe the physiological changes occur during different stages of human sexual response

3.9.6.3 describe the sexual dysfunction

3.9.7 **Pregnancy**

3.9.7.1 list early signs of pregnancy

3.9.7.2 describe the methods of detecting pregnancy

3.9.7.3 describe the changes in endocrine system

3.9.7.4 list the changes in skin

3.9.7.5 explain the mechanisms of changes in body fluid compartments and starling forces

3.9.7.6 explain cardiovascular changes

3.9.7.7 explain haematological changes

3.9.7.8 explain renal changes

3.9.7.9 explain respiratory changes

3.9.7.10 explain gastrointestinal changes

3.9.7.11 list other metabolic changes

3.9.7.12 explain the mechanism of initiation of labour

3.9.7.13 describe Sheehan syndrome

3.9.8 **Lactation**

3.9.8.1 describe the development of breast during pregnancy

3.9.8.2 compare pregnant and non-pregnant breasts

3.9.8.3 describe the milk secretion and milk ejection

3.9.8.4 describe control of lactation

3.9.8.5 describe the mechanism of initiation of lactation after delivery

3.9.8.6 describe milk let-down reflex

3.9.8.7 explain the effect of lactation on menstrual cycles

3.9.9 **Contraception**

3.9.9.1 list commonly use contraceptive methods

3.9.9.2 compare advantages and disadvantages of each method

3.9.9.3 describe mechanism of action of each

3.9.10 **Objectives of practical**

3.9.10.1 Contraceptives

3.9.10.1.1 state different contraceptive methods

3.9.10.1.2 describe the use of safe period for the prevention of contraception

3.9.10.1.3 describe the other natural methods of contraception

3.9.10.1.4 identify different devices used in barrier methods of contraception (i.e. condoms, diaphragms, cervical caps etc.)

3.9.10.1.5 identify different types of oral contraceptive pill packs

3.9.10.1.6 identify injectable hormonal contraceptive vials

3.9.10.1.7 identify different types of intrauterine contraceptive devices

3.9.10.1.8 compare advantages/ disadvantages different methods of contraceptives over other methods

3.9.10.1.9 state common side effects of each contraceptive methods

3.10 Nervous System

3.10.1 **Basic principles of nerve function**

3.10.1.1 describe the basic structure of a neuron

3.10.1.2 describe the electrical properties of a neuron

3.10.1.3 compare ionic properties of a resting membrane potential and an action potential

3.10.1.4 describe the generation and conduction of action potential

3.10.1.5 describe nerve conduction in a myelinated and an unmyelinated nerve

3.10.1.6 explain orthodromic and antodromic conduction

3.10.1.7 state different nerve fibre types in mammalian nervous system

3.10.2 **Synapses and receptors**

3.10.2.1 compare electrical and chemical synapses

3.10.2.2 describe the basic structure and mechanism of synapse

3.10.2.3 compare convergence and divergence take place in synapses

3.10.2.4 describe summation and occlusion related to synapse

3.10.2.5 compare the mechanisms of excitatory postsynaptic potential and inhibitory postsynaptic potentials

3.10.2.6 describe the mechanism of synaptic plasticity and learning

3.10.2.7 describe the basic structure of neuromuscular transmission

3.10.2.8 list common neurotransmitters

3.10.2.9 list common diseases associated with synapses and their physiological basis

3.10.2.10 describe the basic function & structure of receptors

3.10.2.11 describe the mechanism of transmission of sensory information to brain

3.10.2.12 describe different type of sensation – touch, pressure, cold, warmth, pain and proprioception

3.10.3 **Monosynaptic and polysynaptic reflexes**

3.10.3.1 list different types of reflexes

3.10.3.2 list basic components of all reflex arcs

3.10.3.3 describe a spinal reflex

3.10.3.4 describe stretch and Golgi tendon reflexes

3.10.3.5 describe functional anatomy of muscle spindle

3.10.3.6 describe innervations of a muscle spindle

3.10.3.7 describe operation of the muscle spindle

3.10.3.8 explain the mechanisms of stretching of a muscle spindle

3.10.3.9 describe stretch reflex

3.10.3.10 describe the methods and importance of assessment of stretch reflexes

3.10.3.11 describe reciprocal inhibition

3.10.3.12 explain modification of reflexes by higher centers

3.10.3.13 list the features of UMN and LMN lesions

3.10.3.14 describe deep tendon reflexes/ Golgi tendon reflex

3.10.3.15 describe flexor/ withdrawal reflex

3.10.3.16 describe crossed extensor reflex

3.10.3.17 list superficial reflexes

3.10.3.18 describe clasp knife reaction and its mechanism

3.10.3.19 explain hyper tonicity and hypotonicity

3.10.4 **Sense organs & receptors**

3.10.4.1 describe the difference between neural receptors and endocrine receptors

3.10.4.2 describe the basic function & structure of receptors

3.10.4.3 make a list of different types of neural receptors

3.10.4.4 state an accepted classification for neural receptors

3.10.4.5 describe how environmental energy changes are detected and transformed in to nerve impulse in sensory receptors listed above

3.10.4.6 describe specificity of a receptor

3.10.4.7 describe the mechanism of transmitting sensory information to brain

3.10.4.8 describe the mechanism of localization, adaptation and Intensity discrimination of sensory information

3.10.4.9 describe different type of sensation – touch, pressure, cold, warmth, and pain, proprioception

3.10.5 **Vision**

3.10.5.1 describe structural adjustment of the eye to form a visible image

3.10.5.2 describe arrangement and function of different cell layers of retina

3.10.5.3 list functional differences of rods and cone

3.10.5.4 describe how light energy create hyperpolarization in rod and con cells

3.10.5.5 describe how hyperpolarization created in receptor cells are converted to an action potential in the optic nerve

3.10.5.6 describe the basis for colour vision

3.10.5.7 state the different types of refractive errors

3.10.5.8 state the possible corrections of refractive errors

3.10.5.9 physiology behind color vision and color blindness

3.10.5.10 describe light reflex and accommodation reflex

3.10.5.11 explain the term visual acuity

3.10.6 **Hearing**

3.10.6.1 describe the basic structure of the inner ear

3.10.6.2 describe the process of generation of action potential in auditory receptors

3.10.6.3 describe the basic mechanism of sound wave transmission to auditory receptors

3.10.6.4 describe the generation of action potential

3.10.6.5 compare different type of deafness

3.10.6.6 describe mechanism of sound localization

3.10.6.7 explain tympanic reflex

3.10.6.8 describe pitch, loudness, space localization of sound

3.10.7 **Vestibular functions**

3.10.7.1 describe the structure of the ampular and cistra ampularis

3.10.7.2 explain how hair cells of the cistra is stimulated

3.10.7.3 describe the mechanism for generator potential in receptor cells

3.10.7.4 explain the role of vestibular apparatus during rotational movement of the body

3.10.7.5 describe the structure of saccule and utricle

3.10.7.6 describe the mechanism of stimulation of hair cells of the utricle and saccule

3.10.7.7 explain how nerve impulse is generated as a result of the movements of hair cells

3.10.7.8 describe the nerve pathway of vestibular nerve

3.10.7.9 state the neural connections of the vestibular nerve

3.10.7.10 describe the clinical features of excessive stimulation of vestibular apparatus

3.10.7.11 describe how to perform the caloric test and normal findings of the test

3.10.7.12 explain the term nystagmus

3.10.7.13 list several causes for nystagmus

3.10.7.14 describe the role of vestibular apparatus during deep sea diving

3.10.8 **Sleep and EEG**

3.10.8.1 define sleep and describe how sleep is differ from unconsciousness

3.10.8.2 describe the features of prolonged sleep deprivation

3.10.8.3 describe two basic theories for sleep

3.10.8.4 describe the regulation of sleep wake cycle

3.10.8.5 describe the mechanism of keeping the person awake

3.10.8.6 describe the neural basis for sleep and EEG

3.10.8.7 describe the different EEG rhythms

3.10.8.8 state types and stages of sleep

3.10.8.9 describe the features of each stage of non-REM sleep and REM sleep

3.10.8.10 describe the distribution of sleep stages in a typical night sleep

3.10.8.11 explain the genesis REM and non-REM sleep

3.10.9 **Pain**

3.10.9.1 state an accepted definition for pain

3.10.9.2 state the component of pain

3.10.9.3 describe the pain receptors and their stimuli

3.10.9.4 describe the pain pathway

3.10.9.5 state the central connections of pain fibres and possible roles of those connections

3.10.9.6 state the factors that alters the pain threshold

3.10.9.7 classify pain depending on the site of origin and describe important features of each type

3.10.9.8 define referred pain

3.10.9.9 explain the possible mechanism for referred pain using two accepted theories

3.10.9.10 describe the dermatomal rule and role of experience in refereed pain

3.10.9.11 explain the clinical significance of referred pain

3.10.9.12 briefly describe the pain management on physiological basis

3.10.10 **Posture and gait**

3.10.10.1 states tissues and organs that are important in the maintenance of body posture

3.10.10.2 describe broad definition for body posture

3.10.10.3 list the sensory organs that provide inputs for reflex postural adjustments

3.10.10.4 describe the role of proprioceptors, vestibular apparatus, muscle spindle and vision in the maintenance of body posture

3.10.10.5 state the different inputs to alpha motor neuron in relation to control of posture

3.10.10.6 compare and contrast lower motor neuron lesion from upper motor neuron lesion

3.10.10.7 describe the role of muscle spindle in the maintenance of posture

3.10.10.8 describe the role of cerebellum in the posture maintenance

3.10.10.9 students should be able to list different body postures

3.10.10.10 students should be able list abnormal postures occur in certain neurological disorders

3.10.10.11 describe different gait pattern seen in common neurological disorders

3.10.10.12 define ataxia and state the classification

3.10.10.13 state feature and mechanism for the ataxia in each type

3.10.11 **Learning and memory**

3.10.11.1 explain the terms learning and memory

3.10.11.2 classify memory on physiological basis

3.10.11.3 describe explicit memory and its sub groups

3.10.11.4 describe implicit memory and its sub groups

3.10.11.5 describe habituation and sensitization in relation to memory

3.10.11.6 describe the conditioned reflexes

3.10.11.7 explain the molecular basis for memory

3.10.12 **Behavior and emotions**

3.10.12.1 name the structures of the brain that concern with emotions

3.10.12.2 list the limbic functions

3.10.12.3 describe the neural and endocrine basis for sexual behavior

3.10.12.4 describe the role of pheromones in animal behavior

3.10.12.5 describe the neural basis for emotions (fear, anxiety, rage & placidity, disgust)

3.10.12.6 describe the basis for motivation and addiction

3.10.13 **CSF**

3.10.13.1 describe the mechanism of production

3.10.13.2 state the composition and volume

3.10.13.3 describe blood – CSF barrier

3.10.13.4 describe blood brain barrier

3.10.13.5 list the functions of CSF

3.10.13.6 describe the procedure of lumbar puncture

3.10.13.7 explain the importance of CSF analysis

3.10.13.8 relate lumbar puncture findings to different clinical entities

3.10.14 **Autonomic nervous system**

3.10.14.1 describe the basic arrangement of sympathetic nervous system

3.10.14.2 describe the basic arrangement of parasympathetic nervous system

3.10.14.3 compare the basic differences and similarities of sympathetic and parasympathetic nervous system

3.10.14.4 state the neurotransmitters of the sympathetic and parasympathetic nervous system

3.10.14.5 state the different types of receptors of autonomic nervous system

3.10.14.6 describe the effect of sympathetic stimulation in following organ systems (a) heart and blood vessels (b) airways (c) gastro intestinal system (d) reproductive system and (f) eye

3.10.15 **Physiology of sleep**

3.10.15.1 describe benefits of sleep

3.10.15.2 describe electrical activity of brain during sleep

3.10.15.3 describe stages of sleep and physiological/ EEG changes

3.10.15.4 describe sleep disorders

3.10.16 **Limbic system**

3.10.16.1 list component of limbic system

3.10.16.2 describe basic function of limbic system

3.10.16.3 describe specific function of hypothalamus, hippocampus and amygdala

3.10.17 **Objectives for practicals**

3.10.17.1 Field of vision and perimeter

3.10.17.1.1 perform the confrontation method of testing visual fields

3.10.17.1.2 describe the procedure of testing visual field with perimeter

3.10.17.1.3 draw the visual field pattern in a

a) healthy subject
b) patient with a lesion in optic nerve, optic tract, optic chiasma, optic radiation and visual cortex
c) patient with glaucoma
d) patient with a scotoma

3.10.17.2 Visual acuity

3.10.17.2.1 identify the Snellen's chart

3.10.17.2.2 identify the J chart

3.10.17.2.3 test the distant vision and express it correctly

3.10.17.2.4 test the near vision and express it correctly

3.10.17.2.5 state the modifications adopted to test distant vision of an illiterate person, preschool child, and individual with visual acuity less than 1/60

3.10.17.3 Colour vision

3.10.17.3.1 identify the Isihara colour chart

3.10.17.3.2 describe the method of testing for colour vision

3.10.17.3.3 state the different types of colour blindness and their genetic pattern

3.10.17.3.4 state the uses of testing colour vision

3.10.17.4 Hearing tests

3.10.17.4.1 identify a tuning fork

3.10.17.4.2 describe how Rinne test is performed

3.10.17.4.3 describe how Weber test is performed

3.10.17.4.4 interpret the results of Weber and Rinne test in a patient with conduction deafness in one ear

3.10.17.4.5 interpret the results of Weber and Rinne test in a patient with nerve deafness in one ear

3.10.17.5 Audiometry

3.10.17.5.1 state the audible decibel range of the human ear

3.10.17.5.2 state the audible sound frequency range of the human ear

3.10.17.5.3 recognize audiometer record of a

a) individual with normal hearing
b) individual with condition deafness
c) individual with nerve deafness
d) individual with mixed deafness

3.10.17.6 ENG

3.10.17.6.1 draw and label an action potential of a nerve fiber

3.10.17.6.2 draw a compound action potential

3.10.17.6.3 recognize

a) distal latency
b) proximal latency
c) latency difference in ENG recording
d) amplitude of AP

3.10.17.6.4 calculate nerve condition velocity when latency difference and distance between two stimulation points provided

3.10.17.6.5 state the clinical significance of the parameters stated in 3.10.17.6.3 and 3.10.17.6.4 above in axonal loss and demyelinating diseases

3.11 Environmental Physiology and Miscellaneous lectures

3.11.1 Physiology of skin

3.11.1.1 describe the arrangement of skin which is important to understand its functions

3.11.1.2 describe the functions of different components of the skin

3.11.1.3 explain the role of skin in thermoregulation

3.11.1.4 describe the role of skin in protection

3.11.2 **Thermoregulation**

3.11.2.1 list the methods of heat loss through skin: convection, conduction, radiation, evaporation

3.11.2.2 describe the arrangement of blood vessels in the skin which helps in thermoregulation

3.11.2.3 describe the role of hypothalamus in thermoregulation

3.11.2.4 describe the physiological and behavioral responses to exposure to cold environment and hot environment

3.11.2.5 describe the changes occur in thermoregulation in the following phases of fever: development of fever, sustenance of fever and settling of fever

3.11.2.6 describe the changes occur in the body in hypothermia and hyperthermia

3.11.3 **Physiology of aging**

3.11.3.1 define aging

3.11.3.2 describe age related changes in the various systems of the body

4. Department of Microbiology

Vision

The vision of the Department of Microbiology is to facilitate the process of producing a good quality medical practitioner and to uplift knowledge in microbiology

Mission

The mission of the Department of Microbiology is to educate and train students in the discipline of microbiology and to expand the body of knowledge of this scientific field through research

General Objectives

At the end of the teaching-learning course in Microbiology the student should be able to:

1. appreciate common infective agents, their mode of transmission and the symptoms and signs of infections caused by them
2. apply the knowledge on bacteriology, virology, mycology and immunology in the diagnosis of infectious diseases and syndromes
3. apply the knowledge to select the appropriate microbiological investigations and to collect and transport them
4. apply the knowledge on antimicrobials in proper selection of such agents to treat and prevent infectious diseases
5. apply the knowledge on infection prevention and control to appropriately manage infectious diseases
6. apply the knowledge on sterilization, disinfection and antisepsis in the infection prevention and control
7. apply the knowledge on immunisation procedures in control of bacterial & viral diseases

Learning Objectives

At the end of each course, student should be able to;

4.1 Immunology

4.1.1 Basic Immunology

4.1.1.1 define and compare innate (nonspecific) and acquired (specific) immunity

4.1.1.2 list and describe the functions of the mechanisms of innate immunity

4.1.1.3 list and explain the basis for the cardinal features of specific immunity

4.1.1.4 define and describe antigens

4.1.1.5 explain the clonal selection theory

4.1.1.6 describe the recognition, activation and effector phases of the humoral response

4.1.1.7 list the functions of antibodies and explain how they protect against infection and compare and contrast the different classes of antibodies

4.1.1.8 compare and contrast the primary and secondary humoral immune response

4.1.1.9 describe the major histocompatibility complex molecules and their function

4.1.1.10 describe the recognition, activation and effector phases of cell-mediated immunity

4.1.1.11 explain how T cells are important in host defense against intracellular infections

4.1.1.12 compare and contrast the primary and secondary immune cellular immune response

4.1.1.13 describe the functional anatomy of the specific immune system and outline the fate of antigen penetrating the body

4.1.1.14 define and describe cytokines in immunity giving examples

4.1.1.15 compare and contrast host defense against different types of pathogen

4.1.1.16 define active and passive immunity and natural and artificial immunity

4.1.1.17 describe how immunization protects against infectious diseases

4.1.1.18 list some factors that can reduce immunity to infections (immunodeficiency)

4.1.1.19 describe the immunological basis of hypersensitivity reactions and explain the immunopathological mechanisms of clinical manifestations/ diseases associated with each type of hypersensitivity

4.1.2 Applied immunology

4.1.2.1 identify important immunologically mediated diseases in individuals

4.1.2.2 identify immunological and genetic risk factors for the acquisition of

immunological disorders in the individual

4.1.2.3 describe the current vaccination schedule under EPI, contraindications for use and possible future inclusions. Advise on vaccines not included in EPI but available in Sri Lanka

4.1.2.4 describe immunological basis of commonly used serological tests in microbiology

4.2 General Microbiology

4.2.1 classify microorganisms that are of medically important and briefly describe their structural components

4.2.2 list the essential differences between prokaryotes and eukaryotes

4.2.3 list different sources of infection to humans and describe their modes of spread giving examples

4.2.4 enumerate the key steps in pathogenesis of infection including virulence factors

4.2.5 describe dynamics in host parasite relationship

4.2.6 list the essential differences between endotoxins and exotoxins

4.2.7 describe the bacterial genome and its impact on medicine

4.2.8 list the different ways of genetic information in bacteria and describe the method of their replication

4.2.9 list mechanisms of genetic variation in microbes

4.2.10 describe the gene transfer processes in bacteria

4.2.11 describe methods of genetic engineering including monoclonal antibodies, polymerase chain reaction (PCR) and stating their applications

4.2.12 define the terms sterilization, disinfection and antisepsis

4.2.13 list different methods of sterilization & disinfection giving examples for each method

4.2.14 describe the application of the methods of sterilization & disinfection in hospital and laboratory settings

4.2.15 describe advantages and disadvantages of each method of sterilization & disinfection

4.2.16 outline the steps in the processing of items for sterilization

4.2.17 define the different levels of disinfection giving examples

4.2.18 categorize disinfectants into different levels of disinfection and their spectrum of activity

4.2.19 describe the steps in cleaning of a blood spill in a health care facility

4.2.20 describe important factors that should be considered in sample collection

4.2.21 properly fill the specimen request forms

4.2.22 properly select specimen collection containers according to the specimen requested

4.2.23 properly collect the specimens with special reference to collection of CSF, Blood and Urine samples for culture

4.2.24 temporary store the collected specimens under appropriate conditions till dispatch to the laboratory

4.2.25 properly transport the specimens to the correct place of delivery/laboratory

4.2.26 appreciate the tentative date and time of receipt of results of the requested tests

4.2.27 advice health care personnel and patients on proper collection and transport of specimens

4.3 Systematic Bacteriology

4.3.1 classify bacteria under different methods of classifications giving examples

4.3.2 describe the differences in Gram positive and Gram negative cell walls and the effects of these components on the staining characteristics of the Gram stain

4.3.3 list the bacterial species that cause important and common infective diseases in humans

E.g.

- Staphylococci/ Streptococci/ Enterococci
- Gram positive bacilli (Corynebacterium, Bacillus, etc.)
- Gram negative cocci - Neisseria
- Small Gram-negative bacilli (Haemophilus, etc.)
- Salmonella/ Shigella/ E. coli.
- Pseudomonas/ Vibrio / Aeromonas / Plesiomonas
- Anaerobes - Clostridia / Bacteroides
- Campylobacter/ Helicobacter
- Mycoplasma/ Rickettsiae/ Chlamydiae
- Spirochaetes (Troponema/ Leptospira/ Borrelia)
- Mycobacteria / Norcardia / Actinomycetes

4.3.4 list the different organisms (pathogens and potential pathogens) included under the above genera

4.3.5 list the virulence factors of these organisms

4.3.6 describe their habitat and routes of transmission and explain the pathogenesis of infections caused by them

4.3.7 list the different infections/ diseases caused by them and their clinical features

4.3.8 list the microbiological tests available for the diagnosis of these bacterial infections and describe collection and transport of relevant clinical specimens

4.3.9 interpret results of the respective investigations

4.3.10 select appropriate antibiotics/ antisera that can be used in empirical and definitive treatment of these bacterial infections and other supportive measures used in treatment

4.3.11 describe infection control and prevention (chemoprohophylasis, immunization, antisera) measures against these infections

4.3.12 outline important epidemiological characteristics of such bacterial infections

4.3.13 list the antibiotic classes with examples

4.3.14 explain the mechanisms of action, spectrum of activity and adverse effects of antibiotics

4.3.15 describe the origin and types of drug resistance by bacteria to antibiotics and its clinical implications

4.3.16 interpret culture and antibiotic susceptibility test reports issued by the laboratory

4.4 Systematic Virology

4.4.1 classify viruses under different methods of classifications giving examples

4.4.2 list the viruses that cause important and common infective diseases and syndromes in humans

E.g.:

- Viruses of the Respiratory tract (Adeno/ RSV/ Influenza/ parainfluenza/ Corona/ etc.)
- Hepatitis causing viruses (Hepatitis A, B, C, D, E)
- Herpes group of viruses (Chickenpox, Herpes Simplex, HHV)
- pox viruses/ parvovirus/ papilloma viruses
- Mumps / Measles/ Rubella viruses
- Rabies virus
- HIV virus
- Diarrhoeagenic viruses (Rota/ adeno/ nowalk)
- Enteroviruses (Polio/ EV/ etc.)

- Arboviruses (Dengue/ Japanese encephalitis/ etc.)

4.4.3 identify the common characteristics of the family and the genus to which these viruses belong to

4.4.4 identify the important and pathogenic serotypes /strains / variants of these viruses

4.4.5 list the methods of transmission of these viruses to the human host, and their natural hosts and vectors (if any)

4.4.6 explain the pathogenesis and outcome of such viral infections

4.4.7 recognize and describe briefly the clinical features of common diseases and syndromes caused by these viruses

4.4.8 list the appropriate laboratory investigations available for detection of the viral infections

4.4.9 explain the collection and transport of clinical specimens for laboratory diagnosis of such viral infections

4.4.10 interpret laboratory reports of viral infections

4.4.11 list appropriate anti-viral drugs and other agents (if any) used for treatment for such viral infections and describe their mode of action

4.4.12 describe briefly the epidemiology (i.e. the prevalence, distribution, at risk population etc.) of such viral infections

4.4.13 explain the appropriate methods of prevention (chemoprohophylasis, immunization, antisera) and control of such viral infections

4.5 Mycology

4.5.1 list the aetiological agents and identify the clinical features and recognize common superficial fungal infections

E.g.: Dermatophytoses (Ringworm), pityriasis versicolor, piedra, onychomycosis, superficial candidiasis, otomycocis and keratomycosis

4.5.2 list the aetiological agents and identify the clinical features and recognize common subcutaneous fungal infections

E.g.: chromomycosis, mycetoma and rhinosporidiosis, sporothricosis

4.5.3 list the aetiological agents and identify the clinical features and recognize common systemic fungal infections

E.g.: systemic candidasis, aspergillosis and cryptoccosis, dimorphic fungi, PCP

4.5.4 describe collection and transport of appropriate clinical specimens for the laboratory diagnosis of fungal infections

4.5.5 interpret laboratory reports of fungal studies

4.5.6 describe antifungal treatment for common superficial, subcutaneous and systemic fungal infections

4.5.7 advise on prevention (if any) of superficial fungal infections

4.5.8 describe briefly the epidemiology (i.e. the prevalence, distribution, at risk population etc.) of fungal infections

4.5.9 list different groups of antifungal agents with examples, describe their modes of action and spectrum of activity

4.6 Clinical Microbiology

4.6.1 list and prioritise the differential diagnosis of infectious agents according to the clinical presentation and the system affected

E.g.:

- Respiratory tract infections
- Urinary tract infections
- Bone & joint infections
- Pyrexia of unknown origin
- Septicaemia and Infective endocarditis
- Infections of the central nervous system
- Infections of Eye and Ear
- Skin and soft tissue Infections
- Abdominal infections, Gastroenteritis & food poisoning
- Sexually Transmitted Diseases
- Congenital, perinatal infections & blood borne infections
- Infections in the compromised host

4.6.2 narrow down the list of differential diagnosis of infectious diseases by

a) critically analysing symptoms and signs of infectious diseases and syndromes
b) Selecting the appropriate microbiological tests that are available, according to the duration of the illness and other related factors
c) properly interpreting reports of microbiological investigations

4.6.3 advice staff and patients regarding collection and transport of clinical specimens for the microbiological diagnosis of infectious diseases

4.6.4 select appropriate empirical and definitive antimicrobials according to the clinical scenario/ presentation of the infectious diseases

4.6.5 rationalise the use of antimicrobials for empiric therapy, according to the clinical scenario, culture and susceptibility test reports and limitations (cost, availability, patient factors, etc.)

4.6.6 apply the knowledge on infection prevention and control in managing clinical conditions

4.6.7 advice on immunisation procedures for bacterial & viral diseases

4.6.8 explain the epidemiology of infective diseases in the community and update themselves on their prevalence and about emerging and reemerging diseases

4.6.9 explain the importance of sterilization & disinfection in infection control activities

4.6.10 know the importance of health care associated infections and how to identify and properly manage them

5. Department of Parasitology

Vision

To become a world-class center of “parasitology” education and research that contributes to human health on a global scale through interdisciplinary integration of preventive medicine, health economics and other related areas, building on our outstanding achievements in the areas of neglected tropical diseases including herpetology, other infectious diseases and research on toxic marine life.

Mission

To significantly improve the overall excellence of the entire department across all disciplines to establish a foundation for becoming one of the world’s best centers by promoting the sophistication and internationalization of every education and research area, enhancing the collaboration with top-level universities inside and outside Sri Lanka.

General Objectives

1. (a) Acquire knowledge and develop skills to diagnose and treat the parasitic diseases commonly found in Sri Lanka
   (b) To be able to educate the general public regarding the preventive measures of the above diseases
2. To be aware of other medically important parasitic diseases in the world and possibility of these occurring in Sri Lanka
3. To have some understanding of the economic loss in a country which could be brought about by wide spread parasitic disease
4. To acquire knowledge about parasitic infections in the immune compromised patient
5. To acquire knowledge about medically important arthropods with special reference to disease in Sri Lanka caused or transmitted by these arthropods
6. (a) Be skilled in identification of poisonous snakes found in Sri Lanka and the clinical manifestations resulting from bites by them, and the management of such patients
   (b) Be able to recognize common nonpoisonous snakes found in Sri Lanka specially the ones which mimic the poisonous snakes

Learning objectives

At the end of each session, students should be able to

5.1 Helminthology

5.1.1 name the pathogenic intestinal nematodes found in man

5.1.2 name the common habitat of each

5.1.3 describe the mode of infection in each parasite

5.1.4 outline the stages in the life cycle in each

5.1.5 describe the clinical consequences of these stages in man

5.1.6 identify the adult worms

5.1.7 identify the ova on a slide

5.1.8 make faecal smears in iodine and saline to demonstrate Helminth ova and Protozoan cysts

5.1.9 describe the method of diagnosis

5.1.10 describe the preventive measures applicable to each parasite

5.2 Filariasis

5.2.1 name the filarial worms infecting man in Sri Lanka

5.2.2 name the vectors in each case

5.2.3 describe the distribution of filariasis in Sri Lanka

5.2.4 outline the stages in the life cycle

5.2.5 describe the clinical consequences of the stages in man

5.2.6 identify the microfilaria of *Wuchereria bancrofti* and *Brugia malayi* on a blood film

5.2.7 indicate the site in the life cycle where preventive measures are applicable and briefly describe them

5.2.8 describe the elimination programme carried out in Sri Lanka (PELF)

5.2.9 describe the aetiology of Tropical Pulmonary Eosinophelia

5.2.10 list the clinical features of occult filariasis

5.3 Amoebiasis, Giardiasis, Balantidiasis

5.3.1 list the common intestinal protozoa found in man and indicate the pathogenic parasites

5.3.2 describe the two different forms of *Entamoeba histolytica, Giardia intestinalis, Balantidium coli* met with clinically

5.3.3 recognize these on a slide

5.3.4 name the sites in the human body where these parasites can be found

5.3.5 describe the clinical consequences of these parasites found at the site

5.3.6 describe the mode of infection

5.3.7 describe the collection of a specimen of faeces for examination in amoebiasis

5.3.8 describe the life cycle of *E. histolytica*

5.3.9 describe the preventive measures applicable to each parasite

5.4 Guinea worm

5.4.1 identify adult

5.4.2 identify the intermediate host

5.4.3 outline the life cycle

5.4.4 describe the pathological lesions produced by this parasite

5.4.5 outline the eradication programme

5.5 Trichinosis

5.5.1 recognize the larval stage

5.5.2 outline the life cycle

5.5.3 describe briefly the clinical manifestations

5.5.4 outline the preventive measures

5.6 Trematodes (flukes)

5.6.1 name the flukes pathogenic to man

5.6.2 identify adult specimens of these flukes

5.6.3 outline the life cycle of each fluke

5.6.4 outline the preventive measures applicable in each

5.6.5 identify the ova of trematodes

5.6.6 describe the sylvatic cycle of *Paragonimus westermani* in Sri Lanka

5.7 Cestode infections (Tape worms)

5.7.1 identify the scolices of *Hymenolepis diminuta, Taenia saginata, Taenia solium, Hymenolepis nana, , Diphyllobothrium latum*

5.7.2 recognise and differentiate the gravid segments of *T. saginata* and *T. solium*

5.7.3 identify the adults of *Taenia* species, *Echinococcus granulosus, H. nana* and *H. diminuta*

5.7.4 identify the larval stages of *Taenia* species and *E. granulosus*

5.7.5 identify the ova of *Taenia* species, *H. nana* and *H. diminuta*

5.7.6 name the definitive hosts in *Bertiella studeri*, *Dipylidium caninum T. saginata, T. solium, E. granulosus, H. nana and D. latum*

5.7.7 outline the life cycle in each case indicating where preventive measures are applicable

5.7.8 describe cysticercosis in man

5.7.9 describe the incidence of cestode infections in Sri Lanka. Describe why *Bertiella studeri* and *Dipylidium caninum* are commoner than *taeniasis*

5.7.10 describe the current management of cestode infections in Sri Lanka

5.7.11 describe the sylvatic cycle of *E. granulosus* in Sri Lanka

5.8 Malaria

5.8.1 identify important problems related to malaria in individuals and the community and plan and implement appropriate preventive measures, diagnostic and curative practices and rehabilitation methods

5.8.2 identify environmental and behavioural risk factors for the acquisition of malaria in the community and recommend and implement activities which promote health of the individual and community

5.8.3 understand the principles of malaria transmission and innovate and implement disease containment methods in endemic and epidemic situations

5.8.4 work harmoniously with others as a leader/member of a multi-disciplinary care delivery team

5.8.5 educate and train other individuals, health care personnel and the community, towards better health

5.8.6 carry out or confirm to basic procedures related to ethical issues and the proper notification the diseases

5.8.7 plan and carry out appropriate malaria related research projects/assignments

5.8.8 develop into a self-directed learner with the capacity to recognize the need for self-evaluation

5.9 Leishmaniasis

5.9.1 identify the different forms in the life cycle

5.9.2 study the different types of clinical manifestations and their distribution

5.9.3 compare the pathological symptoms of different clinical manifestations

5.9.4 study as an opportunistic disease and co-infection with HIV

5.9.5 describe the current situation of leishmaniasis in Sri Lanka

5.10 Trypanasomiasis

5.10.1 identify the different morphological forms in the trypanosomiasis life cycle

5.10.2 outline the geographical distribution of different types of trypanosomiasis

5.10.3 name the vectors of each condition

5.10.4 name the sites in the human body where these parasites can be found

5.10.5 describe the clinical consequences of these sites

5.11 Toxoplasmosis and other coccidian parasites

5.11.1 name the parasite causing toxoplasmosis

5.11.2 stain and identify the parasite on a smear

5.11.3 describe the life cycle of *Toxoplasma gondii*

5.11.4 describe the mode of transmission of toxoplasmosis

5.11.5 describe the laboratory diagnosis

5.11.6 outline the preventive measures applicable in this disease

5.11.7 identify *Sarcocystis* in a smear or tissue section

5.11.8 recognize a Miescher's tube

5.11.9 identify the habitat of this parasite

5.11.10 name the pathological lesions caused by these parasites

5.12 Trichomoniasis

5.12.1 identify *T. vaginalis* on a saline smear and on a fixed stained smear

5.12.2 name the sites in the human body where the parasite is found

5.12.3 describe the pathogenic effect of this parasite

5.12.4 describe the mode of infection

5.13 Medical Entomology

5.13.1 Mosquitoes

5.13.1.1 list the diseases in Sri Lanka, where mosquitoes act as vectors and name the vectors in each case

5.13.1.2 identify the adult male and female mosquitoes

5.13.1.3 recognize the mouthparts of a mosquito

5.13.1.4 outline the life cycle of a mosquito

5.13.1.5 differentiate between an anopheline and a culicine mosquito

5.13.1.6 recognize mosquito larvae if shown specimens

5.13.1.7 differentiate between an anopheline and a culicine larva

5.13.1.8 identify the adults of the following mosquitoes- *Anopheles* sp*; Culex quinquefasciatus; Culex gelidus; Mansonia* sp*; Aedes aegypti; Aedes albopictus & Armigeres* sp

5.13.1.9 describe the habitats and breeding places of the above mosquitoes

5.13.1.10 identify the eggs of *Anopheles; Culex; Mansonia* and *Aedes* mosquitoes

5.13.1.11 identify the larva of these mosquitoes

5.13.1.12 describe the control measures applicable to each of these mosquitoes

5.13.2 **Mites and scabies**

5.13.2.1 name the causative organisms of scrub typhus and scabies

5.13.2.2 describe the geographical distribution of scrub typhus

5.13.2.3 name the endemic areas in Sri Lanka

5.13.2.4 identify adult male and females of a *Sarcoptes scabiei* and the adult of a trombiculid mite

5.13.2.5 identify larva of a trombiculid mite

5.13.2.6 describe the habitat of the scabies mite in man

5.13.2.7 describe the clinical consequences of its presence in man

5.13.2.8 describe the treatment and control of scabies

5.13.2.9 outline the control measures in scrub typhus

5.13.3 **Dipterous flies of medical importance and Myiasis**

5.13.3.1 name the diseases transmitted by sand fly and Tsetse fly

5.13.3.2 describe the mechanisms by which the house fly transmits disease

5.13.3.3 identify adult specimens of Sand fly; Tsetse fly; House fly; *Scrcophaga* and *Chrysomya*

5.13.3.4 identify the wings of house fly and tsetse fly

5.13.3.5 identify maggots of a dipterous fly

5.13.3.6 describe the life cycle of house fly

5.13.3.7 describe the methods of control of house flies

5.13.3.8 define Myiasis and describe it giving examples

5.13.4 **Fleas**

5.13.4.1 identify adults of *Pulex irritans; Xenopsylla astia X. cheopis; Ctenocephalides* sp. (Dog & Cat fleas) & *Nosopsylla* (Rat flea)

5.13.4.2 outline the life cycle of a flea

5.13.4.3 describe the medical importance of fleas indicating the species responsible in each case

5.13.4.4 name the vectors which transmit Bubonic plague to man

5.13.5 **Ticks**

5.13.5.1 recognize a tick when shown a specimen

5.13.5.2 list the important differences between soft ticks and hard ticks

5.13.5.3 identify a soft tick and a hard tick

5.13.5.4 distinguish between *Argas periscus* and *Ornithodoros* if given specimens

5.13.5.5 outline the life cycles of soft ticks and hard ticks

5.13.5.6 name the diseases transmitted to man by these ticks indicating the species in each case

5.13.5.7 describe the modes of transmission in each of these diseases

5.13.6 **Lice**

5.13.6.1 identify the adult of *Pediculus humanus* and *Phthirus pubis*

5.13.6.2 describe the medical importance of the head louse

5.13.6.3 name the diseases transmitted by the body louse

5.13.6.4 describe the mechanism of transmission in each disease

5.13.6.5 outline the life cycle of a louse

5.13.6.6 name the habitat in the human body in each species

5.13.6.7 identify the egg of a louse

5.13.6.8 describe the treatment and control of pediculosis and infestation with *Phthirus pubis*

5.13.7 **Bugs**

5.13.7.1 identify an adult bed bug and a reduviid bug

5.13.7.2 name the habitat of bed bugs and the medically important reduviid bugs

5.13.7.3 name the disease transmitted by reduviid bugs

5.13.7.4 describe the mode of transmission

5.13.7.5 describe the medical importance of bed bugs

5.13.7.6 outline the life cycle of the bed bug

5.13.7.7 describe the control of bed bugs

5.13.8 **Zoonosis**

5.13.8.1 define zoonosis

5.13.8.2 describe the different types of zoonoses

5.13.8.3 name the important parasitic zoonotic disease in the world

5.13.8.4 name and describe the proven and potential parasitic zoonoses in Sri Lanka

5.13.9 **Snakes**

5.13.9.1 name the poisonous snakes found in Sri Lanka

5.13.9.2 name the commonly found non-poisonous snakes and feebly poisonous snakes in Sri Lanka

5.13.9.3 recognize each if given a specimen

5.13.9.4 list the districts in which these poisonous snakes are commonly found in Sri Lanka

5.13.9.5 name the type of venom toxicity in each

5.13.9.6 describe the clinical manifestations resulting from these poisonous snake bites

5.13.9.7 outline the management and treatment in these cases

5.13.10 **Medically important coral animals of Sri Lanka**

5.13.10.1 name the venomous animals found in coral reefs of Sri Lanka

5.13.10.2 name the poisonous animals found in coral reefs of Sri Lanka

5.13.10.3 recognize each if given a specimen

5.13.10.4 list the habitats in which these animals are commonly found in Sri Lanka

5.13.10.5 name the type of venom / toxicity in each

5.13.10.6 describe the clinical manifestations resulting from exposure to these animals

5.13.10.7 outline the management and treatment in these cases

5.14 Parasitology fixed learning modules

5.14.1 **Insect control and insecticides**

5.14.1.1 list the different methods available for the control of medically important arthropods

5.14.1.2 list the different groups of insecticides

5.14.1.3 describe the insecticidal action of each group

5.14.1.4 name the insecticides in common use belonging to each group

5.14.1.5 list the advantages and disadvantages of these insecticides

5.14.1.6 describe the different types of insecticide formulations

5.14.1.7 describe the different methods of insecticide application

6. Department of Community Medicine

Vision

To be recognized as a center of excellence for teaching, learning and research in Community Medicine that produces medical graduates with an unwavering commitment to uplift the health care quality and health status of the local and global communities

Mission

To provide unique opportunities of education, service and research in Community Medicine and related disciplines for undergraduate and postgraduate students through interdisciplinary collaborations and innovative approaches

General objectives

At the end of the Community Medicine course the student should acquire the following knowledge, skills and attitudes required to practice as a basic doctor in Sri Lanka.

Knowledge

Have knowledge on

1. a) the structure and functions of the health care services in Sri Lanka
   b) the primary health care (PHC) strategies for Sri Lanka and their methods of implementation
   c) health education, health promotion and community empowerment
2. a) the epidemiological techniques, including particularly the formulation of hypotheses and the design and application of prospective, retrospective and prevalence epidemiological studies
   b) the epidemiology, prevention and control of communicable and non-communicable diseases and conditions
3. the descriptive and inferential statistical methods to enable the student to select appropriate descriptive methods and/or inferential statistical methods (e.g. Significance tests etc.) for a given situation through his/her understanding of the principles of statistics

4. the principles of adaptation to environment and the effect of environmental factors on health and etiological factors of diseases in the community
5. the social structure and patterns of community beliefs, values and attitudes in relation to medical care
6. a) the principles of identification, assessment and control of occupational hazards
   b) the etiological importance of occupation in relation to health
7. the organization and delivery of maternal, child health (MCH) and social services in Sri Lanka
8. the principles of nutrition and identification and management of nutritional deficiencies in the community
9. the concept and principles of planning, implementation and evaluation of health care
10. the principles of record keeping in curative and preventive medical services

Skills

Acquire skills necessary to

1. function as a member or a leader of a health care team
2. assess and describe the state of health of a defined community and compare it with that of other communities
3. identify key decision makers in the community and use both formal and informal channels of communication in the course of delivery of health care to the community
4. assess the effectiveness of the health care services provided to prevent and cure illness and disabilities in the community
5. formulate, conduct and present a simple research project
6. provide primary health care with community participation and intersectional coordination

Attitudes

Develop attitudes appropriate

1. for the promotion of health and prevention of diseases
2. to view the care of an individual in the broader context of the family and the community
3. towards integration of health care services in the provision of primary health care
4. to work under conditions of limited resources
5. for continuing self-education

Learning objectives

At the end of each session, students should be able to

6.1 Introductory lectures

6.1.1 have knowledge of the organization of the health care delivery system of Sri Lanka at central, provincial district and divisional levels

6.1.2 understand the concept of primary health care (PHC) and know the methods of delivery PHC

6.1.3 understand the basic principles of health care planning and management and health economics

6.1.4 have knowledge of the basic concepts of disease causation and prevention

6.1.5 have knowledge of the general principles of causation, prevention and control of communicable and non-communicable diseases

6.1.6 have knowledge of the 'Notifiable Diseases' in Sri Lanka

6.1.7 have knowledge of the sources of data on communicable and non- communicable diseases surveillance system in Sri Lanka and the role of the epidemiological unit

6.1.8 have knowledge of the role of local and international organizations in the provision of preventive and promotive health care

6.2 Health education

6.2.1 have knowledge of the objectives and methods of health education

6.2.2 be aware of the process of change in behaviour and different approaches for behaviour change

6.2.3 understand the role of health care providers in health education

6.2.4 have knowledge on the methods of health education and be able to apply this knowledge in promoting health and preventing disease

6.2.5 understand the concepts of health promotion and community empowerment

6.2.6 have knowledge of the determinants of health and be able to apply this knowledge in empowering the individuals, families and communities

6.2.7 be able to plan and implement strategies for health education and promotion in the community

6.3 Medical demography

6.3.1 define demography and describe its importance

6.3.2 describe sources of demographic data

6.3.3 describe a population according to main population characteristics considered in demography

6.3.4 define and describe demographic events and their measurements

6.3.5 describe the influence of demographic events on structure of the population

6.3.6 compare the demographic indices of different populations using standardization

6.3.7 describe population growth, its measurements and influencing factors

6.3.8 relate demographic transition cycle to the population growth in different populations

6.3.9 describe the concepts of demographic dividend, population aging and their implications

6.3.10 describe population projections of Sri Lanka and the world

6.4 Biostatistics

6.4.1 understand the importance of biostatistics in medical science

6.4.2 describe the type of variables and scales of measurement

6.4.3 describe the different methods of summarizing and presenting data and obtain skills in applying them

6.4.4 describe the basic probability theories (additive rule and multiplicative rule) and obtain skills in applying them

6.4.5 describe different probability distributions and calculate probability and Z score using standard normal distribution

6.4.6 describe the principals of sampling, different sampling techniques and gain skills to select suitable sampling method in research studies

6.4.7 describe the methods for statistical inference (confidence interval and hypothesis testing) and gain skills to apply them

6.4.8 describe the steps in hypothesis testing including selection of a suitable statistical test and making statistical conclusions in hypothesis testing

6.4.9 understand the concept of “p value” and apply it for making statistical conclusions in hypothesis testing

6.4.10 gain skills to apply and interpret results for chi square test (goodness-of-fit test, chi square test of statistical independence and chi square test of homogeneity), z test (z test for proportion and z test for mean) and t test (t test for mean, pooled ‘t’ test for independent samples and paired ‘t’ test for dependent samples) in hypothesis testing

6.4.11 describe the concept of “correlation and regression” and gain skills to interpret results obtained through correlation and regression analysis in hypothesis testing

6.4.12 gain skills to use SPSS in data analysis for descriptive data and hypothesis testing (chi square test, z test, t test and correlation and regression) and interpret results

6.5 Maternal and child health

6.5.1 describe the organization and delivery of reproductive, maternal, newborn, child, adolescent and youth health services at central, provincial, district and divisional levels through Reproductive, Maternal, Newborn, Child, Adolescent and Youth Health (RMNCAYH) programme of Sri Lanka

6.5.2 describe the provision of maternal care (preconceptional, antenatal, natal and postnatal) services through RMNCAYH programme

6.5.3 identify the leading causes for maternal morbidity and mortality and describe the measures to prevent maternal morbidity and mortality

6.5.4 describe the provision of child care (newborn, infant and child) services through RMNCAYH programme

6.5.5 identify the leading causes for childhood morbidities and mortalities (perinatal, neonatal, infant and 1-5 year) and describe measures to prevent childhood morbidities and mortalities

6.5.6 describe the provision of school and adolescent health services provided through RMNCAYH programme of Sri Lanka

6.5.7 identify the issues among school children and adolescents and describe the measures to overcome those issues

6.5.8 describe the National Expanded Program of Immunization (EPI) in order to prevent communicable diseases in Sri Lanka

6.5.9 describe the family planning and well-women services provided through the RMNCAYH programme of Sri Lanka

6.5.10 describe the concept of safe motherhood and how safe motherhood is ensured in Sri Lanka through RMNCAYH

6.6 Basic epidemiology

6.6.1 understand the uses of epidemiology in planning and evaluating health services, public health policies, and health promotion

6.6.2 calculate and describe the measures of disease frequency and association in epidemiology

6.6.3 describe the different epidemiological study designs including their strengths and limitations

6.6.4 analyze epidemiological studies by evaluating the roles of errors, biases, and confounding

6.6.5 select a study design suitable to achieve the research objectives in planning a study

6.6.6 critically evaluate the methodology and findings of a research study

6.6.7 evaluate cause-effect relationship based on Bradford Hill criteria for causality

6.6.8 describe and evaluate the quality of a screening test using reliability and validity

6.6.9 describe different surveillance methods and appraise the diseases surveillances carried out in Sri Lanka

6.6.10 plan and undertake a diseases outbreak investigation with the help of a health team

6.7 Nutrition

6.7.1 assess the nutritional status of individual, family and community by using anthropometry, biochemical methods, clinical examination, dietary assessment and other indirect methods

6.7.2 have knowledge on the epidemiology of nutritional deficiency diseases in Sri Lanka

6.7.3 diagnose and treat common nutritional problems in Sri Lanka

6.7.4 recognize the importance of infections and infestations in the causation of nutritional problems

6.7.5 advice on dietary recommendations for healthy eating for the general population

6.7.6 be able to give appropriate advice and manage the nutrition of the infants, young children, elderly, pregnant and lactating mothers and sick individuals

6.7.7 have knowledge on the principals of nutritional management in non-healthy status

6.7.8 advice on the diet in the following ill-health conditions: infections, injury, diabetes mellitus, cardiovascular diseases, obesity, metabolic syndrome, cancer, renal disease, liver diseases and debility status

6.7.9 have knowledge on nutrition interventions implemented by the state in improving the nutritional status of the vulnerable groups and general population

6.7.10 be aware of the role played by international organizations in the promotion of nutrition at global and national level

6.8 Gender-based violence

6.8.1 understand the concept of gender, gender issues and gender-based violence in the community

6.8.2 recognize GBV as a major health issue by appreciating the health effects of GBV

6.8.3 recognize the role of the doctor in identification, prevention and management of GBV

6.9 Environmental health

6.9.1 understand the relationship of the environment to health and disease

6.9.2 describe the health impact due to water pollution, improper discharge of human excreta and waste (solid waste, waste water, hospital waste and e waste), air pollution, exposure to noise and radiation and due urbanization and climate change

6.9.3 describe how to prevent and minimize health impact due to water pollution, improper discharge of human excreta and waste (solid waste, waste water, hospital waste and e waste), air pollution, exposure to noise and radiation and due urbanization and climate change

6.9.4 have knowledge of methods employed (including legal provisions) to environmental sanitation (ensure water sanitation, food sanitation and safety of the living environment)

6.9.5 describe the role of public health staff in ensuring environmental sanitation in the community

6.9.6 describe the concept of disaster management and how to ensure sanitation during disaster situation and among displaced population

6.10 Occupational health

6.10.1 identify the health hazards in different occupations

6.10.2 describe the role of primary care physician in occupational health

6.10.3 describe the usefulness of pre-placement and periodic medical examinations

6.10.4 discuss the methods employed at work sites to ensure the safety of the workers

6.10.5 advice the workers and management on prevention of accidents and injuries at work sites, provision of adequate rest rooms, toilets and suitable healthy working environment and proper disposal of industrial waste

6.11 Behavioural sciences

6.11.1 be aware of community social systems in Sri Lanka

6.11.2 be aware of the roles and responsibilities of the parents, community leaders, politicians and government officials in the community

6.11.3 understand the role of mother and father in the promotion of the health of the family

6.11.4 treat an individual as a part of a family and community from which he/she comes and recognize this fact in providing health and other care to him/her

6.11.5 solicit the support of the community in providing health care to the individuals/community

6.11.6 understand the part played by social practices, customs and beliefs of the community in the causation of diseases, their prevention and in health promotion

6.11.7 be aware of the resources available to the community for health promotion and treatment of disease

6.11.8 communicate effectively with a patient

6.11.9 effectively health educate an individual, family and the community

6.11.10 have knowledge to recognize the rights of the patient in deciding treatment schedules

6.11.11 counsel an individual on health and health related issues

6.11.12 understand the psychosocial factors of different age/sex groups and ethnic groups

6.12 Community attachment programme

6.12.1 acquire knowledge and skills necessary to carry out a survey on the demography of the community

6.12.2 analyze, interpret and present data of the community demographic survey

6.12.3 arrive at a “community diagnosis” through the assessment of the health status of the community, based on the collected data in the survey

6.12.4 understand the influence of socio-economic, environmental and behavioural factors on health and disease and health practices regarding common diseases

6.12.5 be capable of identifying and formulating strategies to solve the identified health, socioeconomic, environmental problems and promote health

6.12.6 gain experience in team work and inter-sectoral approach in the promotion of health and well-being of the community

6.12.7 acquire knowledge and skills of communication and seeking assistance from external agencies in addressing certain identified problems

6.12.8 follow and gain experience in proper referral of patients to higher institutions

6.12.9 cultivate positive attitudes as attitudes of concern for individuals and the community

6.12.10 prepare a comprehensive report

6.13 Community Medicine Clerkship Programme

6.13.1 describe the duties and responsibilities of the health care personnel at district and divisional levels - Medical Officer of Maternal and Child Health (MO/MCH), Regional Epidemiologist (RE), Medical Officer of Non-Communicable Diseases (MO/NCD), Port Health Officer (PHO), Medical Officer of Health (MOH), Public Health Nursing Sister (PHNS), Supervising Public Health Midwife (SPHM), Public Health Midwife (PHM), Supervising Public Health Inspector (SPHI), Public Health Inspector (PHI)

6.13.2 describe the reproductive, maternal, newborn, child, adolescent and youth health services provided at the divisional level

6.13.3 describe the activities carried out to ensure occupational safety and health

6.13.4 describe the activities carried out to ensure food, water and environmental sanitation

6.13.5 describe the activities carried out to prevent the spread of infections

6.13.6 describe the system of record keeping at the divisional level

6.13.7 describe the other community health services such as community-based rehabilitation, care for elderly, care for orphans and counseling services

6.13.8 describe the role played by alternative systems e.g. Ayurveda, Homeopathy etc. In the provision of health care to the community

6.14 Student research project

6.14.1 have the knowledge and skills in identification and prioritization of research problems

6.14.2 critically review the relevant literature using a variety of sources

6.14.3 design a scientifically sound research by applying the knowledge of basic epidemiology and biostatistics

6.14.4 develop a research proposal for ethical approval / funding

6.14.5 have knowledge on methods of data collection and analysis and be able to apply this knowledge in conducting research

6.14.6 critically examine and interpret the results of the research

6.14.7 use relevant computer software for data analysis, reference management etc.

6.14.8 prepare a report based on research findings

6.15 Family Medicine

6.15.1 explain the principals and concepts of Family Medicine that will enhance the practice of primary care medicine

6.15.2 appreciate the “patient centeredness” in contrast to “disease centeredness” in-patient management

6.15.3 demonstrate the basic communication skills required to carry out a doctor-patient consultation in an ambulatory care setting

6.15.4 demonstrate the knowledge and skills required to manage common problems that present to a family physician

6.15.5 describe the process of care in family practice

6.15.6 identify and demonstrate skills to use psychological, personal and family factors which play a role in patient’s illnesses and its management in a family practice

6.15.7 demonstrate decision making skills required by a family physician in treating, referring and admitting a patient to the hospital

6.15.8 develop an attitude to take every opportunity available for health promotion and disease prevention

6.15.9 identify and analyze the differences in presentation of patients and management carried out at a family practice setting in contrast to patient care and management in an Out Patient Department set up and the hospital wards

6.15.10 describe the logistics involved in setting up an independent family practice

7. Department of Forensic Medicine

Vision

Our vision is to be an internationally acclaimed academic center for studies, service and research related to forensic medicine, toxicology, anthropology and associated sciences.

Mission

The purpose of the Dept. is to provide specialized educational programs in the field of legal medicine, toxicology and forensic sciences to both undergraduate and postgraduate medical students, nurses, lawyers, police officers, death investigators and other stakeholders and to provide optimal medico-legal services to the citizens of Sri Lanka.

General objectives

At the end of the learning programme of Forensic Medicine, students should be able to,

1. explain/ describe different medico – legal duties required of a doctor working in the following roles;
    a) Medical Officer in the out-patient department of a hospital.
    b) House Officer in charge of a ward in a hospital.
    c) Specialist in Forensic Medicine
    d) Director of a hospital.
    e) District Medical Officer or Medical Officer (Medico-legal)
    f) General Practitioner
2. identify/ describe/ record/ form an opinion/ interpret basic injuries/ different injury patterns and describe their medico-legal significance
3. describe the steps of a clinical examination of a drunken person
4. demonstrate skill in documenting medico-legal examination findings in appropriate formats – MLEF/ MLR/ PMR
5. explain / describe the different stages of a post-mortem examination and arrive at a cause of death

a) Apply WHO cause of death reporting & data quality requirements
b) Demonstrate analytic approach to determine the causal sequence in the cause of death
c) Demonstrate skill in the correct declaration of the death

6. explain the process of giving evidence at the court of law
7. identify common toxins / different types / clinical features / post-mortem features & explain basic principles of acute management in Sri Lankan setting
    a) Therapeutic drugs
    b) Plant poisoning
    c) Agrochemicals
    d) Abusive drugs
    e) House hold substances
8. explain the process of obtaining samples, dispatch of samples for forensic and toxicological analysis
9. explain different type of deaths which need medico-legal investigation
10. apply the basic principles of forensic anthropology in specific identification of persons through examination of human bones
11. explain essential legal aspects related to medical practice in Sri Lanka
    a) Law related to injuries – category of hurt
    b) Law related to inquest
    c) Law related to child abuse / sexual abuse / drinking and driving
    d) Law related to medical negligence
    e) Law related torture
12. explain basic medical ethics / ethical principles related to medical practice & apply them in given case scenarios
13. communicate effectively with vulnerable patients subject to various types of trauma (e.g. Prisoners / detainees / children, female & elderly)
14. participate as a team member in examination of different crimes / suspicious death scenes
15. explain the necessity of efficient documentation & preservation of clinical and post-mortem records and providing information to relevant parties concerned (while addressing confidential issues)

Learning Objectives

At the end of each session, students should be able to

7.1 Introduction to Forensic Medicine

7.1.1 define and know the scope of Forensic Medicine

7.1.2 outline brief history of Forensic Medicine, current status in Sri Lanka and the world

7.1.3 list the branches of Forensic Medicine

7.1.4 describe the scope of each branch of Forensic Medicine

7.2 Medico-legal frame work of Sri Lanka

7.2.1 describe different courts in Sri Lanka and their powers

7.2.2 describe various court procedures and deposition in the court

7.2.3 differentiate a criminal offence from a civil offence

7.2.4 aware of laws related to practice of medicine

7.3 Court procedure and giving evidence in courts

7.3.1 state the types of evidence admissible in courts

7.3.2 define the term “Expert Witness”

7.3.3 discuss types of witnesses in courts

7.3.4 expert witness

7.3.5 ordinary witness

7.3.6 outline the privileges of expert witness

7.3.7 discuss duties and responsibilities of a medical officer at the court of law

7.3.8 explain how a medical officer may be examined in a court of law

7.4 Blunt force injuries

7.4.1 list different types of blunt force injuries (Abrasion, Laceration, Contusion, Fracture) and their definitions

7.4.2 describe different sub types of blunt force injuries

7.4.3 discuss the agents cause and mechanism of blunt force injuries

7.4.4 discuss the medico legal significance of each of the above injury

7.4.5 discuss the sequel and complications / healing of blunt force injury

7.4.6 differentiation of ante-mortem and post-mortem injuries

7.5 Sharp force injuries

7.5.1 list different types of sharp force injuries (cuts, stabs) and their definitions

7.5.2 describe different sub types of sharp force injury

7.5.3 discuss the agents cause and mechanism of sharp force injury

7.5.4 discuss the medico legal significance of each of the above injury

7.5.5 discuss the sequel and complications / healing of sharp force injury

7.5.6 differentiation of ante-mortem and post-mortem injuries

7.6 Regional injuries

7.6.1 medico-legal significance, sequelae & complications in relation to following regions of the body

a) Neck
b) Chest
c) Abdomen
d) Pelvis/genitals
e) Limbs

7.7 Head Injuries

7.7.1 classifications of head injuries

7.7.2 describe head injury by blunt force trauma

7.7.3 describe different types of skull fractures and their mechanism of causation

7.7.4 describe different types of Intracranial hemorrhages, sequel & complications

7.7.5 discuss cerebral contusions

7.7.6 discuss diffuse axonal injuries

7.7.7 discuss diffuse vascular injury

7.7.8 discuss medico-legal significance of head injuries

7.8 Category of Hurt

7.8.1 discuss how each injury maybe categorized under the following- non-grievous hurt, grievous hurt, endangering life, fatal in ordinary course of nature, necessarily fatal

7.8.2 state the relevant penal code sections and their applications to medical practice

7.9 Penal code of Sri Lanka

7.9.1 outline of the relevant penal code sections to medical practice in Sri Lanka

7.10 Aging of Inquiries

7.10.1 describe different methods available for aging of injuries

7.10.2 describe macroscopic, microscopic, histo-chemical and radiological features that can help in aging of injuries

7.10.3 discuss the medico-legal significance of aging of injuries

7.11 Introduction to Forensic Pathology

7.11.1 list the key areas of forensic pathology

7.11.2 describe the scope of each key area

7.12 Different Injury Patterns

7.12.1 discuss the injury patterns in

a) self-inflicted injuries, suicidal injuries, fabricated injuries, injuries caused by friendly hand
b) defense injuries
c) falls and mob violence

7.13 Roles and responsibilities of a doctor in maintaining relationships

7.13.1 explain the term doctor patient relationship

7.13.2 outline qualities of a doctor expected in a doctor-patient relationship

7.13.3 describe when such a relationship starts and ends

7.13.4 outline doctor-doctor relationship: roles & responsibilities

7.13.5 outline doctor-patient relationships: roles and responsibilities

7.13.6 outline doctor-society relationship: roles & responsibilities

7.14 Legal disposal of a dead body

7.14.1 state why a death certificate is important

7.14.2 list the people who are eligible to issue a death certificate

7.14.3 list the circumstances under which a medical officer should issue a certificate of a medical cause of death

7.14.4 state the law related to disposing a dead body

7.14.5 describe how a dead body could be disposed legally if the death occurs at home or in a hospital

7.14.6 discuss “Minnesota” and “Istanbul” Protocols

7.15 Death investigation and inquest system of Sri Lanka

7.15.1 define the term inquest

7.15.2 state who orders an inquest

7.15.3 discuss the indications for an inquest

7.15.4 list the roles of each person involved in an inquest

7.15.5 discuss how inquirer receives information about death

7.15.6 list Inquirers duties at the scene

7.15.7 describe how an inquest is held

7.15.8 describe the procedure after the inquest

7.15.9 discuss the inquest law of Sri Lanka

7.15.10 discuss advantages and disadvantages of inquest system of Sri Lanka

7.16 Medico-legal and pathological autopsy

7.16.1 describe the procedure in requesting pathological autopsy

7.16.2 discuss the requirements for pathological autopsy

7.16.3 discuss aims & objectives of medico-legal autopsy

7.16.4 state how a case may be referred to the medical officer for judicial postmortem examination

7.16.5 describe the procedure prior to commencement of the judicial autopsy

7.17 Autopsy procedure and correct ethical practices

7.17.1 discuss objectives and prerequisites of autopsy

7.17.2 describe the technique of a routine autopsy and discuss different methods of opening body cavities

7.17.3 list the documents that can be used for the purpose of recording information at an autopsy

7.17.4 describe the procedure in recording information and reporting to courts

7.17.5 discuss Special dissection techniques

7.17.6 describe what is meant by a negative autopsy

7.17.7 what are the lab investigations you would carry out to determine the COD?

7.17.8 discuss preservation of viscera at autopsy

7.17.9 discuss ethical issues related to autopsy procedure

7.17.10 discuss steps to be followed in high risk autopsy

7.18 Post-mortem changes and time since death

7.18.1 list the different types of macroscopic postmortem changes

7.18.2 classify these changes according to the time of onset

a) Early changes
b) Late changes
c) Remote changes

7.18.3 describe the appearance of each of these changes

7.18.4 discuss the medico legal importance of each postmortem change

7.18.5 list the different methods that maybe used in the estimation of TSD

7.18.6 discuss the advantages and disadvantages of each method

7.19 Trace evidence

7.19.1 describe what is meant by trace evidence

7.19.2 discuss the importance of such in medico-legal practice

7.19.3 identify principles of collection and transport of trace material

7.20 Post-mortem artifacts

7.20.1 list the different types of artifacts that may be seen macroscopically on a dead body postmortem

7.20.2 describe the medico legal importance of identifying these artifacts

7.21 Exhumation

7.21.1 differentiate between exhumation and excavation

7.21.2 discuss the legal requirements in case of an exhumation

7.21.3 list the people involved in and the procedure in conducting an exhumation

7.21.4 list the circumstances under which an exhumation/excavation can be ordered

7.22 Transplantation of human tissue

7.22.1 discuss the basic concepts related to transplantation of human tissue act

7.22.2 discuss ethical and medico-legal issues related to transplantation of human tissue

7.23 High risk autopsy

7.23.1 define high risk autopsy

7.23.2 discuss the precautions to be taken during a high-risk autopsy

7.23.3 discuss the disposal of dead bodies in case of high-risk autopsies

7.24 Death

7.24.1 state what is death

7.24.2 list signs of death

7.24.3 describe the different types of death

a) Somatic death
b) Molecular death
c) Brain stem death

7.24.4 outline the steps on how to diagnose brain stem death

7.24.5 list the conditions that are necessary to diagnose clinic-somatic death

7.24.6 list conditions which simulate death (suspended animation)

7.25 Introduction to COD, mode of death and circumstances of death

7.25.1 describe what is meant by

a) cause of death
b) mode of death
c) manner of death/ circumstance

7.25.2 describe the correct documentation of COD, medical certification of death and filling the declaration of death form

7.26 Introduction to Forensic Toxicology

7.26.1 outline the duties of a doctor in a suspected case of poisoning

7.26.2 discuss laws in relation to poisons

7.26.3 categorize the classification of poisons

7.26.4 discuss diagnosis of poisoning in living

7.26.5 discuss autopsy diagnosis of poisoning

7.27 Sample collection in toxicology

7.27.1 discuss collection, storage and dispatch of different samples in the living

7.27.2 discuss collection, storage and dispatch of different samples in the dead

7.27.3 discuss how to maintain chain of custody

7.28 Pathology of drug abuse- Heroin

7.28.1 outline the available forms

7.28.2 state the circumstances / routes of entry

7.28.3 discuss the mechanism of actions

7.28.4 discuss the effects of Heroin / half life

7.28.5 discuss the metabolism

7.28.6 list the clinical features

7.28.7 outline the treatments

7.28.8 discuss the possible cause of death

7.28.9 state the macroscopic features suggestive of heroin abuse at the autopsy

7.28.10 list the investigations

7.29 Pathology of drug abuse- Cocaine

7.29.1 outline the available forms

7.29.2 state the circumstances/ routes of entry

7.29.3 discuss the mechanism of actions

7.29.4 discuss the effects of Cocaine / half life

7.29.5 discuss the metabolism

7.29.6 list the Clinical features

7.29.7 outline the treatments

7.29.8 discuss the possible cause of death

7.29.9 state the macroscopic features suggestive of Cocaine abuse at the autopsy

7.29.10 list the investigations

7.30 Pathology of drug abuse- Amphetamine

7.30.1 outline the available forms

7.30.2 state the circumstances/ routes of entry

7.30.3 discuss the mechanism of actions

7.30.4 discuss the effects of Amphetamine / half life

7.30.5 discuss the metabolism

7.30.6 list the clinical features

7.30.7 outline the treatments

7.30.8 discuss the possible cause of death

7.30.9 state the macroscopic features suggestive of Amphetamine abuse at the autopsy

7.31 Management of drug abuse

7.31.1 outline the management principles and medico-legal aspects of drug abuse

7.31.2 discuss sample collection and storage in relation to drug abuse

7.32 Medical Ethics

7.32.1 define medical ethics

7.32.2 state the 4 basic principles of medical ethics

a) Autonomy
b) Beneficence
c) Nonmaleficence
d) Justice

7.32.3 explain the above 4 principles

7.32.4 explain how a doctor may use above principles in his practice

7.32.5 list and explain ethical duties of a doctor to a patient, society and to each other (medical, paramedical and supportive staff) in the profession.

7.32.6 discuss conflict of interest in relation to medical practice

7.32.7 explain following concepts

a) Best possible care
b) Standard of care
c) Confidentiality
d) Undertaking treatment
e) Professional secrecy / medical confidentiality
f) Privileged communications
g) Irregular prescription of dangerous drugs

7.32.8 discuss different types of consents

a) Implied consent and oral consent.
b) Informed written consent.
c) Informed-written-witnessed consent

7.32.9 discuss problems associated with consent in,

a) patients with unsound mind (mental disorders)
b) patients who lack capacity to give consent (unconscious or mentally retarded)
c) children

7.33 Research Ethics

7.33.1 state laws safe guarding rights of research participants

7.33.2 explain the term “informed consent” with reference to bio medical research

7.33.3 identify ethical issues in bio medical research

7.33.4 explain the role of an ethical review committee

7.33.5 discuss how medical research can be conducted ethically

7.34 Sri Lanka Medical Council

7.34.1 state the composition of the medical council (SLMC)

7.34.2 state how members are appointed

7.34.3 explain the role and scope of SLMC

7.34.4 explain the registration process of medical graduates

7.34.5 discuss the disciplinary proceedings of SLMC

7.35 Medical Negligence

7.35.1 define medical negligence

7.35.2 list and describe the categories of medical negligence

a) Civil medical negligence
b) Criminal medical negligence
c) Res ipsa loquitor

7.35.3 identify and explain the elements to be proved in negligence

7.35.4 state and discuss defenses against negligence

7.35.5 describe what is “Bolam” test

7.36 Different medico-legal duties

7.36.1 outline the duties of a Medical Officer in the out-patient department

7.36.2 outline the duties of a House Officer in charge of a ward in a hospital

7.36.3 outline the duties of a director/ District Medical Officer of a hospital

7.36.4 outline the duties of a General Practitioner

7.37 Principals & Practice of Crime Scene Examination

7.37.1 state what is a crime scene

7.37.2 describe the role of the police investigators at a scene of crime

7.37.3 describe the role of the medical officer at a scene of crime

7.37.4 describe who, why and when to visit to a scene of crime

7.37.5 describe how to record and collect evidence at a scene of crime

7.37.6 describe how to dispatch a body from the scene to the mortuary

7.38 Burns

7.38.1 outline the aetiological classification of burns

a) Thermal burns
b) Chemical burns
c) Electrical burns
d) Mechanical/ Friction burns

7.38.2 outline different types of thermal burns

a) Scald burns
b) Flame burns
c) Flash burns
d) Contact burns
e) Radiant burns
f) Microwave burns

7.38.3 describe different features, sequelae and complication of each and their medico legal significance

7.38.4 outline how to differentiate ante-mortem burn form a post-mortem burn

7.38.5 discuss degree of burns

a) 1st degree burn
b) 2nd degree burn
c) 3rd degree burn
d) 4th degree burn

7.38.6 describe how to assess surface area of burns

7.38.7 discuss heat artifacts

a) Heat rupture
b) Heat fracture
c) Heat haematoma

7.38.8 discuss pathophysiology of complications of burns

7.38.9 discuss cause of death in burns

7.38.10 discuss medico-legal investigation of a burnt body

7.39 Death due to treatment surgery

7.39.1 list specific problems associated with death due to treatment, surgery or anaesthesia

7.39.2 discuss classification of deaths due to treatment, surgery or anaesthesia

7.39.3 discuss the autopsy procedure in deaths due to treatment, surgery or anaesthesia

a) Requirements at the autopsy
b) Analysis
c) Lab investigation
d) Cause of death
e) Allegations
f) Special safety measures

7.40 Death due to electrocution and lighting

7.40.1 discuss death due to low voltage (domestic) electrocution

a) definition
b) predisposing factors
c) circumstances
d) clinical features
e) cause of death
f) mechanism of death
g) post mortem features
h) investigations

7.40.2 discuss death due to high voltage electrocution

a) definition
b) predisposing factors
c) circumstances
d) clinical features
e) cause of death
f) mechanism of death
g) post mortem features
h) investigations

7.40.3 discuss medico-legal aspects of injuries following lightning

a) mechanism of causation of injury
b) post mortem findings
c) mechanism of death
d) investigation in a case of death due to lightning

7.41 Forensic Psychiatry

7.41.1 explain the term ‘Unsoundness of Mind’ and its legal implications

7.41.2 explain the basis of assessing unsoundness of mind

7.41.3 explain following terms

a) Testamentary capacity
b) Testimonial Capacity
c) Fitness to plead

7.41.4 explain how you would estimate testamentary capacity

7.41.5 define “dying declaration “and describe the procedure in recording a dying declaration

7.41.6 discuss the value of a dying declaration

7.41.7 define “dying deposition”

7.42 Sudden Natural Death – CNS, CVS, RS, GIT, GUT

7.42.1 define sudden death

7.42.2 define sudden natural death

7.42.3 discuss the causes, macroscopic and microscopic findings of sudden natural death in relation to CNS, CVS, RS, GIT and GUT

7.43 Sexual offenses

7.43.1 list and describe the different type of sexual offenses punishable according to the Sri Lankan law

7.43.2 state the laws related to sexual abuse in Sri Lanka

7.43.3 define rape according to the Sri Lankan law

7.43.4 describe the steps in the examination of a victim of sexual assault

7.43.5 describe the injuries that you would expect to find in a victim/ assailant of alleged sexual assault and discuss their interpretation

7.43.6 list the procedure in the collection, storage, labeling and transport of specimens from such a victim/ assailant and the relevant documentation

7.43.7 describe the steps in conducting the dissection of the perineum

7.43.8 discuss examination of a victim in a case of alleged anal intercourse

7.43.9 discuss examination, interpretation of injuries & reporting in a case of child sexual abuse

7.44 Firearm Inquiries

7.44.1 describe types of firearms (smooth bore and rifled), mechanisms of their operation and causation of injuries

7.44.2 describe how to identify entry/ exit wounds

7.44.3 describe how to estimate range/ direction/ angle of discharge

7.44.4 describe different types of bullets and cartridges

7.44.5 discuss possible circumstances - homicide/ suicide/ accident

7.44.6 describe the injuries caused by trap guns

7.45 Blast Injuries

7.45.1 define a bomb

7.45.2 discuss types of explosives

7.45.3 discuss mechanism of causation of injuries in bomb blasts

7.45.4 discuss different type of injuries seen in blasts and interpretation of injuries

a) Complete disruption
b) Fragmentation
c) Ballistic (Missile) injuries
d) Burns
e) Blast wave effects
f) Injuries from falling masonry

7.45.5 discuss investigation of bomb blast deaths

a) Identification
b) Number of victims
c) Cause of death
d) Manner of death
e) Reconstruction

7.46 Transportation Injuries

7.46.1 discuss passenger injuries and death under following headings

a) Definition
b) Incidents
c) Causes for passenger deaths and injuries.
d) Different causes of deaths.
e) Factors contribute to passenger deaths.
f) Factors that depend on passenger injuries
g) Different types of injuries and their interpretation
   - Injuries of driver
   - Injuries of front seat passenger

- Injuries to the rear seat passenger/s
- Injuries to restrained passengers

7.46.2 discuss pedestrian injuries and death under following headings

a) Definition
b) Types
   - Primary impact injuries
   - Secondary impact injuries
   - Secondary injuries or tertiary injuries.
   - Run over injuries
c) Predisposing factors
d) Different causes of death
e) Manner of death
f) Post mortem run over

7.46.3 discuss investigation in a case of 'Hit and Run' accident

7.46.4 describe the patterns of injuries sustained by riders of motorcycles and pedal cycles

7.46.5 describe the patterns of injuries in railway accidents

7.47 Asphyxia

7.47.1 define asphyxia

7.47.2 discuss asphyxia signs and their diagnosis

7.47.3 discuss mechanism of death in asphyxia

7.47.4 list the causes of asphyxia with their definitions

a) Suffocation
b) Smothering
c) Choking
d) Ligature strangulation
e) Manual strangulation
f) Hanging
g) Traumatic asphyxia
h) Postural asphyxia
i) Traumatic asphyxia combined with smothering (overlaying)

7.47.5 describe the post mortem appearance of each one of the above, giving the underlying mechanism

7.47.6 discuss the medico legal aspects of each

7.47.7 describe the steps in conducting the dissection of the neck and face

7.48 Drowning

7.48.1 define drowning

7.48.2 list the probable circumstances of death in a body recovered from water

7.48.3 list the mechanism of death in drowning

7.48.4 list post mortem findings of immersion

7.48.5 list post mortem findings of drowning

7.48.6 discuss the method of lab diagnosis of drowning

7.49 Child abuse

7.49.1 define child abuse

7.49.2 outline the incidence of child abuse

7.49.3 list the different types of child abuse

a) Physical child abuse
b) Child Sexual abuse
c) Psychological abuse
d) Child neglect
e) Use of children for begging
f) Child labour
g) Conscription in armies
h) Manchausen syndrome by proxy
i) Intentional drugging or poisoning

7.49.4 describe the classical features suggestive of child abuse

7.49.5 describe the differential diagnosis for injuries suspected of child abuse

7.49.6 discuss how to diagnose child abuse

7.49.7 list causes for child abuse

7.49.8 state the laws regarding child abuse

7.49.9 describe the medico legal investigation in cease of a suspected child abuse

7.49.10 discuss medico-legal management of child abuse and how to conduct case conference

7.50 Starvation and Neglect

7.50.1 define starvation/neglect

7.50.2 discuss causes & circumstances

7.50.3 describe the features suggestive of starvation and neglect

7.51 Medico-legal aspects of domestic violence

7.51.1 discuss circumstances, methods used, diagnosis and management of domestic violence

7.51.2 outline the legal aspects of domestic violence

7.52 Infanticide

7.52.1 define infanticide

7.52.2 state the law of infanticide

7.52.3 discuss aims of postmortem examination

a) Establish whether the child was born alive
b) Act of commission or omission and cause of death
c) Delivery is complete or in complete
d) Age of the child
e) Identification of the child and it's mother

7.53 SIDS

7.53.1 define SIDS

7.53.2 outline the Incidence of SIDS

7.53.3 discuss the possible manner of death

7.53.4 discuss differential diagnosis

7.53.5 list pre disposing factors

7.53.6 discuss possible cause of death

7.53.7 discuss post- mortem features

7.53.8 list the investigations necessary to arrive a diagnosis of SIDS

7.54 Criminal miscarriage/ Abortion

7.54.1 define criminal miscarriage

7.54.2 discuss the methods used

7.54.3 describe the injuries and clinical features of criminal miscarriage

7.54.4 list the causes of death

7.54.5 state the law regarding criminal miscarriage

7.54.6 describe the pelvic dissection technique

7.54.7 discuss special dissection techniques to be used in case of suspected thrombo-embolism and air embolism

7.54.8 discuss aging of the fetus

7.55 Deaths associated with pregnancy

7.55.1 define maternal death and pregnancy related death

7.55.2 outline the incidence of maternal death in Sri Lanka and developed countries

7.55.3 discuss causes of death in pregnancy

7.55.4 discuss medico-legal importance of pregnancy

7.56 Hypothermia and hyperthermia

7.56.1 discuss mechanism of maintenance of body temperature

7.56.2 discuss definition, incidence, circumstances, causes, clinical features, cause of death and post-mortem features in case of Hyperthermia

7.56.3 discuss definition, pathophysiology, clinical features and complications of malignant hyperthermia

7.56.4 discuss definition, incidence, circumstances, causes, clinical features, cause of death and post-mortem features in case of Hypothermia

7.57 Death in custody

7.57.1 define death in custody

7.57.2 discuss possible causes of death

a) Die during arrest
b) Die just after arrest or just after struggling
c) Die while in custody
d) Die during escape

7.57.3 discuss special approaches required in the post-mortem examination

7.58 Medico-legal aspects of torture

7.58.1 define torture

7.58.2 list international laws related to human rights and torture

7.58.3 discuss doctor's duty in the management of torture

7.58.4 list the methods of torture

7.58.5 list the clinical features of torture

7.58.6 state the causes of death in torture

7.58.7 state the medico-legal aspect of torture

7.58.8 describe the especial dissecting techniques in deaths following torture

7.59 Human rights and health care rights

7.59.1 define the term human rights

7.59.2 identify fundamental elements in human rights

7.59.3 list main human Rights documents and identify their key concepts

7.59.4 outline health rights of patients

7.59.5 outline rights of doctors

7.60 Examination of a drunken person

7.60.1 list the offences committed under the influence of alcohol (Check the ordinance)

7.60.2 state the laws regarding drinking and driving

7.60.3 describe how a patient is examined for drunkenness clinically

7.60.4 describe how a breathalyzer test is carried out

7.60.5 list conditions which simulate drunkenness

7.60.6 discuss causes of deaths in alcoholics

7.60.7 discuss alcohol withdrawal

7.61 Identification for medico-legal purposes

7.61.1 explain the value of identification for medico-legal purpose

7.61.2 explain circumstances where issue of identification arises

7.61.3 list and explain the basis for the method/methods for identification in each of the circumstance above

7.61.4 explain the basis of special techniques used in “Specific Identification”- DNA applications in forensic medicine

7.62 Mass disaster & management of the dead

7.62.1 define mass disaster

7.62.2 discuss the phases of mass disaster

a) Initial response
b) Consolidation phase
c) Recovery phase
d) Restoration

7.62.3 discuss management of mass disaster

a) Visit to the scene
b) Activation of other authorities

c) Establishment of centers
d) Management of dead bodies

7.63 Blood stain analysis

7.63.1 discuss physical pattern analysis

7.63.2 discuss assessment of cause of death by blood found at the scene of crime

7.63.3 discuss assessment of time since death by using blood found at scene of crime

7.63.4 discuss laboratory investigation of blood found at scene of crime

7.64 Heavy metal poisoning

7.64.1 discuss mean lethal dose, availability, circumstances, route of entry, mechanism of action, metabolism, clinical features, treatments, cause of death and post mortem features of the following heavy metals

a) Arsenic poisoning
b) Lead poisoning

7.65 Plant poisoning

7.65.1 discuss availability, circumstances, route of entry, mechanism of action, metabolism, clinical features, treatments, cause of death and post mortem features of the following plants

- *Datura stramonium* (attana*)*
- *Mannihot utilisima* (manioc)
- *Gloriosa superba* (niyangala*)*
- *Adenia palmate* (hondala)
- *Thevetia peruviana* (yellow oliyender/ Kaneru)
- *Strichnus nuxvomica* (goda kadura)
- *Ricinous communis* (caste)

7.66 Therapeutic drug poisoning

7.66.1 discuss availability, circumstances, route of entry, mechanism of action, metabolism, clinical features, treatments, cause of death and post mortem features of the following drugs

a) Aspirin
b) Paracetamol
c) Antidepressant-TCA

d) Anxiolytics
   - Benzodiazepines
   - Barbiturates

7.67 Pesticide and Weedicide poisoning

7.67.1 discuss availability, circumstances, route of entry, mechanism of action, metabolism, clinical features, treatments, cause of death and post mortem features of the following poisons

a) Organophosphate
b) Paraquat

7.68 Gas poisoning

7.68.1 discuss availability, circumstances, rout of entry, action and mechanism of death, clinical features, investigations, treatments, cause of death, manner of death and post- mortem features of the following poisoning gases

a) Carbon monoxide
b) Cyanide

7.69 Introduction to Forensic Radiology

7.69.1 discuss when radiology becomes important in medico legal work

7.70 Introduction to Forensic Anthropology

7.70.1 list investigations from bones

7.70.2 describe specific identification from bones

7.70.3 describe sex assessment of the bones

7.70.4 describe age assessment of the bones

7.70.5 describe race assessment of the bones

7.70.6 describe stature assessment from bones

7.71 Forensic Photography

7.71.1 discuss the use of photography in forensic practice

7.72 Forensic DNA Profiling

7.72.1 discuss basic steps in Forensic DNA profiling

7.73 Chemical & Biological Weapon

7.73.1 discuss medico-legal significance of chemical & biological weapon

8. Department of Pathology

Vision

To be a national leader in academic, research and diagnostic pathology

Mission

Department of Pathology strives to provide a quality working environment while fostering unity, respect, professional growth and equity

General objectives

1. To introduce students to the basic pathological processes that underlies all diseases
2. To relate the disease processes to the clinical symptoms and signs
3. To provide sufficient factual details on pathology of common and important diseases affecting specific organs and organ systems. This includes pathogenesis, pathological changes and the natural outcomes of diseases
4. To provide knowledge in how laboratory investigations can establish the true nature of the illness and monitor its progress and response to therapy
5. To integrate basic pathology into the decision-making process for patient care

Learning objectives

At the end of each session, students should be able to

8.1 Clinical Pathology appointment

8.1.1 understand the work of Pathology Laboratory in patient management

8.1.2 identity limitations of laboratory testing

8.1.3 use the Pathology laboratory for diagnosis and optimum patient management

8.1.4 Objectives of practical classes

8.1.4.1 reinforce the knowledge gained at lectures using gross specimens and microscopic images/ slides

8.1.4.2 acquire skills in making accurate observations and precise description of organ and tissue changes in diseases using appropriate terminology

8.2 General Pathology

8.2.1 Cellular Injury, Cell Death and Degeneration

8.2.1.1 list the common causes of cell injury

8.2.1.2 give examples of reversible cellular injury and explain the morphologic and ultrastructural changes associated with both

8.2.1.3 define cell death, including the different morphological types (necrosis and apoptosis) and their significance

8.2.1.4 list and describe the different types of necrosis in tissue or organs, including their morphology and aetiology

8.2.1.5 identity the types of degenerative changes in tissues and their morphology with examples for each

8.2.2 Inflammation

8.2.2.1 Acute Inflammation

8.2.2.1.1 define acute inflammation

8.2.2.1.2 explain the sequence of vascular and cellular events in the histologic evolution of acute inflammation

8.2.2.1.3 identity the roles of various “chemical mediators” of acute inflammation

8.2.2.1.4 explain the possible patterns of acute inflammation

8.2.2.1.5 explain the possible outcomes of acute inflammation

8.2.2.1.6 identify the clinical manifestations of acute inflammation with reference to their underlying pathogenetic mechanisms

8.2.2.2 Chronic Inflammation

8.2.2.2.1 define chronic inflammation

8.2.2.2.2 list the causes of chronic inflammation

8.2.2.2.3 explain the morphologic patterns, principal cells of chronic inflammation

8.2.2.2.4 define chronic granulomatous inflammation

8.2.2.2.5 list examples of diseases with granulomatous inflammation

8.2.2.2.6 describe the morphology of granulomatous inflammation

8.2.2.2.7 identity the clinical manifestations of chronic inflammation with reference to their underlying pathogenetic mechanisms

8.2.2.2.8 explain the possible outcomes of chronic inflammation

8.2.2.2.9 describe the aetiology, pathogenesis, morphology and complications of chronic inflammation with regard to tuberculosis and syphilis

8.2.3 **Regeneration and Repair**

8.2.3.1 classify cells (with examples) based on their regenerative activity

8.2.3.2 define and contrast regeneration and repair

8.2.3.3 explain the processes of wound healing by primary and secondary intension with examples

8.2.3.4 outline the basic steps in fracture healing

8.2.3.5 list and discuss the factors (local and systemic) that influence the rate of wound healing

8.2.4 **Pathological Calcification**

8.2.4.1 define pathological calcification

8.2.4.2 briefly describe the mechanism of calcification

8.2.4.3 identify the two main types of pathological calcification with examples in relation to aetiology, pathogenesis, morphology and clinical effects

8.2.5 **Pathological Pigmentation**

8.2.5.1 identify exogenous and endogenous pigments in the body

8.2.5.2 explain the distribution, morphology and clinical significance of exogenous and endogenous pigments in the body

8.2.6 **Circulatory Disturbances**

8.2.6.1 Oedema, Congestion and Hyperemia

8.2.6.1.1 define oedema and its pathological basis

8.2.6.1.2 explain the range of clinical effects of oedema

8.2.6.1.3 compare and contrast hyperaemia and congestion

8.2.6.1.4 identify the causes of acute and chronic congestion of lungs, liver and describe the morphological changes

8.2.6.2 Shock

8.2.6.2.1 define shock

8.2.6.2.2 explain different types and causes of shock and highlight the pathogenesis of shock in each type

8.2.6.2.3 identify the stage of shock and explain the pathophysiological changes and clinical features at each stage

8.2.6.2.4 describe the morphological changes produced by shock in relation to different organs

8.2.6.2.5 explain the pathological basis of shock in a given clinical scenario

8.2.7 **Thrombosis**

8.2.7.1 define thrombosis, distinguish it from clotting

8.2.7.2 list the main factors (Virchow triad) that predispose to thrombosis

8.2.7.3 compare and contrast venous and arterial thrombosis in relation to the predisposing factors, morphology and clinical effects

8.2.7.4 explain the fate of a thrombus

8.2.8 **Embolism**

8.2.8.1 define embolism

8.2.8.2 classify embolism

8.2.8.3 describe each type of embolism in relation to the causes, pathogenesis and clinical effects

8.2.9 **Infarction**

8.2.9.1 define infarction

8.2.9.2 distinguish arterial and venous infarcts and list common sites

8.2.9.3 identify the main causes of infarction in a given clinical situation

8.2.9.4 explain the difference between the pathogenesis of red and pale infarcts

8.2.9.5 analyze clinical effects of commonly occurring ischemic events due to thrombosis and embolism to identify mechanisms, pathogenesis, relevant investigations and predict usual outcomes

8.2.10 **Amyloid**

8.2.10.1 describe the properties of amyloid

8.2.10.2 describe the types of amyloid

8.2.10.3 using clinical examples, compare and contrast systemic and localized amyloidosis

8.2.10.4 describe the macroscopic and microscopic findings of amyloidosis and correlate it to the possible clinical implications

8.2.11 **Disorders of growth**

8.2.11.1 identify major adaptive reactions in tissues to persistent stress

8.2.11.2 define hypertrophy, hyperplasia, atrophy, metaplasia and dysplasia

8.2.11.3 compare and contrast the different types of disorders of growth

8.2.11.4 describe the aetiology, morphology and clinical effects of major adaptive reactions with examples

8.3 Tumour Pathology

8.3.1 define the term neoplasia

8.3.2 describe the different classifications of tumour

8.3.3 describe the nomenclature of tumours according to the tissue of origin

8.3.4 describe macroscopic and microscopic features of benign tumours

8.3.5 describe macroscopic and microscopic features of malignant tumours

8.3.6 describe the cytological features of malignancy

8.3.7 describe the mechanism of carcinogenesis

8.3.8 list carcinogenic agents

8.3.9 list the known chemical carcinogens and their associated tumours

8.3.10 define initiators and promoters in carcinogenesis

8.3.11 list oncogenic viruses and their associated tumours

8.3.12 briefly describe the carcinogenic effect of radiation with examples

8.3.13 describe routes of tumour spread and mechanism of tumour metastasis

8.3.14 describe the effects of benign and malignant tumours

8.3.15 define para-neoplastic syndrome

8.3.16 list tumors associated with para-neoplastic syndrome

8.3.17 describe the term pre-invasive malignancy

8.3.18 list pre-invasive malignancies

8.3.19 list prognostic markers of malignancies

8.3.20 list the investigations done to diagnose a tumour

8.3.21 describe the important aspects in transport of specimens for cytology and histological assessment

8.3.22 list tumour markers and their associated tumours

8.3.23 describe the

- common sites
- macroscopic appearance

- microscopic appearance
- relevant tumour markers-if available, of common tumours

8.4 Cardiovascular System

8.4.1 Arterial diseases

8.4.1.1 list the type of arteriosclerosis

8.4.1.2 describe the aetiology and pathogenesis of atherosclerosis

8.4.1.3 describe the morphological changes in atherosclerosis including complications

8.4.1.4 explain the clinical effects of atherosclerosis in small and large arteries

8.4.1.5 describe the pathogenesis and clinical effects of arteriolosclerosis

8.4.1.6 briefly describe Monckeberg's arteriosclerosis

8.4.1.7 define aneurysm

8.4.1.8 describe pathogenesis, morphology and clinical effects of aneurysm

8.4.1.9 list types of vasculitis and their clinical effects

8.4.2 Ischaemic heart disease

8.4.2.1 list the risk factors of ischaemic heart disease

8.4.2.2 describe the syndromes of myocardial ischaemia

8.4.2.3 explain the pathological basis of different types of myocardial ischaemia

8.4.2.4 describe the morphology of acute and chronic ischaemic heart disease

8.4.2.5 describe the complications of ischaemic heart disease

8.4.2.6 list the causes of sudden cardiac death

8.4.3 Cardiomyopathy and myocarditis

8.4.3.1 classify cardiomyopathy

8.4.3.2 describe causes and the morphology of cardiomyopathy

8.4.3.3 explain the pathological basis of clinical effects of cardiomyopathy

8.4.3.4 list the aetiological agents of myocarditis

8.4.3.5 describe the morphology of myocarditis

8.4.3.6 describe the clinical effects of myocarditis

8.4.4 Rheumatic heart disease

8.4.4.1 describe the aetiology and pathogenesis of rheumatic heart disease

8.4.4.2 describe the morphology of acute and chronic rheumatic heart disease

8.4.4.3 explain the pathological basis of clinical effects of rheumatic heart disease, including complications

8.4.5 **Infective endocarditis**

8.4.5.1 describe a vegetation

8.4.5.2 list conditions in which vegetations can be seen in the heart

8.4.5.3 identify the features of infective endocarditis

8.4.5.4 classify infective endocarditis

8.4.5.5 compare and contrast the pathogenesis of acute and sub-acute infective endocarditis

8.4.5.6 explain the pathological basis of clinical manifestations of infective endocarditis

8.4.5.7 describe the pathological changes of different types of infective endocarditis

8.4.5.8 describe the complications of infective endocarditis

8.4.5.9 compare and contrast nonbacterial thrombotic endocarditis, endocarditis of Systemic Lupus Erythematosus (SLE) and infective endocarditis

8.4.6 **Heart failure**

8.4.6.1 describe the aetiology and pathogenesis of heart failure

8.4.6.2 define cor-pulmonale

8.4.6.3 explain the pathological basis of clinical features of heart failure

8.5 Respiratory Pathology

8.5.1 **Acute pneumonia**

8.5.1.1 define pneumonia

8.5.1.2 classify pneumonia

8.5.1.3 describe the pathogenesis

8.5.1.4 describe the morphological changes in pneumonia

8.5.1.5 correlate the pathological changes with the clinical features

8.5.1.6 explain the pathological basis of complications of pneumonia

8.5.2 **Tuberculosis**

8.5.2.1 describe the factors predisposing to pulmonary tuberculosis

8.5.2.2 describe the pathogenesis of pulmonary tuberculosis

8.5.2.3 describe the progression of pulmonary tuberculosis

8.5.2.4 describe the morphological changes in pulmonary tuberculosis

8.5.2.5 explain the pathological basis of the clinical effects of pulmonary tuberculosis

8.5.2.6 describe the morphology and clinical effects of extra pulmonary tuberculosis

8.5.3 **Chronic obstructive pulmonary disease (COPD)**

8.5.3.1 list the entities considered under COPD

8.5.3.2 describe the pathogenesis of COPD

8.5.3.3 describe the morphology of COPD

8.5.3.4 explain the pathological basis of clinical effects of COPD including complications

8.5.4 **Chronic diffuse intestinal lung diseases**

8.5.4.1 list the entities considered under Chronic diffuse intestinal lung diseases

8.5.4.2 describe the pathogenesis of Chronic diffuse intestinal lung diseases

8.5.4.3 describe the morphology of Chronic diffuse intestinal lung diseases

8.5.4.4 explain the pathological basis of clinical effects of including complications Chronic diffuse intestinal lung diseases

8.5.5 **Tumour of respiratory system**

8.5.5.1 classify lung tumour

8.5.5.2 describe the aetiology and pathogenesis of lung tumours

8.5.5.3 describe the morphology of lung carcinoma

8.5.5.4 explain the pathological basis of clinical effects of primary lung and pleural tumours

8.5.5.5 describe paraneoplastic syndrome related to lung carcinoma

8.5.5.6 describe metastatic lung tumours

8.5.5.7 explain the value of pathological investigation in the diagnosis of lung tumours

8.5.6 **Other lung diseases**

8.5.6.1 describe the aetiology, pathogenesis and morphology of

a) ARDS (Acute respiratory distress syndrome)
b) Pulmonary thromboembolism
c) Pulmonary infarction
d) Pulmonary congestion and oedema
e) Pleural effusion

8.5.6.2 explain the pathological basis of clinical effects of the above lung diseases

8.6 Gastro intestinal tract

8.6.1 **Oesophagus**

8.6.1.1 list the congenital abnormalities of oesophagus

8.6.1.2 list the lesions associated with motor dysfunction

8.6.1.3 list the causes of oesophagitis

8.6.1.4 describe the pathogenesis of oesophagitis

8.6.1.5 describe the morphology of Barrett's oesophagus

8.6.1.6 list of the complications of Barrett's oesophagus

8.6.1.7 describe the clinical presentation of oesophageal tumours

8.6.1.8 list the factors associated with development of squamous cell carcinoma of oesophagus

8.6.1.9 describe the morphology of squamous cells carcinoma of oesophagus

8.6.2 **Stomach**

8.6.2.1 list the causes of gastritis

8.6.2.2 classify gastritis

8.6.2.3 briefly describe each type of gastritis

8.6.2.4 describe the morphological features of acute gastritis

8.6.2.5 describe the morphological features of chronic gastritis

8.6.2.6 list causes of peptic ulcer

8.6.2.7 list the complications of chronic peptic ulceration

8.6.2.8 describe briefly the aetiology and pathogenesis of chronic peptic ulcer

8.6.2.9 list the pre-malignant lesions of the stomach

8.6.2.10 list the tumours of stomach

8.6.2.11 list the clinical features of gastric carcinoma

8.6.2.12 describe the morphological features of gastric carcinoma

8.6.2.13 describe the spread of gastric carcinoma

8.6.3 **Intestine**

8.6.3.1 list the infective diseases affecting the intestine

8.6.3.2 briefly describe the pathogenesis of typhoid fever

8.6.3.3 briefly describe the morphological features of the intestine in typhoid fever

8.6.3.4 list the complications of typhoid fever

8.6.3.5 describe primary and secondary intestinal TB with morphological features

8.6.4 **Appendicitis and mal-absorption syndromes**

8.6.4.1 describe the macroscopic appearance of the appendix in appendicitis

8.6.4.2 describe the microscopic features of appendicitis

8.6.4.3 list the complication of appendicitis

8.6.4.4 list the malabsorption syndromes

8.6.4.5 describe the important malabsorption syndromes in relation to aetiology, pathogenesis, morphology and clinical features including complications

8.6.5 **Inflammatory bowel disease**

8.6.5.1 describe ulcerative colitis and Crohn's disease in relation to aetiology, pathogenesis, morphology and clinical features including complications

8.6.5.2 compare and contrast ulcerative colitis and Crohn's disease

8.6.6 **Intestinal tumours**

8.6.6.1 list the tumour of small and large intestine

8.6.6.2 list the types of intestinal polyps

8.6.6.3 describe briefly the macroscopic appearance of each type of polyps with emphasis on adenomatous polyps

8.6.6.4 list the polyposis syndromes and briefly describe adenomatous polyposis coli

8.6.6.5 list the pre-malignant lesions in the colon

8.6.6.6 describe colorectal carcinoma in relation to in relation to aetiology, pathogenesis, morphology and clinical features including complications

8.6.6.7 describe the spread and prognosis of colorectal carcinoma

8.6.6.8 describe the Duke's staging for colorectal carcinoma

8.6.6.9 list the types of tumours of the anal canal

8.7 Liver pathology

8.7.1 **Cirrhosis & portal hypertension**

8.7.1.1 define cirrhosis

8.7.1.2 list the causes of cirrhosis

8.7.1.3 briefly describe the aetiology, pathogenesis, clinical features including complications of cirrhosis

8.7.1.4 describe macroscopic and microscopic appearances of liver in cirrhosis

8.7.1.5 list the aetiology, pathogenesis, clinical features including complete of portal hypertension

8.7.2 **Hepatitis and liver abscess**

8.7.2.1 list the viruses that can cause inflammation of the liver

8.7.2.2 describe the pathogenesis in relation to aeitiology, pathogenesis, morphology and clinical features including complications

8.7.2.3 list the clinicopathological syndromes develop in viral hepatitis

8.7.2.4 list the causes of liver abscess

8.7.2.5 briefly describe the macroscopic appearance of liver abscess

8.7.3 **Toxin induced liver diseases**

8.7.3.1 list the types of hepatotoxins

8.7.3.2 describe alcoholic liver disease in relation to, pathogenesis, morphology and clinical features including complications

8.7.3.3 briefly describe other toxin induced liver diseases including hemochromatosis, Wilsons diseases and drug induced liver injury

8.7.4 **Liver tumours & cholelithiasis**

8.7.4.1 list the common tumours seen in the liver

8.7.4.2 briefly describe the aetiology, pathogenesis, morphology of hepatocellular carcinoma

8.7.4.3 briefly describe metastatic tumours of the liver

8.7.4.4 briefly describe the pathogenesis clinical features and complications of cholelithiasis

8.8 Renal Pathology

8.8.1 **Glomerular disease – An introduction and overview**

8.8.1.1 list the different clinical syndromes of renal diseases

8.8.1.2 describe the characteristic clinical features of each syndrome

8.8.1.3 classify Glomerular diseases

8.8.1.4 describe the aetiology and pathogenesis of glomerular diseases

8.8.1.5 describe the common morphological features of glomerulonephritis

8.8.1.6 explain the pathological basis for the clinical features observed in glomerular diseases

8.8.2 **Primary glomerular diseases**

8.8.2.1 list the common histological types of primary glomerulonephritis which cause Nephrotic syndrome and Nephritic syndrome

8.8.2.2 describe the pathogenesis morphology and laboratory findings in the following primary Glomerular diseases

a) Acute diffuse proliferative GN
b) Crescentic GN

c) Minimal change disease
d) Membranous GN
e) Membrano-proliferative GN
f) Focal segmental glomeruli-sclerosis

8.8.3 **Secondary glomerular diseases and the vascular diseases of the kidney**

8.8.3.1 briefly describe the pathology and the laboratory findings in the following Glomerular diseases

a) Systemic lupus erythematosus
b) Infective endocarditis
c) Good pasture syndrome
d) Diabetic mellitus
e) Amyloidosis

8.8.3.2 briefly describe the pathological features observed in the kidneys in essential and malignant hypertension

8.8.4 **Diseases affecting tubules and the interstitium**

8.8.4.1 classify tubulo-interstitial nephritis

8.8.4.2 describe pyelonephritis in relation to aetiology, pathogenesis, morphology and clinical features including complications

8.8.4.3 briefly describe Interstitial nephritis and Acute tubular necrosis

8.8.4.4 list the causes of urolithiasis

8.8.4.5 classify calculi according to chemical composition

8.8.4.6 explain the morphology, clinical features including complication of urolithiasis

8.8.4.7 list causes of obstructive uropathy

8.8.4.8 briefly describe morphology, clinical features and complication of obstructive uropathy

8.8.5 **Neoplasms of the kidney**

8.8.5.1 classify the benign and malignant neoplasms of the kidney, renal pelvis and the bladder

8.8.5.2 describe the aetiopathogenesis, Clinical features and morphology of the following neoplasms

a) Renal cell carcinoma
b) Nephroblastoma

c) Urothelial carcinoma

8.9 Female genital tract

8.9.1 understand the basis of Cervical Intraepithelial Neoplasia (CIN)

8.9.2 discuss the aetiology, pathogenesis, morphology and clinical features including complications of cervical carcinoma

8.9.3 discuss the aetiology and clinicopathological features of pathological conditions of endometrium, including endometritis, endometrial hyperplasia & endometrial carcinoma

8.9.4 describe the clinicopathological features, macroscopy, and microscopy of leiomyoma of uterus

8.9.5 understand ovarian tumours including classification and clinicopathological features

8.9.6 describe macroscopy and microscopy of special types of ovarian tumours. E.g., Teratoma

8.9.7 describe the clinicopathological features, macroscopy and microscopy of gestational trophoblastic diseases with special emphasis on hydatidiform mole

8.10 Breast Pathology

8.10.1 discuss the aetiology and clinicopathologic features of different forms of benign non-neoplastic and neoplastic breast diseases with special emphasize to conditions which mimic malignancy

8.10.2 identify benign breast diseases that increase patients' risk of developing breast cancer

8.10.3 classify malignant tumours of breast

8.10.4 describe the concept of in situ carcinoma in breast and the clinical significance

8.10.5 identify the prognostic/predictive factors of breast cancer

8.11 Male genital tract

8.11.1 briefly describe outline of inflammatory lesions of testis & epididymis

8.11.2 briefly describe classification, clinicopathological features, macroscopy and microscopy of testicular tumours with special emphasizes to seminoma

8.11.3 discuss clinicopathology, macroscopy and microscopy of Benign prostatic hyperplasia and Prostatic carcinoma

8.11.4 briefly describe the pre-malignant lesions of penis

8.11.5 describe aetiopathogenesis and morphology of carcinoma penis

8.12 Reticuloendothelial System

8.12.1 Pathology of lymph node enlargement and splenomegaly

8.12.1.1 list the causes for lymphadenopathy

8.12.1.2 briefly describe morphology of specific infections of lymph nodes with special reference to tuberculous lymphadenitis

8.12.1.3 list the causes for splenomegaly

8.12.1.4 briefly describe of splenic infarctions

8.12.2 Lymphoma

8.12.2.1 explain the clinical features of lymphoma

8.12.2.2 briefly describe the classification of lymphoma

8.12.2.3 discuss the difference between Hodgkin and Non-Hodgkin lymphoma

8.12.2.4 describe the morphological patterns of specific lymphomas (Hodgkin lymphoma, follicular lymphoma, lymphomas with diffuse pattern)

8.12.2.5 list the methods used in diagnosis of lymphoma

8.13 Bone Pathology

8.13.1 briefly describe the following non-neoplastic disorders, in terms of aetiology, pathogenesis, morphology, and clinical findings; osteoporosis, osteomalacia, hyperparathyroidism, Paget disease, renal osteodystrophy

8.13.2 describe infections of bone and joints (acute/ chronic osteomyelitis and tuberculosis) including pathogenesis, morphology and complications

8.13.3 classify tumours of bone

8.13.4 describe the clinicopathological features of common bone and cartilage tumours (Chondroma chondrosarcoma, osteosarcoma, giant cell tumour of bone)

8.14 Central Nervous System

8.14.1 Cerebral oedema & increased intracranial pressure

8.14.1.1 briefly describe the pathogenesis of cerebral oedema

8.14.1.2 briefly describe the macroscopic appearance of cerebral oedema

8.14.1.3 list causes of raised intracranial pressure

8.14.1.4 describe in relation to aetiology, pathogenesis, morphology and clinical features including complications of brain herniation

8.14.1.5 list causes of hydrocephalus

8.14.2 **Traumatic injuries of brain**

8.14.2.1 briefly describe parenchymal injuries of brain (concussion, direct parenchymal injury and diffuse axonal Injury)

8.14.2.2 briefly describe in relation to aetiology, pathogenesis, morphology and clinical features including complications of traumatic vascular injury (epidural and subdural haematoma)

8.14.3 **Intra cranial haemorrhages**

8.14.3.1 list causes of spontaneous intracerebral haemorrhages

8.14.3.2 briefly describe in relation to aetiology, pathogenesis, morphology and clinical features including of hypertensive cerebrovascular disease

8.14.3.3 briefly describe in relation to aetiology, pathogenesis, morphology and clinical features including complications of subarachnoid haemorrhage

8.14.4 **Cerebral Hypoxia, ischemia and infarction**

8.14.4.1 briefly describe the pathophysiology of hypoxia, ischaemia and infarction of brain

8.14.4.2 list the causes of cerebral infarcts

8.14.4.3 briefly describe the morphology and clinical effects of cerebral infarction

8.14.5 **Infections**

8.14.5.1 list the causative organisms in meningitis

8.14.5.2 describe the pathogenesis, morphology, clinical effects and complications of meningitis

8.14.5.3 list the causes of viral meningo encephalitis

8.14.5.4 describe predisposing factors of cerebral abscess

8.14.5.5 describe the CSF changes in viral, bacterial and tuberculous meningitis

8.14.6 **CNS Tumours**

8.14.6.1 classify brain tumours

8.14.6.2 list the brain tumours seen in childhood

8.14.6.3 list the brain tumours seen in adult

8.14.6.4 describe clinicopathological effects of intracranial tumours

8.14.6.5 briefly describe the morphology of common brain tumours

8.15 Chemical Pathology

8.15.1 Introduction to Chemical Pathology

8.15.1.1 describe the scope & clinical significance of tests in Chemical Pathology

8.15.1.2 describe the total testing process and the role of the requesting doctor in the pre-analytical and the post-analytical phases

8.15.1.3 describe the principles of sample collection and transport requirements for common general biochemical and specialized biochemical investigations

8.15.1.4 be able to interpret common biochemical test reports

8.15.2 Water & electrolytes

8.15.2.1 assess the level of hydration & volume status of patients

8.15.2.2 explain the pathological basis and consequences of water depletion and excess

8.15.2.3 explain the pathological basis of common electrolyte disturbances in patients

8.15.2.4 plan and interpret basic investigations in electrolyte disturbances to arrive at a definitive diagnosis

8.15.3 Acid base balance

8.15.3.1 explain the mechanisms of acid production in the body

8.15.3.2 explain the mechanisms of regulating blood pH

8.15.3.3 explain the pathological basis and biochemical findings in simple acid base disorders

8.15.3.4 collect samples for arterial blood gas analysis & interpret results

8.15.3.5 request other biochemical investigations and interpret their results to identify the aetiology in a given acid base disorder

8.15.4 Diabetes mellitus

8.15.4.1 list the different types of diabetes mellitus and describe the aetiopathogenesis in each type

8.15.4.2 select appropriate diagnostic tests based on the clinical context and interpret results

8.15.4.3 request relevant biochemical tests for management of glycaemic control & other long-term complications

8.15.4.4 detect acute metabolic complications of diabetes mellitus and request baseline laboratory tests for their management

8.15.4.5 describe the principles of screening for type 2 diabetes & gestational diabetes mellitus

8.15.5 **Disorders of lipid metabolism**

8.15.5.1 describe the basic structure and metabolism of lipoproteins in plasma

8.15.5.2 explain the pathological basis of common dyslipidemias, both primary and secondary

8.15.5.3 discuss the clinical significance of alterations in lipids and lipoproteins in plasma

8.15.5.4 request basic investigations and interpret results in common lipid disorders

8.15.6 **Plasma proteins & enzymes**

8.15.6.1 discuss the clinical significance of measuring total plasma protein and different fractions

8.15.6.2 define the acute phase response and discuss the clinical significance of acute phase proteins

8.15.6.3 list the common enzymes used in clinical diagnostics and explain the pathological basis of their alterations

8.15.6.4 describe sample collection requirements for proteins & enzymes

8.15.7 **Investigations for liver disorders**

8.15.7.1 discuss the use of laboratory investigations in assessing patients with acute and chronic liver diseases

8.15.7.2 outline a plan of investigations for patients with jaundice including neonates with jaundice

8.15.7.3 explain the pathological basis of biochemical alterations observed in acute and chronic hepatitis caused by different aetiological agents

8.15.7.4 describe the biochemical alterations observed in common metabolic diseases affecting the liver

8.15.7.5 describe the biochemical features of liver failure

8.15.8 **Investigations for renal disorders**

8.15.8.1 list and classify laboratory investigations available to investigate renal diseases

8.15.8.2 describe indications, patient preparation and sample collection and transport for those investigations

8.15.8.3 interpret reports and discuss the limitations of those investigations

8.15.8.4 explain the pathological basis of the investigation findings

8.15.9 **Disorders of calcium & phosphate metabolism**

8.15.9.1 describe the regulation of serum calcium and phosphate levels

8.15.9.2 list the common diseases leading to hypo & hypercalcaemia & hypo & hyperphosphataemia

8.15.9.3 outline a plan for investigating the above disorders

8.15.9.4 explain the alterations of serum calcium & phosphate observed in metabolic bone diseases

8.15.10 **Endocrine disorders of the pituitary, thyroid and adrenal glands**

8.15.10.1 explain the pathological basis of endocrine dysfunction

8.15.10.2 discuss the principles of laboratory investigations

8.15.10.3 select and request primary and secondary investigations for the common endocrine diseases of the pituitary, thyroid and adrenal glands

8.15.10.4 interpret results of the investigations for patients with common endocrine diseases

9. Department of Pharmacology

Vision

To be a global leader in clinical pharmacology education, research and practice with the ultimate goal of providing excellent, innovative patient care.

Mission

Educate students to become excellent medical professionals with advancing pharmaceutical knowledge, respecting the principles of personal integrity, humanity and professionalism.

General objective

To acquire knowledge, analytical and intellectual capabilities in understanding and application of pharmacology for rational clinical practice

Learning objectives

At the end of each session, students should be able to

9.1 Pharmacokinetics

9.1.1 outline the four main pharmacokinetic processes

9.1.2 discuss the factors affecting drug absorption, distribution, metabolism and excretion

9.1.3 define zero and first order kinetics

9.1.4 compare and contrast zero and first order kinetics

9.1.5 outline the concepts of bioavailability and bioequivalence

9.1.6 discuss the factors affecting bioavailability

9.1.7 define the term “first pass metabolism”

9.1.8 discuss the clinical importance of bioavailability and first pass metabolism

9.1.9 define the terms “volume of distribution” and “apparent volume of distribution”

9.1.10 discuss the theoretical basis of a one or two-compartment model for various routes of drug administration

9.1.11 describe the two types of drug metabolism

9.1.12 list the methods of drug excretion

9.1.13 define plasma half-life and biological half life

9.1.14 describe steady state concentration

9.1.15 compare loading dose and maintenance dose

9.1.16 discuss the clinical importance of “plasma half-life”

9.1.17 apply the relationship between volume of distribution, clearance and elimination half-life

9.2 Pharmacodynamics

9.2.1 define the term pharmacodynamics

9.2.2 list the types of receptors

9.2.3 compare and contrast receptor types in relation to onset, mechanism and location of action

9.2.4 describe the properties of a receptor

9.2.5 describe enzymes in relation to pharmacodynamics

9.2.6 define the terms “tolerance” and “dependence”

9.2.7 describe the mechanisms of tolerance

9.2.8 define the terms potency and efficacy

9.2.9 define the terms agonist and antagonist

9.2.10 Illustrate the types of agonists and antagonists with examples

9.2.11 apply knowledge of drug synergism in clinical practice

9.2.12 list the quantitative aspects of pharmacodynamics

9.2.13 define the dose response curves

9.2.14 discuss the importance of a dose response curve

9.2.15 describe therapeutic index

9.2.16 relate the importance of therapeutic index in clinical practice

9.3 Adverse drug reactions (ADR) & pharmacovigilance

9.3.1 define ADR

9.3.2 describe different types of ADR in relation to etiology, occurrence, prediction, mortality and morbidity

9.3.3 classify ADR according to severity

9.3.4 outline the frequency of ADR

9.3.5 describe the effects of ADR with examples

9.3.6 list the predisposing factors for ADR

9.3.7 discuss how to minimize ADR

9.3.8 define pharmacovigilance

9.3.9 describe importance of pharmacovigilance

9.3.10 explain the procedure of reporting adverse drug reactions (what to report, who should report, when to report, how to report and where to report)

9.4 Drug interactions and reducing toxicity

9.4.1 define drug interaction

9.4.2 describe the possible sites of drug interactions

9.4.3 describe the different types of pharmacokinetic drug interactions with examples

9.4.4 describe the different types of pharmacodynamic drug interactions with examples

9.4.5 apply the knowledge of drug interactions when prescribing

9.4.6 explain the strategies to minimize drug interactions

9.4.7 check the information on drug interactions before prescribing

9.5 Discovery and development of new drugs

9.5.1 list the main stages of drug discovery and development

9.5.2 identify the steps of drug discovery

9.5.3 highlight the characteristics of a “drug target”

9.5.4 illustrate the methods of “lead finding”

9.5.5 explain the importance of “lead optimization”

9.5.6 identify the factors causing termination of process of drug discovery and development

9.6 Pre-clinical trials, clinical trials

9.6.1 appraise the importance of preclinical and clinical trials

9.6.2 discuss the different types of preclinical studies

9.6.3 discuss the four phases of clinical trials

9.6.4 describe the concepts of blinding, randomization and control group used in clinical trials

9.6.5 outline the steps followed in drug development, from drug discovery to phase 4 clinical trials

9.6.6 identify the importance of research ethics in preclinical and clinical trials

9.7 Essential drug list, rational use of medicine

9.7.1 define essential drug list

9.7.2 discuss the criteria in selecting drugs to the essential drug list

9.7.3 value the importance of essential drug list

9.7.4 outline the concept of WHO essential drug list

9.7.5 recognize the characteristics of essential drug list of Sri Lanka

9.7.6 identify the differences between essential drug list and hospital formulary list

9.7.7 discuss the concept of rational drug therapy

9.7.8 highlight the impact of irrational use of drugs

9.7.9 apply the knowledge on rational use of medicine in prescribing drugs

9.8 Standard therapeutic guidelines and Pharmacoeconomics

9.8.1 identify the concept of standard therapeutic guidelines

9.8.2 discuss the importance of standard therapeutic guidelines

9.8.3 outline the steps of establishing a standard therapeutic guideline

9.8.4 define pharmacoeconomics

9.8.5 outline the goals of pharmacoeconomics in clinical practice

9.8.6 classify the costs of health care

9.8.7 discuss the different types of pharmacoeconomic analysis

9.9 Pharmacogenetics

9.9.1 define pharmacogenetics and pharmacogenomics

9.9.2 discuss how pharmacogenetic variations alter the pharmacokinetics of drugs

9.9.3 discuss how pharmacogenetic variations alter the pharmacodynamics of drugs

9.9.4 discuss the effect of pharmacogenetic variations on efficacy and toxicity of drugs with examples

9.9.5 discuss the importance of pharmacogenetics in clinical practice

9.9.6 recognize studies used to identify genetic variability

9.9.7 appraise the concept of precision medicine

9.10 Principles of toxicology

9.10.1 outline preclinical toxicology studies in animals

9.10.2 explain the mechanisms of drug toxicity with examples

9.10.3 identify the importance of toxicokinetic principles in the treatment of poisonings

9.10.4 approach to the management of an acute poisoning based on risk assessment

9.11 Principles of chemotherapy and bacterial resistance

9.11.1 describe the following terms with examples

a) bactericidal, bacteriostatic
b) minimum inhibitory concentration
c) concentration dependent killing, time dependent killing

9.11.2 describe biochemical reactions and potential targets for chemotherapy of bacteria

9.11.3 classify antimicrobial drugs according to the mechanism of action

9.11.4 identify the targets of using antimicrobial combinations

9.11.5 discuss mechanisms of resistance in bacteria with examples

9.11.6 determine how to minimize emergence of antimicrobial resistance

9.12 Penicillins

9.12.1 identify the molecular structure of penicillin and its derivatives

9.12.2 list the types of penicillins with examples and their antimicrobial spectrum

9.12.3 illustrate the pharmacodynamics and pharmacokinetics of different types of penicillins

9.12.4 discuss the clinical indications of penicillins (penicillin alone and with their combinations)

9.12.5 justify the selection of penicillin in different clinical scenarios

9.12.6 apply the knowledge on adverse effects, precautions and contraindications in selecting penicillins

9.13 Cephalosporins

9.13.1 classify cephalosporins with examples

9.13.2 illustrate the pharmacodynamics and pharmacokinetics of cephalosporins

9.13.3 justify the selection of chephalosporins in different clinical settings

9.13.4 apply the knowledge on adverse effects, precautions and contraindications in selecting cephalosporins in different settings

9.14 Inhibitors of protein synthesis (tetracyclines, macrolides, chloramphenicol and fusidate, aminoglycosides)

9.14.1 list the inhibitors of protein synthesis with examples

9.14.2 illustrate the spectrum of coverage of inhibitors of protein synthesis

9.14.3 illustrate the pharmacodynamics and pharmacokinetics of inhibitors of protein synthesis

9.14.4 justify the selection of inhibitors of protein synthesis in different clinical settings

9.14.5 apply the knowledge on adverse effects, precautions and contraindication of inhibitors of protein synthesis– when you select the treatment for patients with different diseases

9.15 Sulfonamides, quinolones and nitroimidazoles

9.15.1 Sulfonamides

9.15.1.1 list the names of sulfonamides and identify their structural similarity

9.15.1.2 analyze the pharmacodynamics of sulfonamides and trimethoprim

9.15.1.3 describe pharmacokinetics of sulfonamides

9.15.1.4 identify the antimicrobial spectrum of sulfonamides

9.15.1.5 illustrate the clinical indications of sulfonamides and trimethoprim

9.15.1.6 discuss the adverse effects, contraindications and precautions of sulfonamides

9.15.2 Quinolones

9.15.2.1 list the names of quinolones

9.15.2.2 analyze the pharmacodynamics of quinolones

9.15.2.3 describe the pharmacokinetics of quinolones

9.15.2.4 identify the antibacterial spectrum of quinolones

9.15.2.5 discuss clinical indications of quinolones

9.15.2.6 discuss the adverse effects, contraindications and precautions of quinolones

9.15.3 Nitroimidazoles

9.15.3.1 list the names of nitroimidazole antibiotics

9.15.3.2 analyze the pharmacodynamics of nitroimidazoles

9.15.3.3 describe pharmacokinetics of nitroimidazoles

9.15.3.4 identify the antimicrobial spectrum of nitroimidazoles

9.15.3.5 discuss clinical indications of nitroimidazoles

9.15.3.6 discuss the adverse effects, contraindications and precautions of nitroimidazoles

9.16 Lincosamides, vancomycin and other β -lactam antibiotics, newer antibiotics

9.16.1 identify lincosamides, glycopeptides and other β-lactam antibiotics

9.16.2 describe the pharmacodynamics of lincosamides, glycopeptides and other β-lactam antibiotics

9.16.3 outline the use of lincosamides, glycopeptides and other β-lactam antibiotics in clinical setting

9.16.4 recognize the important adverse effects of lincosamides, glycopeptides and other β-lactam antibiotics

9.16.5 recognize the novel antibiotics and their clinical use in the setting of antibiotic resistance

9.16.6 illustrate the pharmacodynamics and adverse effects of novel antibiotics

9.17 Drugs used in leprosy

9.17.1 write the classification of leprosy

9.17.2 describe the drug regimens used in the treatment of leprosy

9.17.3 understand the important pharmacokinetic properties of dapsone, rifampicin, and clofazimine

9.17.4 explain pharmacodynamics of dapsone, rifampicin, and clofazimine

9.17.5 write the adverse effects of dapsone, rifampicin, and clofazimine

9.17.6 describe the management of lepra reactions

9.18 Antituberculous therapy

9.18.1 define the categories of patients with tuberculosis based on the previous treatment for tuberculosis

9.18.2 elaborate the CAT 1 and CAT 2 treatment regimens

9.18.3 convince the use of multiple drugs in the treatment of tuberculosis

9.18.4 discuss pharmacodynamics and pharmacokinetics of the drugs used in the treatment for tuberculosis

9.18.5 determine the adverse effects of the drugs used in the treatment for tuberculosis

9.18.6 illustrate the precautions and contraindications for the drugs used in the treatment for tuberculosis

9.18.7 plan the management of drug induced complications (hepatitis, severe cutaneous reactions) and defaulted treatment

9.18.8 value the importance of fixed dose combinations and direct observed therapy in the "national programme for tuberculosis control and chest disease"

9.19 Antiviral drugs

9.19.1 classify antiviral drugs according to their mode of action

9.19.2 describe the pharmacodynamics of antiviral drugs

9.19.3 explain the clinical indications of antiviral drugs

9.19.4 discuss the important pharmacokinetics, adverse effects and precautions of commonly used antiviral drugs

9.19.5 illustrate 'Highly Active Anti-Retroviral Therapy'(HAART) in AIDS

9.20 Antifungal drugs

9.20.1 revise the classification of fungal infections with examples

9.20.2 classify the drugs used in fungal infections with examples

9.20.3 discuss the pharmacokinetics and pharmacodynamics of antifungal drugs

9.20.4 illustrate the clinical indications of antifungal drugs

9.20.5 apply knowledge on adverse effects, precautions and contraindications of using antifungal drugs in clinical settings

9.20.6 identify the importance drug interactions of antifungal drugs

9.21 Cholinergic and anticholinergic drugs

9.21.1 recall the knowledge on cholinergic transmission

9.21.2 classify cholinergic/anticholinergic drugs with examples

9.21.3 understand pharmacokinetics of the cholinergic/anticholinergic drugs

9.21.4 explain the pharmacodynamics of cholinergic/anticholinergic drugs

9.21.5 list the clinical uses and adverse effects of cholinergic/anticholinergic drugs

9.21.6 illustrate pharmacological basis of using cholinergic/anticholinergic drugs in different clinical indications

9.21.7 state disorders of neuromuscular transmission and treatment options for them

9.22 Sympathomimetics

9.22.1 summarize the synthesis, storage, release and re-uptake of catecholamines

9.22.2 outline the functions of adrenoceptors

9.22.3 classify the sympathomimetic drugs

9.22.4 discuss the pharmacokinetics and pharmacodynamics of commonly used sympathomimetic drugs

9.22.5 illustrate the clinical indications of sympathomimetic drugs

9.22.6 apply knowledge on adverse effects, precautions and contraindications of sympathomimetic drugs in clinical settings

9.23 α-blockers

9.23.1 describe the effects of adrenoceptor activation

9.23.2 classify α-blockers with examples

9.23.3 state pharmacokinetics of α-blockers

9.23.4 list clinical uses of α-blockers

9.23.5 describe the pharmacological basis of using α-blockers in different clinical indications

9.23.6 advice a patient who is prescribed an α-blocker

9.24 β-blockers

9.24.1 recall the actions of β receptors

9.24.2 classify β-blockers according to selectivity towards adrenoreceptors at therapeutic doses with examples

9.24.3 identify β-blockers with additional effects at their therapeutic doses

9.24.4 describe pharmacokinetics of β-blockers

9.24.5 describe mechanism of action of β-blockers

9.24.6 list clinical indications of β-blockers

9.24.7 justify the use of β-blockers in different clinical indications

9.24.8 apply the knowledge of limitations of β-blockers when prescribing

9.24.9 write drugs used in the management of overdose of β-blockers

9.25 Drugs used in bronchial asthma

9.25.1 recall the knowledge on pathophysiology of bronchial asthma

9.25.2 recognize the approaches in the treatment of bronchial asthma

9.25.3 classify the drugs used in bronchial asthma with examples

9.25.4 elaborate pharmacokinetics and pharmacodynamics of drugs used in bronchial asthma

9.25.5 illustrate the adverse effects, precautions and contraindications of drugs used in bronchial asthma

9.25.6 highlight the stepwise strategy in the long-term management of bronchial asthma

9.25.7 outline the management of exacerbation of bronchial asthma

9.26 Diuretics

9.26.1 revise the knowledge on physiology of renal tubular transport mechanisms

9.26.2 classify the types of diuretics with examples

9.26.3 discuss pharmacokinetics and pharmacodynamics of diuretics

9.26.4 illustrate the clinical uses relating with their pharmacological effects

9.26.5 integrate the precautions with adverse effects of diuretics

9.27 Drugs acting on renin-angiotensin system

9.27.1 describe the renin-angiotensin-aldosterone cascade

9.27.2 list examples for ACE inhibitors/angiotensin receptor blockers (ARB)

9.27.3 state the important pharmacokinetics of ACE inhibitors/ARB

9.27.4 list the clinical indications of ACE inhibitors/ARB

9.27.5 justify the pharmacological basis of using ACE inhibitors/ARB in different clinical indications

9.27.6 discuss the clinically important adverse effects of ACE inhibitors/ARB

9.27.7 state the cautions and contraindications of ACE inhibitors/ARB

9.28 Calcium channel antagonists (CCA)

9.28.1 categorize CCA with example/s to each

9.28.2 illustrate the mode of action and pharmacological effects of CCA

9.28.3 discuss pharmacokinetics of CCA

9.28.4 illustrate precautions and contraindications of CCA

9.28.5 educate a patient on adverse effects of CCA with actions need to be taken to minimize adverse effects

9.28.6 apply knowledge on pharmacokinetics and pharmacodynamics in selecting CCA for different clinical settings

9.29 Vasodilators and other antihypertensive drugs

9.29.1 list the vasodilator drugs with examples

9.29.2 discuss the pharmacological basis of using vasodilators in different clinical indications

9.29.3 apply the knowledge on pharmacokinetics and adverse effects of vasodilators in clinical setting

9.29.4 discuss the precautions and contraindications of vasodilators

9.29.5 illustrate the use of other antihypertensive drugs (centrally acting drugs and alpha receptor antagonists) in relation to their pharmacodynamics and pharmacokinetics

9.29.6 identify the adverse effects, precautions, and contraindications of other antihypertensive drugs

9.30 Cardiac glycosides

9.30.1 list the cardiac glycosides used in clinical practice

9.30.2 analyze the mechanism of action of digoxin

9.30.3 describe the pharmacokinetics of digoxin

9.30.4 discuss the clinical indications of digoxin

9.30.5 describe the adverse effects of digoxin

9.30.6 identify the features of digoxin toxicity

9.30.7 discuss the drug interactions, contraindications and precautions of digoxin

9.31 Drugs used in dyslipidaemia

9.31.1 revise the knowledge on lipoprotein metabolism

9.31.2 recall the role of lipoproteins in vascular disease

9.31.3 classify the drugs used in dyslipidaemia with examples

9.31.4 discuss the pharmacokinetics and pharmacodynamics of the drugs used in dyslipidaemia

9.31.5 illustrate the pharmacological basis of the drugs used in dyslipidaemia in different clinical situations

9.31.6 determine the adverse effects of the drugs used in dyslipidaemia

9.31.7 recognize precautions and contraindications of the drugs used in dyslipidaemia

9.32 Antiarrhythmic drugs

9.32.1 recall knowledge on cardiac action potential and pathophysiology of arrhythmia

9.32.2 classify antiarrhythmic drugs according to the Vaughan Williams classification with examples

9.32.3 list the antiarrhythmic drugs which are not classified under Vaughan Williams classification

9.32.4 explain pharmacodynamics and pharmacokinetics of antiarrhythmic drugs

9.32.5 identify the antiarrhythmic drugs used in different types of cardiac arrhythmias

9.32.6 discuss the adverse effects, contraindications, precautions and interactions of antiarrhythmic drugs

9.32.7 identify the antiarrhythmic drugs used for rate control and rhythm control of atrial fibrillation

9.33 Drugs used in coronary artery disease

9.33.1 describe the spectrum of coronary artery disease (CAD) and their presentations

9.33.2 list the drug groups used in the treatment of CAD with examples

9.33.3 illustrate the pharmacological basis of using above mentioned drugs in different clinical presentations

9.33.4 justify the usage of drugs in CAD in secondary prevention

9.33.5 apply the knowledge on adverse effects, precautions and contraindication of drugs used in CAD in selecting drugs for special situations

9.34 Anticoagulants

9.34.1 recall knowledge on coagulation cascade and physiological anticoagulation mechanisms

9.34.2 list oral and parenteral anticoagulants with examples (including novel oral anticoagulants - NOACs)

9.34.3 describe the mechanism of action of anticoagulants

9.34.4 list indications of anticoagulants with examples

9.34.5 state adverse effects of anticoagulants

9.34.6 explain the drugs that interact with anticoagulants and the outcome

9.34.7 describe how to monitor anticoagulant therapy

9.34.8 state antidotes given in overdose of anticoagulant

9.34.9 compare oral and parenteral anticoagulants in relation to pharmacokinetics, pharmacodynamics, indications, monitoring and antidotes

9.34.10 compare LMW heparin and unfractionated heparin in relation to pharmacokinetics, pharmacodynamics, indications and monitoring

9.34.11 discuss the advantages of NOACs

9.35 Thrombolytics (Fibrinolytic drugs)

9.35.1 identify the thrombolytic drugs in clinical use

9.35.2 compare and contrast different types of thrombolytic drugs

9.35.3 describe the pharmacodynamics and pharmacokinetics of thrombolytic drugs

9.35.4 explain the pharmacological basis of using thrombolytic drugs in different clinical indications

9.35.5 recognize adverse effects and contraindications of thrombolytic drugs

9.36 Antiplatelets

9.36.1 recall the mechanism of hemostasis: vascular response, platelet aggregation and thrombus formation

9.36.2 classify the antiplatelet drugs with examples

9.36.3 describe the pharmacological basis of using antiplatelet drugs in different clinical indications

9.36.4 illustrate the pharmacokinetics, adverse effects, precautions and contraindications of antiplatelet drugs

9.36.5 elaborate the duration of antiplatelet therapy in different clinical situations

9.36.6 identify the drug interactions with antiplatelet drugs

9.36.7 discuss the indications of temporary discontinuation of antiplatelet drugs

9.37 Treatment for hypertension

9.37.1 define hypertension and the grades

9.37.2 classify anti-hypertensive drug groups with examples

9.37.3 outline the goals of anti-hypertensive therapy

9.37.4 explain the compelling indications for individual drug classes

9.37.5 list compelling and possible contraindications of antihypertensive drugs

9.37.6 outline the first line treatment for hypertensive emergencies with the route of administration

9.37.7 select appropriate antihypertensive drug/s to a given clinical presentation and justify the selection

9.38 Treatment for cardiac failure

9.38.1 state the goals of heart failure treatment

9.38.2 list the drug groups or combination of drugs used to treat heart failure

9.38.3 state examples for different drug groups

9.38.4 explain the advantages and limitations of individual drug groups

9.38.5 plan long term pharmacological management of heart failure

9.38.6 manage acute decompensated heart failure

9.38.7 select appropriate drugs in different clinical settings

9.39 Haemopoietic system and treatment of anaemia

9.39.1 describe physiology of iron absorption

9.39.2 outline the physiological effects of iron

9.39.3 classify the iron preparations

9.39.4 justify the selection of iron preparations in different clinical indications

9.39.5 discuss the adverse effects of iron in therapeutic use

9.39.6 apply the knowledge on adverse effects, precautions and contraindications in selecting different iron preparations in clinical setting

9.39.7 illustrate the importance of folic acid and vitamin B12 in erythropoiesis

9.39.8 outline the role of haemopoietic growth factors and erythropoietin in different clinical indications

9.40 Blood products

9.40.1 classify blood products with examples

9.40.2 identify the components of each blood product

9.40.3 justify the use of blood products in different clinical situations

9.40.4 describe the adverse effects of blood products

9.40.5 illustrate the precautions to be taken when using blood products

9.40.6 outline the management of transfusion reactions

9.40.7 state massive transfusion protocol

9.41 IV Fluids and ORS

9.41.1 **IV fluids and electrolyte solutions**

9.4.1.1 identify the ideal features of IV fluids

9.4.1.2 define crystalloids, colloids, isotonic, hypotonic and hypertonic solutions with examples

9.4.1.3 list the three phases of correction of fluid requirement

9.4.1.4 discuss the clinical indications of IV fluids and electrolyte solutions with examples and justifications

9.4.1.5 justify the selection of IV fluids in different clinical situations

9.4.1.6 describe common adverse effects of IV fluids

9.4.1.7 describe the assessment of IV fluid replacement

9.4.2 **Oral Rehydration Solutions (ORS)**

9.4.2.1 list the composition of ORS

9.4.2.2 compare the two types of ORS solutions

9.4.2.3 analyze the action of different ingredients of ORS

9.4.2.4 discuss the indications of ORS

9.4.2.5 discuss adverse effects of ORS

9.4.2.6 advice regarding preparation and administration of ORS

9.5 Parenteral nutrition

9.5.1 explain the nutrition requirement in critical illness

9.5.2 state different access for parenteral nutrition

9.5.3 identify the importance of different preparations of parenteral nutrition

9.5.4 state indications of parenteral nutrition with examples

9.5.5 describe the limitations of parenteral nutrition with examples

9.5.6 explain how to administer parenteral nutrition with a multichambered bag

9.5.7 monitor a patient who is on parenteral nutrition

9.6 Systemic anti-cancer therapy (SACT)

9.6.1 understand the basic characteristics and pathophysiology of cancer

9.6.2 list the therapeutic goals of SACT

9.6.3 classify SACT with examples

9.6.4 list clinical indications of SACT with examples

9.6.5 describe the pharmacodynamics of commonly used chemotherapeutic agents

9.6.6 list adverse effects of commonly used SACT

9.7 Dermatopharmacology

9.7.1 recall the structure and functions of the skin in order to understand the pharmacokinetic activities of drugs on skin

9.7.2 list the different types of dermal vehicles

9.7.3 describe the differences between various formulations (ointment cream/gel/lotion) in relation to the properties and uses of them

9.7.4 list commonly used topical preparations of the following

a) topical steroids
b) topical antifungal agents
c) topical retinoids

9.7.5 describe steroid ladder by mild, moderate and potent topical applications with regard to their uses with examples

9.8 Drugs used in peptic ulcer disease

9.8.1 recall the pathophysiology of peptic ulcer disease

9.8.2 list the drug classes used in peptic ulcer disease with examples

9.8.3 analyze the mechanism of action of different drug classes used in the management of peptic ulcer disease

9.8.4 describe the pharmacokinetics of drugs used in peptic ulcer disease

9.8.5 discuss the different clinical indications of drugs used in peptic ulcer disease

9.8.6 discuss the adverse effects, drug interactions and precautions of drugs used in peptic ulcer disease

9.8.7 describe the treatment regimens for the management of *Helicobacter pylori* infection

9.8.8 outline the drugs used in the management of gastro-oesophageal reflux disease (GORD)

9.9 Anti-emetics

9.9.1 recall the reflex mechanism of vomiting

9.9.2 list the groups of anti-emetic drugs with examples

9.9.3 list the clinical indications of anti-emetics

9.9.4 describe the pharmacological basis of using anti-emetics in different clinical scenarios

9.9.5 explain the pharmacokinetics and adverse effects of individual anti-emetics

9.10 Antidiarrhoeals, antispasmodics and laxatives

9.10.1 Antidiarrhoeals

9.10.1.1 list the types of antidiarrhoeal agents with examples

9.10.1.2 discuss the mechanism of action of antidiarrhoeal agents

9.10.1.3 discuss the pharmacokinetics, adverse effects, contraindications and precautions of antidiarrhoeal agents

9.10.1.4 outline the management of a patient with diarrhoea

9.10.1.5 explain the role of antidiarrhoeal agents and antibiotics in the management of diarrhoea

9.10.2 Antispasmodics

9.10.2.1 classify antispasmodic agents with examples

9.10.2.2 explain the mechanism of action of antispasmodic agents

9.10.2.3 discuss the clinical indications of antispasmodic agents

9.10.3 **Laxatives**

9.10.3.1 list the different types of laxatives with examples

9.10.3.2 explain the mechanism of action of each type of laxative

9.10.3.3 explain the pharmacological basis of using lactulose in hepatic encephalopathy

9.10.3.4 discuss the clinical indications of laxatives

9.10.3.5 identify the different dosage forms of laxatives

9.10.3.6 justify the selection of laxatives for different clinical situations

9.10.3.7 discuss the adverse effects, contraindications and precautions of laxatives

9.11 Hypothalamo-pituitary axis and pituitary gland

9.11.1 recall the knowledge on hypothalamo-pituitary axis

9.11.2 identify the hormones secreted by the anterior and posterior gland and their target organs

9.11.3 outline the analogues and antagonists of pituitary hormones

9.11.4 identify the diseases related to pituitary gland

9.11.5 justify the use of pituitary hormones, their analogues and antagonists in different clinical indications (Growth hormone, prolactin, vasopressin, etc.)

9.11.6 outline the importance of diurnal rhythm and its effect on hormonal treatment

9.12 Gonadal hormones and their inhibitors

9.12.1 identify disease related to gonadal hormone deficiency/excess

9.12.2 state the preparations of gonadal hormones and their inhibitors

9.12.3 explain pharmacokinetics, mode of action and adverse effects of gonadal hormone preparations and their inhibitors

9.12.4 justify the clinical uses of gonadal hormones and their inhibitors

9.12.5 discuss the pros and cons of Postmenopausal Hormone Replacement Therapy (HRT)

9.12.6 outline the clinical uses of anabolic steroids and GnRH analogue

9.12.7 describe the drugs used in erectile dysfunction

9.13 Hormonal contraceptives

9.13.1 classify hormonal contraceptives with examples

9.13.2 explain the mechanism of action of different hormonal contraceptives

9.13.3 describe the pharmacokinetics of hormonal contraceptives

9.13.4 describe clinical indications of different hormonal contraceptives

9.13.5 discuss the adverse effects, drug interactions, contraindications and precautions of hormonal contraceptives

9.13.6 discuss different types of emergency contraceptive methods

9.13.7 justify selection of a contraceptive for different clinical situations

9.13.8 advice regarding hormonal contraceptives including management of a missed pill

9.14 Thyroxine and antithyroid drugs

9.14.1 retrieve the knowledge on synthesis, storage, secretion and regulation of thyroid hormone

9.14.2 describe the preparations of thyroxine and their clinical indication

9.14.3 list the actions of thyroid hormones

9.14.4 discuss pharmacokinetics, pharmacodynamics and adverse effects of thyroxine

9.14.5 justify the principles of prescribing thyroxine

9.14.6 outline the management of myxedema coma

9.14.7 categorize the anti-thyroid drugs with examples

9.14.8 relate the mode of action of different anti-thyroid drugs to its expected clinical outcome

9.14.9 discuss the pharmacokinetics and adverse effects of anti-thyroid drugs

9.14.10 justify the principles of prescribing antithyroid drugs

9.14.11 discuss the anti-thyroid drugs therapy in pregnancy and lactation

9.14.12 illustrate the adjuvant therapy in hyperthyroidism

9.14.13 outline the management of thyrotoxic crisis

9.14.14 explain pre-operative Preparation of hyperthyroid patient for thyroidectomy

9.15 Drugs act on the uterus

9.15.1 classify the drugs that stimulate/inhibit uterine contractions

9.15.2 illustrate the clinical indications of uterine stimulants and relaxants

9.15.3 illustrate the pharmacological basis of selecting different uterine stimulants and uterine relaxants in different clinical indications

9.15.4 describe the management of postpartum haemorrhage

9.15.5 apply the knowledge on adverse effects, precautions and contraindications of selecting oxytocin and ergometrine in different clinical indications

9.16 Insulins

9.16.1 list different types of insulin according to the onset of action

9.16.2 explain the mechanism of insulin secretion

9.16.3 describe how insulin acts on its receptors

9.16.4 explain the membrane and cellular effects of insulin

9.16.5 describe the pharmacological basis of using insulin in patients with diabetes

9.16.6 explain the indications of insulin

9.16.7 state the important pharmacokinetics of insulin

9.16.8 state the adverse effects of insulin

9.16.9 describe the measures that could be taken to minimize the adverse effects due to long-term use of insulin

9.16.10 explain different insulin delivery methods

9.16.11 describe how to advise to a patient regarding insulin administration (site selection, method, mixing insulin and priming)

9.16.12 describe different insulin regimens with their clinical indications

9.17 Oral anti-diabetic drugs

9.17.1 list groups of antidiabetic drugs with examples

9.17.2 describe mode of action of each group

9.17.3 state pharmacokinetics of each group

9.17.4 describe clinical indications of each group

9.17.5 state the adverse effects of each group

9.17.6 compare different anti-diabetic drugs in relation to efficacy, mechanism of action, cost and indications

9.17.7 justify the selection of oral hypoglycemic drugs in different clinical situations

9.18 Adrenal steroids

9.18.1 recall the physiology of hypothalamic-pituitary-adrenal axis

9.18.2 correlate the knowledge on diurnal rhythm with adrenocorticosteroid therapy

9.18.3 classify adrenal steroids based on their potency

9.18.4 recognize the function of glucocorticoids and mineralocorticoids in homeostasis of the body

9.18.5 identify the commonly used natural and synthetic corticosteroids

9.18.6 outline the indications of corticosteroids with their relevant routes of administration (oral, intravenous, intramuscular, topical, inhalation, intraarticular and intraarterial)

9.18.7 identify the short- and long-term adverse effects of steroids and measures to reduce them

9.18.8 explain the basis of gradual withdrawal of corticosteroid

9.19 Drugs used in calcium homeostasis and bone disorders

9.19.1 recall the knowledge on bone structure, remodelling and importance of hormones in bone metabolism

9.19.2 classify the drugs used in bone disorders with examples

9.19.3 outline the indications of different drugs used in bone disorders

9.19.4 describe the pharmacodynamics and pharmacokinetics of drugs used in bone disorders

9.19.5 illustrate the use of different drugs in the management of osteoporosis

9.19.6 justify the role of calcium and vitamin D3 in bone disorders

9.19.7 outline the potential new therapies for bone disorders

9.20 Antiepileptic drugs

9.20.1 recall the physiology of action potential of nerve, nerve impulse propagation, synaptic transmission and pathophysiology of epilepsy

9.20.2 classify antiepileptic drugs according to their mode of action with examples

9.20.3 analyse the mechanism of action of antiepileptic drugs

9.20.4 discuss the pharmacokinetics of antiepileptic drugs

9.20.5 illustrate the indications of antiepileptic drugs

9.20.6 identify the antiepileptic drugs used in different types of epilepsy

9.20.7 discuss the adverse effects, contraindications, precautions and interactions of antiepileptic drugs

9.20.8 describe the principles of antiepileptic drug therapy

9.20.9 outline the pharmacological management of status epilepticus

9.21 Hypnotics and anxiolytic drugs

9.21.1 **Hypnotics**

9.21.1.1 identify sleep-wake physiological systems

9.21.1.2 classify the drugs used as hypnotics with examples

9.21.1.3 compare the difference between sedatives and hypnotics

9.21.1.4 describe the pharmacodynamics and pharmacokinetics of hypnotics

9.21.1.5 illustrate the adverse effects, precautions and contraindications of drugs used as hypnotics

9.21.1.6 apply knowledge in selecting hypnotics for different clinical settings

9.21.2 **Anxiolytics**

9.21.2.1 list the anxiety disorders

9.21.2.2 classify the drugs used as anxiolytics with examples

9.21.2.3 describe the pharmacodynamics and pharmacokinetics of anxiolytics

9.21.2.4 apply knowledge on adverse effects, precautions and contraindications of anxiolytic drugs in clinical settings

9.21.2.5 discuss the pharmacological basis of using benzodiazepine in alcohol withdrawal

9.22 Antipsychotics

9.22.1 classify antipsychotics with examples

9.22.2 compare and contrast atypical antipsychotics with classical antipsychotics

9.22.3 apply knowledge on pharmacokinetics, pharmacodynamics and precautions in prescribing antipsychotics

9.22.4 discuss general principles of prescribing antipsychotics

9.22.5 educate the patient and care givers on adverse effects of antipsychotics

9.22.6 discuss the management of adverse effects of antipsychotics

9.22.7 outline the management of rapid tranquillization

9.23 Antidepressants and mood stabilizers

9.23.1 classify antidepressants according to their mechanism of action and state examples to each group

9.23.2 describe the pharmacological basis of using the above drug groups in depression

9.23.3 state the important pharmacokinetics of antidepressants

9.23.4 describe adverse effects of antidepressants

9.23.5 describe the drug interactions of antidepressants

9.23.6 justify the selection of different antidepressants in various clinical scenarios

9.23.7 describe the criteria for stopping antidepressant drugs

9.23.8 list drugs used as mood stabilizers

9.23.9 state the pharmacokinetics, side effects, contraindications, precautions of different mood stabilizers

9.23.10 explain the pharmacodynamics of lithium

9.23.11 describe how to monitor a patient who is on lithium

9.24 Drugs used in Parkinson's disease

9.24.1 describe the pathophysiology of Parkinson's disease

9.24.2 list the different drug groups used in the treatment of Parkinson's disease with examples

9.24.3 describe the pharmacological basis of using the above drugs in Parkinson's disease

9.24.4 state important pharmacokinetics, adverse effects, contraindications and drug interactions of the above drugs

9.24.5 understand the drug selection in the long-term management of a patient with Parkinson's disease

9.25 Drugs used in migraine

9.25.1 recall the knowledge on pathophysiology of migraine including triggering factors

9.25.2 classify the drugs used in the management of migraine with examples

9.25.3 discuss the management of acute attack of migraine

9.25.4 illustrate the pharmacodynamics and pharmacokinetics of drugs used in the management of migraine

9.25.5 justify the selection of different drugs in the management of migraine

9.25.6 apply the knowledge of adverse effects, precautions and contraindications of drugs used in migraine in different clinical settings

9.26 General anaesthetics

9.26.1 define general anaesthesia

9.26.2 outline the desired properties of general anaesthetic agents

9.26.3 identify the appropriate drugs used in peri-operative (pre-operative, intra-operative, post-operative) period.

9.26.4 categorize the inhalational and intravenous anaesthetic agents with their indications

9.26.5 illustrate the pharmacokinetics and pharmacodynamics of inhalational and intravenous anaesthetic agents

9.26.6 justify the use of anaesthetic agents in different clinical scenarios

9.26.7 assess the adverse effects of general anaesthetic agents

9.26.8 interpret the precautions and contraindications of general anaesthetic agents

9.27 Local anaesthetics

9.27.1 defined term local anaesthesia

9.27.2 classify local anaesthetic agents with examples

9.27.3 illustrate the pharmacodynamics and pharmacokinetics of local anaesthetic agents

9.27.4 discuss the factors which affect the action of a local anaesthetic agent

9.27.5 justify the selection of local anaesthetic agent in different clinical procedures

9.27.6 apply the knowledge on adverse effects, precautions and contraindications in selecting local anaesthetic agents

9.28 Skeletal muscle relaxants

9.28.1 classify the different types of neuromuscular blocking drugs with examples

9.28.2 Illustrate the pharmacodynamics and pharmacokinetics of different types of neuromuscular blocking drugs

9.28.3 compare and contrast the above drug groups in relation to pharmacokinetics, pharmacodynamics, antagonism, adverse effects and clinical indications

9.28.4 Justify the selection of different neuromuscular blocking drugs in different clinical scenarios

9.28.5 list the different drug groups used to reduce spasticity with examples

9.28.6 describe the mechanism of action of the above drugs

9.29 Opioid analgesics and antagonists

9.29.1 classify opioid analgesics with examples

9.29.2 relate functional effects of opioids with the types of opioid receptors

9.29.3 explain mode of action of opioids

9.29.4 analyse adverse effects in relation to mode of action of opioids

9.29.5 apply knowledge on pharmacokinetics, precautions and contraindications in clinical practice

9.29.6 rationalize selection of opioids in clinical indication

9.29.7 explain importance of monitoring of an inward patient who is on parenteral opioid

9.29.8 identify clinical uses of opioid antagonists

9.30 Non-opioid analgesics

9.30.1 recall the knowledge on pathophysiology of pain and inflammation

9.30.2 classify non-opioid analgesics with examples

9.30.3 describe the mechanism of action of non-opioid analgesics

9.30.4 state pharmacokinetics of non-opioid analgesics

9.30.5 identify the therapeutic effects of non-opioid analgesics

9.30.6 describe adverse effects of non-opioid analgesics

9.30.7 balance the risk and benefits when prescribing non opioids

9.30.8 describe the effects of paracetamol / aspirin overdose

9.30.9 discuss the management of paracetamol / aspirin overdose

9.31 Drugs used in rheumatoid arthritis

9.31.1 recall pathology of rheumatoid arthritis

9.31.2 discuss general principal of treating rheumatoid arthritis

9.31.3 describe the pharmacodynamics and pharmacokinetics of the drugs used to treat rheumatoid arthritis

9.31.4 outline the treatment options with examples

9.31.5 justify the selection of treatment option in different clinical settings

9.32 Drugs used in gout

9.32.1 identify the drugs used in management of acute and chronic gout

9.32.2 describe the pharmacological basis of using the above drugs in gout based on pharmacodynamics

9.32.3 recognize the adverse effects, precautions and contraindications of drugs used in gout

9.33 Antihistamines

9.33.1 identify the different types of histamine receptors and their functions

9.33.2 classify the antihistamines with examples

9.33.3 outline the pharmacokinetics and pharmacodynamics of different generations of antihistamines

9.33.4 select the best antihistamine in different clinical settings

9.33.5 apply knowledge on adverse effects and precautions in prescribing antihistamines

9.34 Drugs acting on immune system

9.34.1 recall the knowledge on immunology

9.34.2 categorize the drugs acting on the immune system based on their pharmacodynamics

9.34.3 outline the clinical indications of different types of drugs acting on the immune system

9.34.4 identify the adverse effects of drugs acting on immune system

9.35 Eicosanoids; Prostaglandin, leukotriene agonists/antagonists, 5-hydroxytryptamine agonists/antagonists

9.35.1 list the examples for eicosanoids, prostaglandins, leukotriene agonists and antagonists and 5-hydroxytryptamine agonists and antagonists

9.35.2 discuss the mechanism of action of the above drugs

9.35.3 describe the pharmacokinetics of the above drugs

9.35.4 discuss the clinical indications of the above drugs with examples

9.35.5 describe the adverse effects of the above drugs

9.36 Drug treatment in elderly and children

9.36.1 identify the factors that affect treatment of children and the elderly

9.36.2 elaborate the pharmacokinetic changes in children and the elderly

9.36.3 illustrate the pharmacodynamic responses in paediatric and geriatric age groups

9.36.4 rationalize the dose adjustment in children and the elderly

9.36.5 identify the much-concerned adverse effects experienced by the elderly with their causative drugs

9.36.6 determine the principles of prescribing in the elderly

9.37 Drug treatment in liver and renal impairment

9.37.1 describe the physiological role of liver and kidneys in relation to pharmacokinetics and pharmacodynamics

9.37.2 discuss the pharmacokinetic and pharmacodynamic changes in liver disease

9.37.3 discuss the pharmacokinetic and pharmacodynamic changes in renal disease

9.37.4 discuss the rationale of adjusting drug regimens in liver and renal diseases with examples

9.38 Drug treatment in pregnancy and lactation

9.38.1 outline the pharmacokinetic changes in pregnancy and lactation

9.38.2 discuss the factors affecting the usage of drugs in pregnancy and lactation

9.38.3 classify the FDA drug categories in pregnancy

9.38.4 illustrate the commonly used drugs and their effects which cause problems in pregnancy and breast feeding

9.38.5 identify the drugs which are excreted via breast milk

9.38.6 illustrate the clinical indications of sympathomimetic drugs

9.38.7 describe the importance of data resources that can be utilized to gain the information on safety of drugs, prescribe in pregnancy and lactation

9.39 Prescription writing

9.39.1 define a prescription

9.39.2 describe the format of a prescription

9.39.3 describe the rules for writing drug quantity and frequency in a prescription

9.39.4 define over the counter, controlled and prescription only drugs

9.39.5 state the rules in writing a prescription when prescribing controlled drugs

9.39.6 create a model prescription

9.39.7 critically evaluate a prescription

9.40 Systemic antidotes and chelating agents

9.40.1 discuss general mechanisms of action of antidotes and chelating agents

9.40.2 state the specific antidote/chelating agent in a given clinical conditions

9.40.3 describe pharmacodynamics and pharmacokinetics of a given antidote/chelating agent

9.40.4 outline the adverse effects, precautions and contraindications of a given antidote/chelating agent

10. Department of Medicine

Vision

To become a leader in patient care, innovative research and undergraduate and postgraduate education related to internal medicine

Mission

To deliver the most appropriate and holistic care to patients taking new developments in the medical field into consideration, engage in outcome based innovative research to enhance knowledge and practices and lead the undergraduate and postgraduate education related to internal medicine

General Objectives

1. Learn the common presentations, main physical findings, patho-physiological basis of diseases frequently encountered in an inpatient and outpatient settings and to arrive at a reasonable differential diagnosis based on the clinical presentation, and to formulate appropriate management plan.

2. demonstrate interpersonal and communication skills that enable to establish and maintain excellent professional relationships with patients and their families, and other health care professionals
3. demonstrate behaviors that reflect a commitment to continuous professional development, ethical practice, an understanding and sensitivity to diversity and a responsible attitude toward their patients, their profession, and society.

Learning objectives

At the end of each session, students should be able to

10.1 Lecture Objectives

10.1.1 **Cardio-vascular (CV) system**

10.1.1.1 Approach a patient with CV disorder

10.1.1.1.1 familiarize with main types and the nomenclature of common CVD disease

10.1.1.1.2 list the major symptoms of cardiovascular disease and describe their pathophysiology

10.1.1.1.3 understand the value of available investigations for CVD in adults

10.1.1.2 Cardiac Investigations

10.1.1.2.1 discuss the indications and use of transthoracic and transoesophageal echocardiography

10.1.1.2.2 discuss the indications and contraindications of exercise ECG

10.1.1.2.3 discuss the role of exercise ECG in diagnosis and risk stratification of IHD

10.1.1.2.4 discuss the indications and use of Holter monitoring

10.1.1.3 Valvular heart disease

10.1.1.3.1 describe common valvular lesion of heart

- Mitral Stenosis
- Mitral Regurgitation
- Aortic Regurgitation
- Aortic Stenosis

10.1.1.3.2 describe aetiology and Pathophysiology

10.1.1.3.3 describe the common symptoms and signs of each valve lesions

10.1.1.3.4 discuss diagnostic testing

10.1.1.3.5 discuss the management of valve lesions

10.1.1.4 Acute coronary syndrome, diagnosis, risk assessment & treatment

10.1.1.4.1 understand the definition of ACS

10.1.1.4.2 know the Pathophysiology of ACS

10.1.1.4.3 be able to explain the differences between UA, NSTEMI, and STEMI

10.1.1.4.4 know the common presentation

10.1.1.4.5 describe Risk stratification and Diagnosis

10.1.1.4.6 be familiar with the basic management of ACS

10.1.1.5 Hypertension - diagnosis, investigation & treatment

10.1.1.5.1 recognize Hypertension as a leading NCD

10.1.1.5.2 describe definition, etiology, & classification

10.1.1.5.3 elicit important points in the history & Ex

10.1.1.5.4 list routine vs special investigations

10.1.1.5.5 describe different management protocols

10.1.1.6 Infective endocarditis (IE)

10.1.1.6.1 describe define endocarditis on the basis of the tempo and severity of the clinical presentation and possible causative agents

10.1.1.6.2 discuss the risk factors for development of IE

10.1.1.6.3 discuss the causative organisms in subacute and acute IE and microbiological identification methods

10.1.1.6.4 discuss the role of exercise ECG in diagnosis and risk stratification of IHD

10.1.1.6.5 discuss the clinical features of IE

10.1.1.6.6 discuss application of Duke criteria for IE diagnosis

10.1.1.6.7 discuss the empirical and typical antibiotic selection and

10.1.1.6.8 management of IE

10.1.1.6.9 describe the complications of IE

10.1.1.6.10 describe antibiotic prophylaxis of IE and prevention of IE

10.1.1.7 Heart failure

10.1.1.7.1 describe epidemiology, definition, classification & etiology of Heart failure

10.1.1.7.2 list clinical features & value of different investigations

10.1.1.7.3 describe the principles of management and prevention of heart failure

10.1.1.8 Management of shock (cardiac septic)

10.1.1.8.1 define the shock

10.1.1.8.2 classification

10.1.1.8.3 etiology

10.1.1.8.4 pathophysiology

10.1.1.8.5 approach to the hypotensive patient

10.1.1.8.6 outline management

10.1.1.8.7 discuss goals of fluid resuscitation

10.1.1.9 Cardiac Arrhythmias 1

10.1.1.9.1 describe pathophysiology of tachy-arrhythmias

10.1.1.9.2 differentiate broad complex tachycardia from narrow complex tachycardia

10.1.1.9.3 list causes for narrow (regular & irregular) & broad complex tachycardia

10.1.1.9.4 outline management of narrow & broad complex tachycardia

10.1.1.10 Cardiac Arrhythmias 2

10.1.1.10.1 classify atrial fibrillation (AF)

10.1.1.10.2 diagnose AF

10.1.1.10.3 list causes for AF

10.1.1.10.4 list clinical features expected to observe in AF

10.1.1.10.5 outline management of AF

10.1.1.10.6 diagnose atrial flutter, non-sustained ventricular trachycardia (VT), long QT syndrome, sinus bradycardia, sick sinus syndrome, heart blocks (1st, 2nd & 3rd degree) & paced rhythm

10.1.1.10.7 outline management of atrial flutter, sinus bradycardia, sick sinus syndrome & heart blocks

10.1.2 **Respiratory system**

10.1.2.1 Approach to a patient with dyspnea, cough and haemoptysis

10.1.2.1.1 describe the introduction to respiratory illness

10.1.2.1.2 describe the common symptoms and signs of respiratory illness

10.1.2.1.3 understand the path physiological basis of cough, dyspnea and haemoptysis

10.1.2.1.4 learn the common causes of cough, dyspnea and

10.1.2.1.5 learn the management of cough, dyspnea and haemoptysis in adults.

10.1.2.1.6 learn the management of cough, dyspnea and haemoptysis

10.1.2.2 Respiratory Investigations

10.1.2.2.1 learn how to approach a patient with respiratory emergency

10.1.2.2.2 learn how to recognize type 1 and type 2 respiratory failure

10.1.2.2.3 learn how to deliver oxygen therapy in respiratory emergencies

10.1.2.2.4 learn the management of acute severe asthma/COPD

10.1.2.2.5 learn the management of spontaneous pneumothorax

10.1.2.3 Pneumonias/Lung abscess

10.1.2.3.1 discuss the different microbial agents causing pneumonia: according to age groups and situations: community or hospital

10.1.2.3.2 discuss presenting features of a typical lobar pneumonia

10.1.2.3.3 differentiate lobar pneumonia from atypical pneumonia

10.1.2.3.4 discuss presentations of viral pneumonia

10.1.2.3.5 discuss investigations and complications of pneumonia

10.1.2.4 Obstructive Airways Disease (Asthma, COAD, Bronchiectasis)

10.1.2.4.1 define BA

10.1.2.4.2 describe how to diagnose BA

10.1.2.4.3 describe differences between BA and COPD

10.1.2.4.4 list common clinical features of bronchial asthma

10.1.2.4.5 list clinical features of acute and life-threatening asthma

10.1.2.4.6 list complications of acute severe asthma

10.1.2.4.7 outline management of acute and life-threatening asthma

10.1.2.4.8 outline long term management of bronchial asthma

10.1.2.5 Pleural effusion

10.1.2.5.1 understand pathogenesis of pleural effusion

10.1.2.5.2 describe clinical features

10.1.2.5.3 list causes

10.1.2.5.4 draw up a plan of management of pleural effusion

10.1.2.6 Lung Malignancy

10.1.2.6.1 discuss the epidemiology of lung cancer

10.1.2.6.2 discuss the risk factors to develop lung cancer

10.1.2.6.3 list the common cell types of bronchial carcinoma

10.1.2.6.4 discuss the recognition of lung cancer, history and physical examination

10.1.2.6.5 discuss metastatic and non-metastatic manifestations of lung cancer

10.1.2.6.6 discuss the different radiological appearances of lung cancer

10.1.2.6.7 discuss the investigations of a patient with lung cancer

10.1.2.6.8 outline the steps in management of a patient with lung cancer

10.1.2.7 Deep Vein Thrombosis (DVT), Pulmonary Embolism (PE) and pulmonary hypertension

10.1.2.7.1 understand the pathogenesis of venous thromboembolism

10.1.2.7.2 describe the clinical feature and differential diagnosis (DD) for lower limb DVT

10.1.2.7.3 describe the clinical feature and DD for PE

10.1.2.7.4 evaluate a patient with a suspected Venous Thromboembolism (VTE)

10.1.2.8 Tuberculosis

10.1.2.8.1 describe the epidemiology of tuberculosis

10.1.2.8.2 describe the pathophysiology of pulmonary and extra-pulmonary tuberculosis

10.1.2.8.3 understand the basis of diagnosis of tuberculosis

10.1.2.8.4 describe the management of tuberculosis

10.1.2.8.5 describe the methods for control and prevention of tuberculosis

10.1.2.9 Respiratory Emergencies (acute severe asthma, Pneumothorax, acute respiratory failure)

10.1.2.9.1 learn how to approach a patient with respiratory emergency

10.1.2.9.2 learn how to recognize type 1 and type 2 respiratory failure

10.1.2.9.3 learn how to deliver oxygen therapy in respiratory emergencies

10.1.2.9.4 learn the management of acute severe asthma/COPD

10.1.2.9.5 learn the management of spontaneous pneumothorax

10.1.3 Renal System

10.1.3.1 Introduction to renal diseases

10.1.3.1.1 list the clinical presentation of major disorders of the kidney

10.1.3.1.2 investigations in renal disease

10.1.3.1.3 define AKD, and CKD

10.1.3.1.4 differentiate AKD from CKD

10.1.3.2 Nephrotic syndrome

10.1.3.2.1 describe Pathogenesis of glomerular disease and presentation of primary Glomerular disease

10.1.3.2.2 describe the common histological appearance of common glomerulopathies causing adult Nephrotic syndrome

10.1.3.2.3 describe Clinical presentation of an adult with Nephrotic syndrome

10.1.3.2.4 compare nephrotic vs nephritic clinical presentation

10.1.3.2.5 list indications for renal biopsy

10.1.3.2.6 discuss the management of nephrotic syndrome in an adult

10.1.3.3 Acute renal failure/ Acute kidney infection (AKI)

10.1.3.3.1 learn what is AKI

10.1.3.3.2 learn what is Rapidly Progressive Glomerulonephritis (RPGN)

10.1.3.3.3 state the causes of AKI

10.1.3.3.4 explain the clinical assessment of a patient with AKI

10.1.3.3.5 learn the investigations in a patient with AKI

10.1.3.4 Chronic renal failure/ Chronic kidney disease

10.1.3.4.1 define chronic kidney disease (CKD)

10.1.3.4.2 discuss pathophysiology

10.1.3.4.3 discuss how to diagnose CKD

10.1.3.4.4 describe the main symptoms and signs of CKD

10.1.3.4.5 describe the risk factors for CKD

10.1.3.4.6 describe when to screen chronic kidney disease?

10.1.3.4.7 discuss the investigations in CKD

10.1.3.4.8 stage CKD

10.1.3.4.9 list causes of CKD

10.1.3.4.10 list clinical features of CKD

10.1.3.4.11 list complications of CKD

10.1.3.4.12 outline management of CKD according to

- reno-protection
- identification & management of complications

10.1.3.4.13 Control of symptoms

10.1.3.5 Genitourinary infections

10.1.3.5.1 revise normal defense mechanisms in GUT

10.1.3.5.2 understand mechanisms of different UTI

10.1.3.5.3 identify risk groups

10.1.3.5.4 describe major types

10.1.3.5.5 list diagnostic criteria

10.1.3.5.6 describe the principles of management of genitourinary infections

10.1.4 Gastrointestinal (GIT) Module

10.1.4.1 Approach to a patient with GIT disorders

10.1.4.1.1 learn how to take a detailed history in a patient suspected to have GIT disease

10.1.4.1.2 learn the symptoms related to common GIT diseases

10.1.4.1.3 learn the signs to look for in suspected GIT diseases

10.1.4.1.4 learn the investigations related to GIT diseases

10.1.4.1.5 learn the different imaging techniques related to GIT

10.1.4.2 Acute Hepatitis

10.1.4.2.1 define acute hepatitis

10.1.4.2.2 list common aetiologies for acute hepatitis

10.1.4.2.3 discuss symptoms and signs of acute hepatitis

10.1.4.2.4 discuss the principles of investigating a patient with acute hepatitis

10.1.4.2.5 outline the principles of management of a patient with acute hepatitis

10.1.4.3 Chronic liver cell disease (CLCD)

10.1.4.3.1 define CLCD

10.1.4.3.2 describe difference between compensated and decompensated CLCD

10.1.4.3.3 list causes of CLCD

10.1.4.3.4 list clinical features of CLCD

10.1.4.3.5 stage CLCD according to clinical features and investigation results

10.1.4.3.6 list common complications of CLCD

10.1.4.3.7 outline management of CLCD and its common complications

10.1.4.4 Upper gastrointestinal (GI) Bleeding

10.1.4.4.1 define & recognize different presentations

10.1.4.4.2 describe epidemiology and common etiology

10.1.4.4.3 focus on relevant information in the history

10.1.4.4.4 classify according to severity

10.1.4.4.5 describe steps in the management according to severity

10.1.4.4.6 arrange follow up of upper gastrointestinal hemorrhage

10.1.4.5 Chronic diarrhoea

10.1.4.5.1 define chronic diarrhoea

10.1.4.5.2 list common causes of chronic diarrhea among adults

10.1.4.5.3 describe the clinical evaluation of a patient with a chronic diarrhea

10.1.4.5.4 discuss the principles of investigating a patient with a chronic diarrhea

10.1.5 Endocrine Module

10.1.5.1 Introduction to endocrine system

10.1.5.1.1 define the term hormone

10.1.5.1.2 distinguish between endocrine and exocrine glands

10.1.5.1.3 describe the mechanisms of steroids and non-steroids hormone action

10.1.5.1.4 identify and locate the primary endocrine glands and list the major hormones produced by each gland

10.1.5.1.5 explain how negative and positive feedback mechanisms regulate the secretion of endocrine glands

10.1.5.1.6 identify the principal functions of each major endocrine hormone

10.1.5.1.7 describe the conditions that may result from hypo secretion and hyper secretion

10.1.5.2 Common Pituitary disorders

10.1.5.2.1 revise anatomy & physiology

10.1.5.2.2 describe main types

10.1.5.2.3 list common causes

10.1.5.2.4 select appropriate investigations

10.1.5.2.5 outline the Principles of management of pituitary disorders

10.1.5.3 Diabetes Mellitus

10.1.5.3.1 appraise the global epidemic

10.1.5.3.2 definitions, classifications & pathogenesis

10.1.5.3.3 acute and chronic complications

10.1.5.3.4 therapeutic approaches

10.1.5.3.5 principles of prevention

10.1.5.4 Thyroid disorders

10.1.5.4.1 list common causes

10.1.5.4.2 recognize clinical features

10.1.5.4.3 investigate a suspected patient

10.1.5.4.4 choose necessary therapy

10.1.5.4.5 recognize and treat complications of hyper and hypothyroidism

10.1.5.5 Disorders of calcium metabolism

10.1.5.5.1 describe the mechanism of Ca metabolism

10.1.5.5.2 describe the factors that influence Ca metabolism

10.1.5.5.3 describe the diseases related to Ca metabolism

10.1.5.5.4 describe how to differentiate diseases related to Ca metabolism

10.1.5.5.5 describe the management of diseases related to Ca metabolism

10.1.5.6 Water and electrolytes disturbances

10.1.5.6.1 discuss the physiology water and electrolyte balance

10.1.5.6.2 discuss the common electrolyte abnormalities

10.1.5.6.3 discuss the pathophysiology of hyper and hyponatremia

10.1.5.6.4 discuss the pathophysiology of hyper and hypokalemia

10.1.5.6.5 learn the common causes

10.1.5.6.6 know the acute management of electrolyte disturbances

10.1.5.7 Adrenal disorders

10.1.5.7.1 Addison syndrome, Cushing syndrome, Conn syndrome, Pheochromocytoma

10.1.5.7.2 discuss clinical features of common adrenal disorders

10.1.5.7.3 discuss basic investigation results of common adrenal disorders

10.1.5.7.4 learn the confirmation of common adrenal disorders

10.1.6 Nervous System

10.1.6.1 Approach to a patient with neurological disorders/ illness

10.1.6.1.1 identify the nature of the lesion in a patient

10.1.6.1.2 determine the site of the lesion

10.1.6.1.3 list the possible differential diagnosis considering the site of the lesion and the nature of the lesion

10.1.6.1.4 list appropriate investigations and expected results in a given patient

10.1.6.1.5 plan management of a neurological patient

10.1.6.2 Central Nervous System (CNS) Infection

10.1.6.2.1 diagnose CNS infections in a patient with fever

10.1.6.2.2 discuss the methods of confirmation of diagnosis

10.1.6.2.3 interpret CSF findings of patient with CNS infection

10.1.6.2.4 describe the specific and supportive treatment in different settings of CNS infections

10.1.6.2.5 identify complications of CNS infections

10.1.6.2.6 diagnose auto immune encephalitis

10.1.6.2.7 list the drugs used in autoimmune encephalitis

10.1.6.3 Cerebral vascular disorders - Muscle and neuromuscular junction disorders and anterior horn cell disorders

10.1.6.3.1 diagnose muscle / neuro-muscular junction (NMJ) / anterior horn cell disorders

10.1.6.3.2 list investigations for above and expected results

10.1.6.3.3 describe clinical features and management of myasthenia gravis

10.1.6.3.4 describe management of polymyositis

10.1.6.3.5 list principles of management of muscle disorders and alternating hemiplegia of childhood (AHC) disorders

10.1.6.4 Cerebral vascular disorders - Headache disorder

10.1.6.4.1 obtain a complete and relevant history of a patient with headache

10.1.6.4.2 do relevant examination to confirm the suspected diagnosis and exclude other causes

10.1.6.4.3 identify sinister causes requiring urgent referral in a patient presenting with headache

10.1.6.4.4 diagnose primary headaches, investigate and manage appropriately

10.1.6.4.5 identify patients with headache who require specialist care

10.1.6.4.6 identify non-neurological causes of headache

10.1.6.5 Cerebral vascular disorders - Disorders of the peripheral nervous system

10.1.6.5.1 to diagnose muscle / NMJ / anterior horn cell disorders

10.1.6.5.2 list investigations for above and expected results

10.1.6.5.3 describe management of myasthenia gravis

10.1.6.5.4 describe principles of management of muscle disorders and AHC disorders

10.1.6.6 Epilepsy

10.1.6.6.1 list the causes of seizures and mimics of seizure of different types

10.1.6.6.2 differentiate causes of episodic loss of consciousness

10.1.6.6.3 classify seizures according to the new classification

10.1.6.6.4 classify epilepsy wherever possible

10.1.6.6.5 plan investigations in a patient suspected to have epilepsy

10.1.6.6.6 describe the management of seizure/ epilepsy in different settings

10.1.6.6.7 describe the management of status epilepticus

10.1.6.7 Dementia and Cognitive Dysfunctions

10.1.6.7.1 determine the site of lesion in a patient with cognitive impairment

10.1.6.7.2 determine the score in monumental state examination

10.1.6.7.3 differentiate a patient with dementia from those with cognitive dysfunction due to focal neurological lesions

10.1.6.7.4 list the therapeutic agents used in the management of dementia

10.1.6.7.5 discuss the supportive management of dementia with patient (early) and the family

10.1.6.7.6 discuss diagnosis and management of delirium

10.1.6.8 Movement disorders and Parkinson' disease

10.1.6.8.1 identify common movement abnormalities in a patient

10.1.6.8.2 list the common causes of tremor, dystonia, chorea

10.1.6.8.3 describe the physical signs of Parkinson disease

10.1.6.8.4 list the conditions that mimic Parkinson Disease and main differentiating features

10.1.6.9 Management of unconscious/ confused patient

10.1.6.9.1 list the sources of information useful in a patient with unconsciousness

10.1.6.9.2 diagnose cause of unconsciousness in different contexts

10.1.6.9.3 describe the general management of unconscious patient

10.1.6.9.4 list the steps of specific management of different causes of unconsciousness

10.1.6.10 Stroke

10.1.6.10.1 diagnose a patient with stroke and TIA based on clinical features

10.1.6.10.2 localize the site of the lesion in relation to the lobe and involved vascular territory

10.1.6.10.3 plan emergency investigations and management

10.1.6.10.4 describe the emergency management of ischemic and haemorrhagic stroke

10.1.6.10.5 describe inward management of stroke after emergency management

10.1.6.10.6 list the facilities available for rehabilitation of patients with stroke

10.1.6.10.7 take appropriate action on primary and secondary prevention of stroke

10.1.7 Haematology Module

10.1.7.1 Approach to a patient with anemia

10.1.7.1.1 describe anaemia due to haematinic deficiency

10.1.7.1.2 describe hemolytic anaemia

10.1.7.1.3 describe hematological malignancy (Leukemia, lymphoma, Myeloma)

10.1.7.1.4 describe thrombophilic disorders and anticoagulation

10.1.7.1.5 describe Bleeding and coagulation disorders

10.1.7.2 Anemia due to haematinic deficiency

10.1.7.2.1 describe the types of anaemia due to haematinic deficiency- iron deficiency anaemia (IDA) and megaloblastic anaemia

10.1.7.2.2 explain the clinical features of anaemia

10.1.7.2.3 explain the evaluation of anaemia due to haematinic deficiency

10.1.7.2.4 describe the treatment of anaemia due to haematinic deficiency

10.1.7.3 Hemolytic anemia

10.1.7.3.1 give the definition and classification of haemolytic anaemia (HA)

10.1.7.3.2 know the aetiology of HA

10.1.7.3.3 learn clinical features and presentation of HA including autoimmune haemolytic anaemia (AIHA), G6PD, and congenital spherocytosis.

10.1.7.3.4 describe the diagnosis and investigations of HA

10.1.7.3.5 explain prevention and management

10.1.7.4 Bleeding and coagulation disorders

10.1.7.4.1 understand the basics of coagulation disorders

10.1.7.4.2 describe the clinical features, evaluation & management of hereditary coagulation disorders

- Haemophilia A
- Haemophilia B
- Von Willebrand's disease
- Identify the acquired coagulation disorders
- Vitamin K deficiency
- CLCD

- Disseminated intravascular coagulation (DIC)

10.1.8 Rheumatology Module

10.1.8.1 take relevant history including the social history and disability scale in patients with rheumatological conditions mention below

10.1.8.2 examine and identify clinical features,

10.1.8.3 discuss the acute management, investigations and the long term management including the pharmacological and non-pharmacological therapies (rheumatoid arthritis, osteoarthritis, SLE, Polymyositis, sclerodrma, spondyloartheritis, soft tissue rheumatism)

10.1.8.4 discuss the value of physiotherapy, occupational therapy, speech therapy in rehabilitation of patients with rheumatological, neurological and orthopedic conditions

10.1.8.5 describe the facilities and social support available for patients with long term disability in Sri Lanka

10.1.8.6 Vasculitis

10.1.8.6.1 gain basic understanding of vasculitis

10.1.8.6.2 understand current classification of vasculitis

10.1.8.6.3 understand the potential organ involvement and clinical features of vasculitis

10.1.8.6.4 diagnosis and management of vasculitis

10.1.9 Dermatology Module

10.1.9.1 Eczema/ Psoriasis

10.1.9.1.1 explain the aetiology and pathogenesis of different types of eczema

10.1.9.1.2 explain the classification – atopic, contact, stasis etc.

10.1.9.1.3 explain the clinical features of different types of eczema

10.1.9.1.4 explain how to differentiate different types by clinically and by investigations

10.1.9.1.5 describe the differential diagnosis

10.1.9.1.6 describe complications

10.1.9.1.7 explain treatment

10.1.9.2 Leprosy

10.1.9.2.1 explain the aetiology and pathogenesis of leprosy

10.1.9.2.2 explain classification

10.1.9.2.3 explain clinical features in different types of leprosy

10.1.9.2.4 describe complications of leprosy

10.1.9.2.5 explain diagnosis of leprosy

10.1.9.2.6 describe treatment and drug induced complications

10.1.9.3 Dermatological manifestation of systemic disease

10.1.9.3.1 identify specific dermatological manifestations of important systemic diseases like

- Connective tissue disorders
- Skin manifestation in malignancies

10.1.9.3.2 explain how to manage these dermatological conditions

10.1.9.3.3 identify common non-specific dermatological manifestations which are associated with wide variety of underlying systemic diseases like erythemia nodosum/multiforme, pyodema gangrenosum

10.1.9.3.4 explain how to evaluate these non-specific skin manifestations on arriving at underline specific systemic disease

10.1.10 Immunology Module

10.1.10.1 HIV and AIDS

10.1.10.1.1 describe the patho-physiology of HIV infection

10.1.10.1.2 understand the different between HIV and AIDS

10.1.10.1.3 name stages of AIDS

10.1.10.1.4 list preventive strategies

10.1.10.1.5 outline treatment

10.1.11 Tropical Medicine

10.1.11.1 Dengue Fever

10.1.11.1.1 describe the epidemiology, transmission, serotypes and the burden of dengue

10.1.11.1.2 describe the pathogenesis of primary and secondary dengue and complications

10.1.11.1.3 discuss the clinical features and classification of dengue according to WHO classification 1997 and 2009

10.1.11.1.4 discuss the supportive investigations and confirmatory tests and in a patient with fever suspected of dengue

10.1.11.1.5 discuss identification of leaking phase of dengue

10.1.11.1.6 describe the monitoring and fluid management in DF, DHF and DSS according to Sri Lankan guidelines

10.1.11.1.7 describe the role of a Medical office in treatment and prevention of Dengue

10.1.11.2 Snake bite

10.1.11.2.1 identify the venomous snakes in Sri Lanka

10.1.11.2.2 carryout initial assessment and resuscitation for a patient with snake bite

10.1.11.2.3 recognize and monitor features of envenomation

10.1.11.2.4 decide on the need for anti-venom treatment

10.1.11.2.5 take precautions, detect and treat reaction to anti-venom

10.1.11.2.6 prevent deaths due to snakebites

10.1.12 Geriatrics

10.1.12.1 Problems in elderly care

10.1.12.1.1 learn the changing demography related to older adults

10.1.12.1.2 learn bodily changes in old age

10.1.12.1.3 learn non-specific presentations of common diseases

10.1.12.1.4 learn the components of a comprehensive Geriatric assessment

10.1.12.1.5 learn the diseases that are common in old age

10.1.12.1.6 learn the management of major diseases/ conditions

10.1.12.1.7 learn prescribing in older adults

10.1.13 Alcohol and alcohol associated problems

10.1.13.1 revise knowledge on chemistry & physiology

10.1.13.2 list effects of excess alcohol on health

10.1.13.3 describe different stages of alcohol misuse

10.1.13.4 manage different stages of alcohol abuse

10.1.14 Evidence based medicine (EBM)

10.1.14.1 discuss what is evidence-based medicine and its relevance to Medical practice

10.1.14.2 describe the hierarchy of evidence / meta-analysis / systematic review

10.1.14.3 describe steps of EBM using PICO format

10.1.14.4 describe the steps in searching literature

10.1.14.5 discuss appraisal of research findings briefly

10.1.14.6 discuss how to apply it to clinical practice

10.1.15 Emergency Medicine

10.1.15.1 Respiratory emergencies (Acute severe asthma, pneumothorax, acute respiratory failure)

10.1.15.1.1 learn how to approach a patient with respiratory emergency

10.1.15.1.2 learn how to recognize type 1 and type 2 respiratory failure

10.1.15.1.3 learn how to deliver oxygen therapy in respiratory emergencies

10.1.15.1.4 learn the management of acute severe asthma/COPD

10.1.15.1.5 learn the management of spontaneous pneumothorax

10.1.15.2 Cardiac arrest and CPR

10.1.15.2.1 apply basic life support (BLS) & advanced life support (ALS) algorithms

10.1.15.2.2 understand the treatment of shockable and non-shockable rhythms

10.1.15.2.3 recognize potentially reversible causes of cardiac arrest

10.2 Introductory Medicine appointment

10.2.1 observe good student-patient relationship (good rapport) and proper conduct showing politeness, care and concern to patients

10.2.2 learn how to maintain confidentiality regarding information relevant to patient and illness

10.2.3 be able to list the items of a complete history and record the symptoms of each system in a systematic manner

10.2.4 be able to describe the basis of physical examination techniques from the knowledge of basic sciences

10.3 First Medicine appointment

10.3.1 display good student-patient relationship (good rapport) and proper conduct showing politeness, care and concern to patients

10.3.2 maintain confidentiality regarding information relevant to patient and illness

10.3.3 be competent in taking a relevant and complete history and recording it in a systematic manner

10.3.4 be able to perform a proper physical examination using correct techniques and record them in a systematic manner

10.3.5 be able to differentiate normal physical findings from abnormal physical signs and interpret them

10.3.6 be able to explain the abnormal physical findings, wherever possible using their knowledge in pre- and para-clinical subjects

10.3.7 use the findings in history and examination to arrive at a possible diagnosis or differential diagnosis

10.3.8 be able to list the relevant investigations that will assist in patient management with expected results and actions taken based on results

10.3.9 be able to understand the management plan made for their patients by the medical team

10.3.10 be able to recall important steps that are carried out in the management of medical emergencies as recommended by the consultant physician

10.3.11 observe ward procedures and familiarize with diagnosis cards, notification forms and other forms used in a medical ward

10.4 Second Medicine appointment

10.4.1 display good student-patient relationship (good rapport) and proper conduct showing politeness, care and concern to patients

10.4.2 maintain confidentiality regarding information relevant to the patient and illness

10.4.3 be able to take a relevant and complete history and record it in a systematic manner

10.4.4 be able to perform a proper physical examination using correct techniques and record them in a systematic manner

10.4.5 be able to differentiate normal physical findings from abnormal physical signs and interpret them

10.4.6 be able to explain the abnormal clinical findings, wherever possible using their knowledge in pre- and para-clinical subjects

10.4.7 use the findings in history and examination to list out the problems and arrive at a possible diagnosis or differential diagnosis for the problems where relevant

10.4.8 be able to discuss the relevant investigations that will assist in patient management

10.4.9 be able to discuss the management plan made for their patient by the medical team

10.4.10 be able to describe important steps that are carried out in the management of some medical emergencies as recommended by the consultant physician

10.4.11 observe and assist ward procedures and familiarize with diagnosis cards, notification forms and other forms used in a medical ward

10.5 Short appointments

10.5.1 Cardiology

10.5.1.1 obtain histories, elicit physical signs and describe the principles of management of the following conditions

a) Acute coronary syndrome
b) Acute left ventricular failure
c) Cardiogenic shock
d) Common arrhythmias
e) Pulmonary embolism

f) Valvular heart disease

10.5.1.2 examine the cardiovascular system and relevant components of general examination with a view to identify abnormal physical signs

10.5.1.3 identify the indications and describe the necessary preparations for the following procedure

a) DC cardioversion
b) Echocardiogram
c) Stress ECG
d) Holter monitoring
e) Insertion of Temporary pace maker
f) Coronary angiogram
g) Trans Oesophageal Echocardiogram

10.5.2 **Chest Medicine**

10.5.2.1 develop history taking and clinical examination skills on patients presenting with common respiratory symptoms

10.5.2.2 examine the Respiratory system and relevant parts of the general examination with a view to identify abnormal physical signs

10.5.2.3 describe the symptomatology and clinical examination findings of common respiratory illness

a) Bronchial Asthma
b) COPD
c) Pneumonia
d) Tuberculosis
e) Bronchiectasis
f) Lung abscess
g) Lung Tumours
h) Idiopathic fibrosing alveolitis
i) Lung fibrosis to other diseases
j) Pneumothorax
k) Cor pulmonale
l) Pleural effusion

10.5.2.4 interpret the results of an arterial blood gas report, pleural fluid report, lung function tests and peak flow rate tests

10.5.2.5 interpret chest radiograph in common respiratory conditions

10.5.2.6 witness advanced investigation techniques in respiratory medicine such as fiber optic bronchoscopy

10.5.2.7 discuss the principles of diagnosis prevention and treatment strategies of tuberculosis of Sri Lanka

10.5.3 **Neurology**

10.5.3.1 obtain a relevant and detailed history from a patient with a neurological illness paying attention to the diagnosis issues in the management and rehabilitation

10.5.3.2 examine the nervous system and relevant parts of the general examination with a view to identify abnormal physical signs in order to localize the lesion and arrive at a diagnosis

10.5.3.3 discuss the features, examination findings, investigations including results and principles of the management of the following condition (Stroke, Epilepsy, Myasthenia gravis, AIDP, CIDP, Myopathies, Parkinson disease and other movement disorders, CNS infections, cervical and lumbar root lesions, spinal cord compressions and other spinal cord diseases)

10.5.3.4 describe the indications, contra indications, preparations, equipment required, specimen collection, transport and complications of the following procedures

a) Lumbar puncture
b) CSF manometry
c) Nerve conduction studies
d) EMG
e) EEG
f) CT scanning and MRI scanning

10.5.3.5 be able to advise patients with Epilepsy, Migraine, Stroke, Peripheral neuropathy, Parkinson's disease

10.5.3.6 describe the management of acute stroke including procedures, indications and contra indications for thrombolytic therapy

10.5.4 **Rheumatology and rehabilitation**

10.5.4.1 take relevant history including the social history and disability scale in patients with rheumatological conditions mention below

10.5.4.2 examine and identify clinical features, discuss the acute management, investigations and the long-term management including the pharmacological and

non-pharmacological therapies in following conditions (Rheumatoid arthritis, Osteoartheritis, SLE, Polymyositis, Sclerodrma, Spondyloartheritis, soft tissue rheumatism)

10.5.4.3 discuss the value of physiotherapy, occupational therapy, speech therapy in rehabilitation of patients with rheumatological, neurological and orthopedic conditions

10.5.4.4 describe the facilities and social support available for patients with long term disability in Sri Lanka

10.5.5 **Emergency Medicine**

10.5.5.1 witness and understand the rationale and describe the steps involved in the management of medical emergencies

10.5.5.2 observe and be familiar with the following procedures

a) Arterial puncture for blood gas analysis
b) Carotid massage
c) Basic and Advanced life support
d) Cardioversion
e) Assisted ventilation

10.5.6 **Sexually transmitted diseases (STD)**

10.5.6.1 learn about the prevalent sexually transmitted diseases, the investigations carried out to diagnose them and treatment, follow up and contact tracing carried out in the STD units.

10.5.6.2 maintain strict confidentiality and respect patient autonomy in the given circumstances

10.5.6.3 describe the consent procedure prior to examining such cases and patient counseling procedure

10.5.6.4 obtain a relevant history and identify specific clinical features in common STD (Gonorrhoea, Genital herpes, HIV and complications, Syphilis, Chancroid)

10.5.6.5 describe the treatment, complications and follow up of the STDs

10.5.6.6 describe the strategies of HIV prevention in Sri Lanka and globally

10.5.6.7 describe the procedures of

a) obtaining a vaginal swab
b) obtaining a urethral smear
c) examination of wet smear

10.5.7 **Dermatology**

10.5.7.1 obtain a relevant history, perform a relevant physical examination and describe the steps in the management and follow up of the following common dermatological conditions

10.5.7.2 Leprosy, Eczema, Contact dermatitis, Psoriasis, Bullous dermatosis, Cutaneous fungal infections, bacterial infections and viral exanthems, Urticaria, Drug eruptions, Steven Johnsons Syndrome, Cutaneous malignancies as melanoma, squamous cell carcinoma, Cutaneous manifestations of systemic disorders (SLE, Systemic sclerosis)

10.5.7.3 identify the following procedures and list the indications and preparation

a) Skin biopsy
b) Cauterization
c) Laser therapy
d) Cosmetic surgery
e) UV therapy
f) Allergy skin test

10.6 Professorial Medicine appointment

10.6.1.1 be competent in taking a complete and relevant history

10.6.1.2 perform a complete physical examination with the correct technique and record the findings in the format given in student's history sheet

10.6.1.3 present the patient's history and examination findings in an orderly, clear and concise manner

10.6.1.4 formulate a problem list including medical, social and psychological problems and make a diagnosis or a differential diagnosis based on history and examination findings

10.6.1.5 make relevant investigation plan for the patient depending on the resources available (you may have to perform investigations that can be performed at the ward laboratory by yourself)

11. Department of Surgery

Vision

Produce innovative, competent and caring doctors proficient in managing surgical conditions in Southern Province, Sri Lanka and the world at large.

Mission

Transform undergraduate of Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka to doctors who are capable of delivering safe, effective, efficient and economical care for surgical illnesses under any kind of circumstances.

General objectives

The purpose of undergraduate surgical training is to prepare the medical students for internship and to practice medicine as a skillful doctor subsequently. The clinical training in surgery is to acquire adequate knowledge, achieve clinical skills to diagnosis and treat the most common surgical diseases including surgical emergencies.

On completion of clinical training in surgery, students should be able to

1. acquire required surgical knowledge to practice as a clinician
2. obtain a comprehensive history, elicit physical signs and interpret those findings of a surgical patient and come to a reasonable diagnosis/ different diagnosis
3. request relevant investigations to arrive a diagnosis
4. formulate a basic management plan
5. plan appropriate pre-operative assessment of a surgical patient
6. appreciate the operative theatre practices, universal precautions, sterilization and disinfection, assisting a surgery, basic instrument handling
7. plan appropriate post-operative management that includes monitoring, analgesia, fluid management & subsequent management. e.g. discharge plan, rehabilitation, medical education
8. understand and manage common surgical emergencies
9. understand the principles of management of critically injured patients

10. acquire skills in performing simple surgical procedures such as suturing of wound
11. appreciate the importance and need for the careful, accurate and speedy decision making in the setting of the surgical ward
12. be familiar with the spectrum of surgical care available and to develop a critical attitude to assess its risks and benefits
13. acquire communications skills to advice, counsel and explain about the disease condition, management options with possible outcomes in simple lay terms
14. emphasize the important ethical, moral and social issues involved in surgical practice and induce discussion on cost benefit analysis
15. understand the role of surgical services to the community with a view to prevention of possible surgical conditions and know ways how surgical patients could be rehabilitated
16. acquire knowledge and skills to deal with social aspects of patients and families when delivering health care
17. understand the role of surgical audit and research to improve the quality of surgical care. Student also should be able to acquire suitable level of skills on information and data handling
18. show enthusiasm to update knowledge and skills by means of continuous medical education that will improve the quality of the practice
19. show abilities to take leadership if required and be able to work as a team person maintaining good rapport between medical and non medical health care personals
20. emphasize the public regarding the awareness of preventable surgical conditions

Learning objectives

At the end of each session, students should be able to

11.1 Short surgical Appointments

11.1.1 **Eye**

11.1.1.1 take pertinent history and perform ophthalmological examination

11.1.1.2 check visual acuity, visual fields (by confrontation), colour vision and fundoscopy

11.1.1.3 list indications and apply local anaesthetics, cycloplegics and fluorescein dye to eye

11.1.1.4 perform a slit lamp examination; understand principles of eye pressure measurements and slit lamp examination

11.1.1.5 explain the management of ophthalmological emergencies

11.1.1.6 assess a patient with acute red eye and make accurate diagnosis followed by appropriate treatment and emergency referral to a specialist unit

11.1.1.7 identify common fundoscopic abnormalities such as those due to hypertension, diabetes, glaucoma, papilledema, macular degeneration, optic atrophy etc.

11.1.1.8 diagnose important conditions such as cataract, refractory errors, retinal detachment, diabetic retinopathy, glaucoma and understand their management

11.1.1.9 diagnose ocular foreign bodies, injuries caused by ocular trauma and understand their management

11.1.1.10 be proficient in Primary management of acid and alkali burns to eye and surrounding structures

11.1.1.11 diagnose neuro-ophthalmological disorders such as diplopia, nystagmus, optic neuritis, visual field abnormalities, amurosis fugax and understand their management

11.1.1.12 explain basic anatomy and physiology of the eye as well as related pathophysiology of its diseases

11.1.2 **Eyes, Nose, Throat (ENT)**

11.1.2.1 be able to obtain appropriate history and perform examination of ear, nose and throat

11.1.2.2 correctly and confidently use otoscope, nasal speculum, tongue depressor and indirect laryngoscope

11.1.2.3 explain causes of deafness and principles of tests for detection

11.1.2.4 demonstrate the ability to diagnose and manage common outpatient ENT problems such as tonsillitis, otitis media (acute and chronic) and sinusitis

11.1.2.5 observe the procedures of ear syringing

11.1.2.6 explain management of epistaxis and be able to apply an anterior nasal pack

11.1.2.7 list different causes of stridor and explain their appropriate management

11.1.2.8 diagnose different ear disorders associated with vertigo, loss of balance, otalgia and their management

11.1.2.9 list red flag signs for the diagnosis of serious ENT diseases such as laryngeal malignancies, maxillary tumours, nasopharyngeal carcinoma and acoustic neuroma

11.1.2.10 explain the value of tracheostomy – indications, procedure, management and complications

11.1.3 **Orthopaedics**

The main objective of the appointment is to understand the basic pattern of diseases in orthopaedic and trauma

11.1.3.1 diagnose, clinically and radiologically the common fractures and dislocations and explain their management

a) Fracture neck of femur
b) Fracture shaft of femur
c) Ankle fractures
d) Fracture in distal radius
e) Supracondylar fracture of humerus
f) Scaphoid fracture
g) Dislocation of shoulder, hip, knee and elbow

11.1.3.2 demonstrate different techniques of immobilizing fractures and their management

11.1.3.3 identify complications of fractures and explain their management

11.1.3.4 explain stages of fracture healing in a timely manner

11.1.3.5 assess a patient with suspected spinal injury with the aid of imaging

11.1.3.6 demonstrate log roll, spinal lift and spinal immobilization

11.1.3.7 evaluate a patient with back pain in order to make a diagnosis and direct appropriate management

11.1.3.8 diagnose common acute and chronic injuries to tendons, nerves and other soft tissues such as

a) Achilles tendinitis
b) De Quervain’s tenosynovitis
c) Carpal tunnel syndrome

11.1.3.9 diagnose common injuries, infections and other disorders affecting hands and describe their management while explaining the impact on functional importance

11.1.3.10 examine hip and knee joints

11.1.3.11 diagnose common orthopaedic problems in children such as dislocated hip, talipes equinovarus, limping child etc.

11.1.3.12 describe the importance of infections involving different bones and joints and explain their prevention and treatment

11.1.3.13 explain the role of different techniques of physiotherapy and occupational therapy in orthopaedics and demonstrate the ability to select them in a judicious manner for optimal patient care

11.1.4 **Oncology**

11.1.4.1 describe the principles, main categories of side effects of chemotherapy and their management

11.1.4.2 describe the principles, mode of delivery, side effects of radiotherapy and their management

11.1.4.3 explain the principles and side effects of hormonal therapy

11.1.4.4 describe the role of immunohistochemistry and tumour markers in the managements of malignancies

11.1.4.5 explain different treatment options available to manage common malignancies such as Oesophageal carcinoma, colorectal carcinoma, head and neck tumours, lung carcinomas, multiple myeloma, lymphoma, breast carcinoma, cervical carcinoma, soft tissue sarcomas and etc.

11.1.4.6 explain fundamentals of palliative care and be able to select appropriate options judiciously

11.1.4.7 observe the use of special procedures such as central lines, parenteral nutrition, feeding jejunostomy, pleural tap and peritoneal tap in oncotherapy

11.1.4.8 effectively communicate with patients and relatives specially in obtaining informed consent and breaking bad news

11.1.5 **Radiology**

11.1.5.1 describe principals and hazards of radiation on patients and staff, especially to children, pregnant women and women of child bearing age

11.1.5.2 explain protective methods employed in prevention of radiation in hospital practice

11.1.5.3 explain physics of X-rays, Ultrasound, CT, MRI, PET, Gamma Camera and their value, limitations and dangers

11.1.5.4 describe commonly used contrast media, possibility of anaphylaxis and importance of steroid coverage

11.1.5.5 read common X rays such as Chest (PA), Spine, Pelvis and limbs in a methodical manner and identify common and important abnormalities particularly in an emergency setting

11.1.5.6 read CT-Head and CT-abdomen with a view to identify common and important abnormalities in an emergency setting

11.1.5.7 prepare patients for radiological examinations in general such as USS abdomen, Barium enema, X-ray KUB (Kidney, Ureter and Bladder) and IVU (Intravenous urogram)

11.1.5.8 list indications and contraindications of radiological studies in general

11.1.5.9 identify the services available in emergency and routine basis;
plain films, Mammography, Angiography, Special contrast studies, USS & Doppler, CT scan, MRI scan, Nuclear medicine studies, interventional radiology

11.1.5.10 obtain an evaluative history in relation to possible allergy to contrast media and explain the management of such an emergency if occurs

11.1.6 **Neurosurgery**

Medical students are expected to refresh their knowledge in neuroanatomy, neurophysiology and neuropathology before commencement of the appointment.

11.1.6.1 explain the pathophysiology of primary and secondary head injury

11.1.6.2 discuss how to prevent head injury

11.1.6.3 explain the importance of Advanced Trauma Life Support protocol in preventing secondary brain damage

11.1.6.4 demonstrate care of cervical spine during primary survey

11.1.6.5 list Indications for Non-Contrast CT Scan of head in trauma and interpret critical abnormalities

11.1.6.6 monitor a patient with head injury in a ward setting

11.1.6.7 list indications for intubation in head trauma and principals governing ventilation strategy

11.1.6.8 explain Intracranial pressure monitoring methods and its importance

11.1.6.9 identify when to refer a patient with head injury to the neurosurgical team

11.1.6.10 diagnose and assess spinal injury and use American Spinal Injury Association (ASIA) score

11.1.6.11 perform initial management of a patient with spinal injury and be able to perform spinal immobilization, spinal lift and log roll without supervision

11.1.6.12 discuss the pathology, presentation, diagnosis, imaging of tumours of the CNS

11.1.6.13 diagnose common paediatric neurosurgical conditions such as hydrocephalus, spinal meningocele etc.

11.1.6.14 outline diagnosis and management of degenerative spinal disease

11.1.6.15 differentiate vascular from neurogenic claudication

11.1.6.16 recognize sinister presentations in a patient with spinal pathology especially Back Pain and appraise the concept of early referral to neurosurgeons

11.1.6.17 interpret MRI scan of brain and spinal cord with a view to diagnose common pathology

11.1.7 **Vascular Surgery**

Medical students are expected to refresh their knowledge in vascular anatomy, cardiovascular physiology and cardiovascular pathology before commencement of the appointment.

11.1.7.1 take a comprehensive History, conduct physical examination and prepare a summary followed by an outline of the management plan related to a patient with following vascular conditions

a) Acute limb ischemia
b) Chronic limb ischemia
c) Compartment syndrome of limbs
d) Abdominal Aortic of Aneurysm
e) Varicose Veins of lower limbs
f) Chronic ulcers and Diabetic foot

11.1.7.2 briefly explain following vascular pathologies, their presentations, investigations, diagnosis and outline their management

a) Congenital vascular lesions
b) Arterio-venous fistulas
c) peripheral Aneurysms
d) Lymphodema
e) Mesenteric angina
f) Renal artery stenosis and Surgical Hypertension

11.1.7.3 explain indications, outline surgical techniques and post-operative care of a patient with lower limb amputation

11.1.7.4 draw a pulse tree

11.1.7.5 use a hand-held Doppler

11.1.7.6 list indications and be able to conduct pre-op preparation required for following procedures:

a) Vascular anastomosis
b) Angioplasty and stenting

c) AAA (Abdominal Aortic Aneurysm) repair
d) Common bypass procedures used for PVD (Peripheral Vascular Disease)
e) LSV (Long Saphenous Vein) and SSV (Small Saphenous Vein) surgery
f) Laser therapy for varicose veins

11.1.7.7 observe/ assist in above procedures and outline operating procedures with aid of diagrams

11.1.7.8 conduct post-op care for above procedures and diagnose complications when they occur

11.1.7.9 demonstrate skills in management of chronic wounds such as debridement, application of 4-layer bandages and off-loading

11.1.8 **Paediatric Surgery**

Medical students are expected to refresh their knowledge in paediatric anatomy, physiology and pathology before commencement of the appointment

Basic knowledge of common congenital abnormalities affecting different systems as well as emergency and common non-emergency paediatric conditions are expected at the end of the appointment.

11.1.8.1 explain clinical presentations of following conditions, diagnose them and outline a plan for investigation and management

a) Tracheo-Oesophageal Fistula
b) Congenital Pyloric Stenosis
c) Duodenal atresia
d) Biliary atresia
e) Intestinal Obstruction
f) Hirschprung disease
g) Imperforated Anus
h) Congenital diaphragmatic Hernia
i) Phimosis,
j) Epispadias, Hypospadias, undescended testis
k) B.O.O in Paediatrics
l) Congenital Hernia

11.1.9 **Genito-Urinary Surgery**

11.1.9.1 take relevant history and examine a patient with urinary tract related problems

11.1.9.2 perform Digital Rectal Examination and assess the prostate clinically

11.1.9.3 diagnose a patient with ureteric colic, to differentiate it from other causes of acute abdomen and outline further management including interpretation of imaging/investigations

11.1.9.4 evaluate a patient with bladder outlet obstruction, manage acute urinary retention and insert a Foley urinary catheter

11.1.9.5 investigate a patient with urinary incontinence –To differentiate different types with the assistance of history, examination and investigations and outline their respective management

11.1.9.6 evaluate a patient with Hematuria and discuss the management of different aetiology including Renal cell carcinoma, transitional cell carcinoma and prostate carcinoma

11.1.9.7 investigate an adult with a Urinary tract infection.

11.1.9.8 diagnose and outline management of different Penile conditions – Phimosis, balanitis, posthitis, sexually transmitted disease and carcinoma of the Penis

11.1.9.9 evaluate a patient presenting with acute scrotum and outline their management

11.1.9.10 differentiate common chronic conditions affecting scrotum such as hydrocele, varicocele, epididymal cysts and outline their management

11.1.9.11 outline investigation of a male with erectile dysfunction and briefly explain management options for different aetiology

11.1.9.12 outline investigation of a male with Infertility and briefly explain management options for different aetiology

11.2 First Surgery clinical appointment

11.2.1 take a reasonable history and perform relevant examination

11.2.1.1 perform general and specific clinical examination

11.2.1.2 make a clinical diagnosis and exclude other possibilities (differential diagnosis)

11.2.1.3 list the relevant investigations to arrive at a diagnosis

11.2.1.4 understand the methods of treatment available

11.2.1.5 understand the prognosis and be able to explain the condition to the patient

11.2.2 be proficient on the examination of the following:

a) General examination
b) Superficial Lumps
c) Ulcers

d) Inguino-scrotal lumps
e) Abdomen
f) Thyroid lump
g) Breast lump

11.2.3 have a basic knowledge of aetiology, pathology, clinical features and management of the common diseases which occur in the above organs

11.2.4 perform certain practical procedures such as:

a) suturing of wounds
b) dressing of ulcers
c) intra muscular and sub-coetaneous injection
d) venepuncture etc.

11.2.5 communicate effectively with the patients

11.3 Second Surgical appointment

11.3.1 become more proficient in history taking and examination

11.3.2 expand the knowledge in topics already learnt and learn new topics as well

11.3.3 improve their communication skills with the patients

11.3.3.1 explain to the patients about their illness

11.3.3.2 provide health education to patients relevant to their illness

11.3.4 study special investigations ordered on their patients and their preparations

11.3.4.1 participate or watch them being carried out on their patients whenever possible

11.3.4.2 record the investigations and their results

11.3.4.3 attempt to interpret the results and correlate with the clinical data and diagnosis

11.3.4.4 attempt to follow reasons for any narrowing or revision of the diagnosis in the light of the results of the investigations

11.3.5 study and understand the reasons for maintaining the following charts:

a) Temperature chart
b) Fluid balance chart
c) Pulse, blood pressure and respiratory chart
d) Head injury chart
e) Chest/ abdominal injury chart
f) Urine sugar chart (diabetic)
g) Trauma scores

11.3.6 perform the following minor procedures

a) Dressing of wounds
b) Suturing of wounds
c) Catheterization
d) Passing of NG tube
e) Venepuncture and blood collection for various investigations

11.3.7 learn scrubbing technique and assisted in surgeries

11.4 Professorial Surgical appointment

11.4.1 diagnose and plan treatment for common problems

11.4.2 diagnose and plan the management for emergencies

11.4.3 prepare the patients for surgery

11.4.4 manage the post-operative patients

11.4.5 scrub, assist in surgery and write operation notes

11.4.6 prepare patients for special investigations

11.4.7 perform the minor procedures necessary in the ward

11.4.8 write diagnostic cards and clinic books

11.4.9 have a deep knowledge of surgical diseases and their management – expanded their clinical knowledge in clinical history taking, examination and managements [pre-operative, peri operative, post-operative and clinical follow up].

11.4.10 have developed their communication skill and attitude towards the patients

a) explain to the patients about their illness
b) provide health education to patients relevant to their illness
c) obtain consent for surgical procedures

11.5 Accident and Trauma clinical appointment

11.5.1 Assessment and Management of multiple trauma patients

a) primary survey and secondary survey
b) should include simulation-based training in skills lab
c) how to move and transport injured patients

11.5.2 Basic life support (CPR)

11.5.3 Disaster Management

11.5.4 First Aid (including anaphylaxis)

11.5.5 Care of Wounds

12. Department of Obstetrics & Gynaecology

Vision

To be excellence in producing medical professionals capable of advocates and the pursuit in women's health care, advancing and transforming women's health across the lifespan for the gobble challenges.

Mission

To maintain and train scholarly educational environment, to maintain research culture and to provide quality, state of the art healthcare in women.

General objectives

At the end of each session, students should be able to

1. interview and obtain a clear, concise & chronological history of:
    a) a pregnant female
    b) a gynaecological patient
2. carry out abdominal examination of a pregnant female
3. carry out speculum & bimanual vaginal examination of gynaecological patient
4. carry out physical examination of a utero vaginal prolapse
5. present a detailed history of a pregnant female and a gynaecological patient
6. present a brief summary of a pregnant female and a gynaecological patient
7. carry out routine antenatal care
8. diagnose labour
9. maintain a partogram & manage normal labour
10. understand the basic principles of fetal monitoring and the use of cardiotocography
11. detect abnormalities of labour and intra partum fetal compromise
12. suture an episiotomy
13. diagnose & differentiate between different types of miscarriages
14. carry out a cervical (pap) smear
15. counsel a woman who need temporary contraception/ sterilization

16. insert an intra uterine contraceptive device (Copper T)
17. counsel and manage all aspects of normal pregnancy, labour, delivery and puerperium without any further resident training
18. counsel and manage common gynaecological problems without further resident training

Learning objectives

At the end of each session, students should be able to

12.1 Objectives of Lectures

12.1.1 **Obstetrics - Pregnancy, antenatal care & labour/ postnatal management**

12.1.1.1 Physiological changes in pregnancy – maternal and fetal

12.1.1.1.1 understand the physiological changes in pregnancy

12.1.1.1.2 describe changes according to the systems of the body

12.1.1.1.3 describe the role of feto-placental unit and its development

12.1.1.2 Pre conceptional Assessment/ Risk factor analysis/ Counseling

12.1.1.2.1 describe the basic principles of pre conceptional counseling

12.1.1.2.2 recognize risk factors and optimization

12.1.1.2.3 list routine preconceptional care for healthy woman

12.1.1.3 Normal pregnancy –anatomy/ clinical features and diagnosis

12.1.1.3.1 explain anatomical changes taken place during pregnancy in relation to its function

12.1.1.3.2 list clinical features of early pregnancy and explain physiological basis for the changes

12.1.1.3.3 explain clinical relevance and diagnostic methods of early pregnancy

12.1.1.4 Antenatal care in Sri Lanka and management of low-risk pregnancy

12.1.1.4.1 discuss the structure and setting provide antenatal care in Sri Lanka

12.1.1.4.2 explain the term shared care

12.1.1.4.3 recognize care pathway for low-risk pregnancies

12.1.1.5 Prenatal screening & diagnosis (detection of high-risk fetus)

12.1.1.5.1 list methods available for prenatal screening

12.1.1.5.2 interpret the detection rate and results

12.1.1.5.3 know the specific test available for different genetic and structural abnormalities

12.1.1.6 Fetal wellbeing monitoring

12.1.1.6.1 list and explain methods available for fetal wellbeing monitoring

12.1.1.6.2 discuss the reliability of test to predict fetal wellbeing

12.1.1.7 Early pregnancy care and Minor complications of pregnancy

12.1.1.7.1 explain basic principles of early pregnancy care

12.1.1.7.2 list different minor complications in pregnancy in relations to systems and timing

12.1.1.7.3 discuss management

12.1.1.8 Induction and augmentation of labour

12.1.1.8.1 define terms induction and augmentation of labour

12.1.1.8.2 list indications for labour induction

12.1.1.8.3 explain different methods available for induction of labour

12.1.1.9 Diagnosis & management of normal labour

12.1.1.9.1 explain and demonstrate the mechanism of normal labour

12.1.1.9.2 describe signs and symptoms of normal labour

12.1.1.9.3 discuss phases and stages of labour

12.1.1.9.4 outline the components and maintenance of National partogram

12.1.1.9.5 discuss management of normal labour

12.1.1.9.6 discuss different options for the labour pain relief

12.1.1.10 Diagnosis and management of Abnormal labour

12.1.1.10.1 explain different types of abnormal labour

12.1.1.10.2 discuss how to diagnose abnormal labour

12.1.1.10.3 outline different management of abnormal labour

12.1.1.11 Management of third stage of pregnancy & its complications (PPH, Retained placenta, Uterine inversion, postpartum collapse) + Obstetric anal splinter injury

12.1.1.11.1 describe routine management of third stage of labour

12.1.1.11.2 list third stage complications

12.1.1.11.3 outline risk factors etiology diagnosis and management of third stage of labour

12.1.1.12 Management of puerperium & puerperial complications

12.1.1.12.1 discuss routine management of puerperium

12.1.1.12.2 list different complications during puerperium

12.1.1.12.3 explain diagnosis and management of puerperal complications

12.1.1.13 Mental health disorders in pregnancy

12.1.1.13.1 list different mental health disorders during pregnancy

12.1.1.13.2 discuss diagnosis and management of mental health disorders in pregnancy

12.1.2 **Obstetrics – Medical disorders in pregnancy**

12.1.2.1 Hypertensive disorder in pregnancy (Management of pre-eclampsia & eclampsia)

12.1.2.1.1 define hypertension in pregnancy

12.1.2.1.2 name the different variance of hypertensive disorders in pregnancy

12.1.2.1.3 develop the ability to manage cases of hypertension on a scientific basis

12.1.2.2 Anaemia complicating pregnancy

12.1.2.2.1 discuss etiology of different type of anaemia in pregnancy

12.1.2.2.2 describe diagnostic workout

12.1.2.2.3 explain management

12.1.2.3 Heart disease complicating pregnancy

12.1.2.3.1 describe different types of heart diseases

12.1.2.3.2 recognize the fetal and maternal complications

12.1.2.3.3 describe the principles of management during antenatal period and labour

12.1.2.4 Hyperglycaemia complicating pregnancy & management

12.1.2.4.1 define and classify diabetes in pregnancy

12.1.2.4.2 list risk factors

12.1.2.4.3 discuss the impact of maternal hyperglycaemia on pregnancy outcome

12.1.2.4.4 discuss the methods available for screening and diagnosis

12.1.2.4.5 outline the principles of management

12.1.2.5 Respiratory disease complicating pregnancy

12.1.2.5.1 discuss basic principles of management of common respiratory disorders during pregnancy

12.1.2.6 Renal disease

12.1.2.6.1 discuss basic principles of management of common renal diseases during pregnancy

12.1.2.7 Auto immune disease in pregnancy

12.1.2.7.1 discuss basic principles of management of auto immune diseases during pregnancy

12.1.2.7.2 list possible fetal and maternal complications

12.1.2.8 Obstetric cholestasis

12.1.2.8.1 discuss the diagnosis risk factors and possible maternal and fetal complications

12.1.2.8.2 outline basic principles of management

12.1.2.9 Dermatological condition in pregnancy

12.1.2.9.1 list different types of skin conditions in pregnancy

12.1.2.9.2 discuss the diagnosis

12.1.2.9.3 discuss the basic principles of management

12.1.2.10 Coagulatory disorders in pregnancy

12.1.2.10.1 list different acquired and hereditary bleeding disorders

12.1.2.10.2 explain diagnostic work-up

12.1.2.10.3 discuss the basic principles of the management

12.1.2.11 Endocrinological disorders in pregnancy

12.1.2.11.1 list different endocrinological disorders in pregnancy

12.1.2.11.2 enumerate fetal and maternal outcome

12.1.2.11.3 discuss the basic principles

12.1.2.12 DIU management

12.1.2.12.1 explain the term DIU

12.1.2.12.2 discuss the diagnosis

12.1.2.12.3 list etiological and risk factors

12.1.2.12.4 discuss the basic principles of management

12.1.2.12.5 explain value of pathological postmortem

12.1.2.12.6 discuss next pregnancy management

12.1.3 **Obstetrics - Management of high-risk pregnancies**

12.1.3.1 Management of SGA fetus & FGR (Fetal growth disorders and fetal programming of adult disease)

12.1.3.1.1 define small for gestational age

12.1.3.1.2 describe how to differentiate constitutional small baby from pathological small baby

12.1.3.1.3 list risk factors and etiologies

12.1.3.1.4 discuss the basic principles of management

12.1.3.1.5 explain place of ultra sound scan in management

12.1.3.2 Multiple pregnancy & management

12.1.3.2.1 list risk factors for multiple pregnancy

12.1.3.2.2 explain obstetric complications

12.1.3.2.3 enumerate diagnosis of chorionisity

12.1.3.2.4 discuss basic principles of management

12.1.3.3 Breech presentation &management

12.1.3.3.1 list risk factors for breech presentation

12.1.3.3.2 explain associated complications

12.1.3.3.3 discuss management of term breech

12.1.3.3.4 describe intrapartum management

12.1.3.4 Abnormal lie & abnormal presentation

12.1.3.4.1 list the different types of abnormal lie and presentation

12.1.3.4.2 enumerate risk factors

12.1.3.4.3 discuss basic principle of management

12.1.3.5 PROM / PPROM & management

12.1.3.5.1 describe signs and symptoms of PPROM/PROM

12.1.3.5.2 describe initial management

12.1.3.5.3 list possible complications of ruptured membrane

12.1.3.5.4 enumerate timing and management of her labour

12.1.3.6 Pre-term labour (PTL)

12.1.3.6.1 define preterm labour

12.1.3.6.2 identify risk factors

12.1.3.6.3 describe diagnosis, assessment and management

12.1.3.6.4 list adverse outcomes associated with PTL

12.1.3.7 Blood group incompatibilities & Rh iso immunization (Alloimmunisation in pregnancy)

12.1.3.7.1 discuss the sequence of pathophysiological events

12.1.3.7.2 discuss the clinical effect of iso-immunization

12.1.3.7.3 discuss the concept of anti-D immunoglobulin prophylaxis

12.1.3.7.4 discuss the management principles

12.1.3.8 Teenage pregnancy & management/ Advanced maternal age & grand multiparity

12.1.3.8.1 explain obstetric outcomes of pregnancies in age extremities

12.1.3.8.2 discuss the principles of management of Teenage pregnancy/ Advanced maternal age & grand multiparity

12.1.3.8.3 outline steps to minimize teenage pregnancy

12.1.4 **Obstetrics – Infection in pregnancy & drug use**

12.1.4.1 Viral infection in pregnancy - TORCH + *Varicella zoster* (Infection in pregnancy)

12.1.4.1.1 name important viral infection affects pregnancy

12.1.4.1.2 outline fetal and maternal manifestations

12.1.4.1.3 discuss principles of management

12.1.4.2 STD complicating pregnancy

12.1.4.2.1 name STI during pregnancy

12.1.4.2.2 list possible fetal and maternal effects

12.1.4.2.3 discuss principles of management of different STIs

12.1.4.3 Drugs in pregnancy & lactation (Prescribing in pregnancy)

12.1.4.3.1 explain term teratogenicity

12.1.4.3.2 list possible drugs that can cause possible congenital abnormalities and physiological disturbances in the fetus and the newborn

12.1.4.3.3 explain the principle of prescribes in pregnancy

12.1.4.3.4 explain the effect of drugs taken by breast feeding mothers on newborns

12.1.4.3.5 list drugs are contraindicated during breast feeding

12.1.5 **Obstetrics – Other Topics**

12.1.5.1 Operative interventions in Obstetrics (Caesarean delivery and instrumental delivery)

12.1.5.1.1 list indications for caesarean delivery / instrumental delivery

12.1.5.1.2 identify the trend of caesarean delivery

12.1.5.1.3 discuss complications related to caesarean delivery / instrumental delivery

12.1.5.1.4 explain pre-procedure preparations /pre-requisites for instrumental delivery

12.1.5.1.5 discuss after care

12.1.5.2 Perinatal and Maternal mortality & indices/ clinical governance (risk management and patients' safely)

12.1.5.2.1 define term MMR /PMR and other indices

12.1.5.2.2 discuss trend of perinatal and maternal mortality in Sri Lanka

12.1.5.2.3 discuss steps to minimize perinatal and maternal mortality

12.1.5.2.4 list components of clinical governance

12.1.5.2.5 enumerate risk management process

12.1.5.2.6 explain how to ensure patients safety

12.1.5.3 Medical ethics and human rights (autonomy) inform consent and confidentiality (medico-legal aspect related to women's care)

12.1.5.3.1 explain medical ethics related to women's care

12.1.5.3.2 define term autonomy

12.1.5.3.3 explain different types con consent

12.1.5.3.4 describe how to maintain confidentiality in clinical practice

12.1.6 **Gynaecology - Contraception/ subfertility and endometriosis**

12.1.6.1 Contraception/family planning

12.1.6.1.1 list various methods of contraception and family planning

12.1.6.1.2 state the mechanism of action of the different methods

12.1.6.1.3 compare the advantages and disadvantages of commonly practiced methods

12.1.6.2 Subfertility – assessment & management

12.1.6.2.1 define term subfertility

12.1.6.2.2 list different courses for male and female subfertility

12.1.6.2.3 describe basic evaluation of subfertile couple

12.1.6.2.4 explain commonly performing investigations

12.1.6.2.5 describe the treatment option available for subfertility defending of the course

12.1.6.2.6 summarize the advance fertility treatments and principles of such treatments

12.1.6.3 Adenomyosis and pelvic endometriosis

12.1.6.3.1 explain presenting clinical features of Adenomyosis and pelvic endometriosis

12.1.6.3.2 discuss diagnose of conditions

12.1.6.3.3 enumerate basic principles of management

12.1.7 **Gynaecology - Gynecological malignancies and benign tumors**

12.1.7.1 Benign uterine tumours

12.1.7.1.1 explain clinical features of fibroid uterus

12.1.7.1.2 discuss the diagnosis, management of fibroid uterus

12.1.7.2 CA endometrium

12.1.7.2.1 list risk factors for CA endometrium

12.1.7.2.2 explain presenting symptoms and diagnosis of CA endometrium

12.1.7.2.3 discuss FIGO staging and basic principles of management

12.1.7.3 Benign ovarian tumours

12.1.7.3.1 list different types of benign ovarian tumours

12.1.7.3.2 explain differentiation of benign ovarian tumours from malignancy

12.1.7.3.3 discuss basic principles of management

12.1.7.4 Ovarian cancer

12.1.7.4.1 list different types of malignant ovarian tumours

12.1.7.4.2 explain diagnostic workup

12.1.7.4.3 discuss FIGO staging and basic principles of management

12.1.7.5 Screening of Carcinoma of cervix and management of CA Cervix

12.1.7.5.1 explain cervical cancer screening programme

12.1.7.5.2 discuss diagnosis, FIGO staging and basic principles of management of CA cervix

12.1.7.6 Vulval carcinoma

12.1.7.6.1 discuss diagnosis, FIGO staging and basic principles of management of vulval carcinoma

12.1.7.7 Gestational Trophoblastic Disease

12.1.7.7.1 list different types of gestational trophoblastic disease

12.1.7.7.2 discuss diagnosis and basic principles of management of GTD

12.1.8 **Gynaecology - Infections in gynaecology / Endocrinology disorders in gynaecology**

12.1.8.1 Pelvic infection and pelvic Inflammatory Disease (PID)

12.1.8.1.1 describe the PID

12.1.8.1.2 list complications

12.1.8.1.3 state the clinical features and diagnostic criteria

12.1.8.1.4 discuss the management principles

12.1.8.2 STI

12.1.8.2.1 list different STI affective women

12.1.8.2.2 discuss complications related to STI

12.1.8.2.3 discuss basic principles of management of STI

12.1.8.3 Endocrinology disorders in gynaecology

12.1.8.3.1 list relevant endocrinology disorders in gynaecology

12.1.8.3.2 explain clinical impact of different disorders

12.1.8.3.3 discuss basic principle of management

12.1.9 **Gynaecology – Fetal embryology and early pregnancy complications**

12.1.9.1 Development of female genital tract & its abnormalities

12.1.9.1.1 describe development of female genital tract

12.1.9.1.2 list development abnormalities

12.1.9.1.3 explain how those abnormalities effect during reproductive life

12.1.9.1.4 discuss basic principles of management

12.1.9.2 Early pregnancy complications/ Miscarriages and management

12.1.9.2.1 list significant early pregnancy complications

12.1.9.2.2 discuss basic principles of management

12.1.9.3 Ectopic pregnancy/ PUL – Management

12.1.9.3.1 list presenting features

12.1.9.3.2 explain diagnosis workup

12.1.9.3.3 discuss basic principles of management

12.1.10 **Gynaecology – Menstruation and its abnormalities**

12.1.10.1 Physiology of menstruation

12.1.10.1.1 describe the events during menstrual cycle and its control by the HPO axis

12.1.10.1.2 explain sex hormone fluctuation during menstrual cycle

12.1.10.1.3 explain follicular genesis and endometrial cycle

12.1.10.2 Abnormal uterine bleeding & Management (Menstrual disorders and their current classification)

12.1.10.2.1 describe different types of AUB and new classification

12.1.10.2.2 list different aetiologies for AUB

12.1.10.2.3 discuss basic principles of management of AUB

12.1.11 **Gynaecology - Urogynaecology and menopause**

12.1.11.1 Post reproductive life care (Menopause & Hormone replacement therapy)

12.1.11.1.1 define the menopause

12.1.11.1.2 explain short term and long-term manifestations

12.1.11.1.3 discuss the place of HRT

12.1.11.2 Utero vaginal prolapse

12.1.11.2.1 explain pelvic organ support in females

12.1.11.2.2 list different components of UVP

12.1.11.2.3 explain presenting symptoms and clinical diagnosis

12.1.11.2.4 discuss basic principles of management

12.1.11.3 Urinary incontinence – assessment & management

12.1.11.3.1 list types of urinary incontinence in females

12.1.11.3.2 discuss clinical assessment of a woman with urinary incontinence

12.1.11.3.3 discuss baseline and second line investigations available to investigate urinary incontinence

12.1.11.3.4 describe basic principles of management of different types of urinary incontinence in a female

12.1.12 **Gynaecology - Pre- and post-operative care /procedures in gynaecology**

12.1.12.1 Principles of surgical procedures and pre and post-operative care in gynaecology

12.1.12.1.1 name commonly performing minor and major surgical procedures in gynaecology

12.1.12.1.2 explain steps taken to minimize surgical related complications in gynaecological surgeries

12.1.12.1.3 discuss minimally invasive surgical options available in gynaecology

12.1.12.1.4 discuss pre- and post-operative care arrange for gynaecological surgeries

12.1.13 **Gynaecology - Adolescent gynaecology**

12.1.13.1 Physiology of puberty / Abnormal puberty / Disorders of sexual development

12.1.13.1.1 explain physiological and anatomical adaptation during puberty

12.1.13.1.2 discuss different conditions related to abnormal puberty / disorders of sexual development

12.1.13.1.3 discuss basic principles of management abnormal puberty / disorders of sexual development

12.1.13.2 Care of survivors of sexual assault

12.1.13.2.1 identify high risk situation and immediate risk for the patient

12.1.13.2.2 explain medico legal procedure for sexual assault

12.1.13.2.3 discuss the social care pathway available for victims

12.1.13.2.4 describe how to liaise with other medical disciplines

12.2 Introductory Appointment

12.2.1 To acquire core knowledge and basic clinical skills in

12.2.1.1 taking a clear, consise & chronological history of obstetric and gynaecologic patients

12.2.1.2 abdominal palpation of pregnant female

12.2.1.3 speculum and bimanual vaginal examination of gynae patient

12.2.1.4 present a brief summary of a pregnant female and a gynae patient

12.2.1.5 maintain a partogram

12.3 Skills Laboratory Training

12.3.1 acquire hands-on skills to carry out basic obstetric and gynaecological procedures of following

a) Mechanism of Labour
b) Forceps Delivery
c) Breech Delivery
d) Shoulder Dystocia
e) Manual Removal of Placenta
f) Suturing of Episiotomy
g) Insertion of Speculum
h) Insertion of IUCD
i) Cervical Smear (PAP)

12.4 1st Obstetrics and Gynaecology Clinical Appointment

12.4.1 Basic Clinical Skills (BCS)

12.4.1.1 take a clear, concise & chronological history of

a) pregnant female
b) Gynae patient

12.4.1.2 abdominal palpation of a pregnant female

12.4.1.3 speculum & bimanual vaginal examination of Gynae patient

12.4.1.4 present a brief summary of a pregnant female and a Gynae patient

12.4.1.5 maintain a partogram

12.4.2 Critical Clinical Skills (CCS)

12.4.2.1 take a clear, concise & chronological history of pregnant female & Gynae patient

12.4.2.2 abdominal palpation of a pregnant female

12.4.2.3 speculum & bimanual vaginal examination of Gynae patient

12.4.2.4 present a detailed history of a pregnant female and a gynae patient

12.4.2.5 present a brief summary of a pregnant female and a gynae patient

12.4.2.6 diagnose labour

12.4.2.7 maintain a partogram and manage normal labour

12.4.2.8 identify normal and abnormal CTG

12.4.2.9 diagnose and differentiate between different types of miscarriage

12.4.2.10 routine antenatal care

12.4.2.11 suture an episiotomy

12.4.2.12 carry out a cervical (PAP) smear

12.5 2nd Obstetrics and Gynaecology Appointment

12.5.1 Basic Clinical Skills (BCS)

12.5.1.1 take a clear, concise & chronological history of

a) pregnant female
b) Gynae patient

12.5.1.2 abdominal palpation of a pregnant female

12.5.1.3 speculum & bimanual vaginal examination of Gynae patient

12.5.1.4 present a brief summary of a pregnant female and a Gynae patient

12.5.1.5 maintain a partogram

12.5.2 Core Knowledge and Skills (CKS)

12.5.2.1 write a case summery

12.5.2.2 write a diagnosis card

12.5.2.3 write operation notes

12.5.2.4 assist for

a) LSCS
b) Laparotomy

c) TAH/BSO
d) VH&R
e) D&C
f) LFD / Vacuum extraction
g) IUCD Insertion
h) Female sterilization

12.5.2.5 manage normal labour & conduct normal vaginal delivery
12.5.2.6 identify abnormalities in Partogram & fetal movement chart
12.5.2.7 interpretation of CTG
12.5.2.8 induction of labour
12.5.2.9 augmentation of labour
12.5.2.10 diagnose & manage multiple pregnancy
12.5.2.11 diagnose & manage breech presentation and other malpresentations
12.5.2.12 diagnose & manage medical disorders in pregnancy
a) Heart Disease in pregnancy
b) Hypertension in pregnancy
c) Anaemia in pregnancy
12.5.2.13 blood cross matching
12.5.2.14 manage a retained placenta
12.5.2.15 diagnose & manage an acute inversion of uterus
12.5.2.16 management of shoulder dystocia
12.5.2.17 diagnose & manage pre labour rupture of membrane
12.5.2.18 diagnose and manage pre term labour
12.5.2.19 differentiate growth restricted baby from preterm baby
12.5.2.20 antenatal fetal monitoring
12.5.2.21 manage a post-partum haemorrhage
12.5.2.22 diagnose & manage eclampsia
12.5.2.23 diagnose & manage cord presentation & prolapse
12.5.2.24 diagnose & manage an ante partum haemorrhage
12.5.2.25 diagnose & manage pre-eclampsia and hypertension in pregnancy
12.5.2.26 physical examination of an abdominal lump which is arising from the pelvis
12.5.2.27 differential diagnosis of a lump arising from the pelvis
12.5.2.28 diagnose an ectopic pregnancy
12.5.2.29 diagnose & manage Hyperemesis Gravidarum

12.5.2.30 diagnose & manage an incomplete miscarriage

12.5.2.31 diagnosis & manage a septic abortion

12.5.2.32 temporary contraceptive techniques

12.5.2.33 counsel for sterilization

12.5.2.34 diagnose & manage common menstrual disorders

12.5.2.35 diagnose & manage common vaginal infections

12.5.2.36 investigation of subfertility

12.5.2.37 investigation of a patient prior to chemotherapy for gynae malignancies

12.5.2.38 sexual counseling

12.5.2.39 early diagnosis of gynae cancer

12.6 Professorial Clinical Appointment

12.6.1 acquire basic skills obtaining focus clinical histories and perform relevant clinical examinations

12.6.2 formulate management plan taking in to account the personal social and emotional aspect of the patient

12.6.3 acquire basic skills in the management of obstetrics and gynaecological patients in the outpatient department

12.6.4 acquire basic skills in management of inward Obstetrics & Gynaecologal patients

12.6.5 acquire basic skills in pre op and post op assessment and management of obstetrics & gynaecology patients following surgical procedures

12.6.6 acquire experience and basic skills in minor gynaecological procedures and delivery

12.6.7 acquire basic skills in prompt management of obstetrics and gynaecological emergencies

12.6.8 acquire basic skills in counseling of the woman and her family

12.6.9 acquire basic skills to work as a team member

12.6.10 acquire experience in assisting obstetrics & gynaecological surgeries

13. Department of Psychiatry

Vision

To excel in undergraduate and postgraduate education, novel research and patient care in the field of mental health

Mission

To impart up-to-date knowledge, skills and healthy attitudes in undergraduate and postgraduate trainees to deliver holistic humane and integrated care to enhance mental wellbeing of the patients, promote research and deliver optimal clinical care in the field of mental health.

General objectives

At the completion of the clinical training in psychiatry student should be able to;

1. identify biological, psychological and social factors that affect human behavior in health and illness
2. apply basic scientific knowledge of psychology and psychiatric phenomenology in a wide range of clinical conditions
3. diagnose and rationally manage a defined range of psychiatric disorders in Sri Lanka
4. recognize the importance of establishing a good therapeutic relationship with patients which is necessary for a productive professional relationship to care for the mentally ill
5. apply communication skills, counseling skills in psychiatric practice
6. demonstrate caring, empathic and holistic approach in patient management
7. learn basic ethical and legal issues related to psychiatry and apply them in necessary practical situations
8. understand social, cultural, religious and economic characteristics of the individual and the society and their impact on presentation, management and prevention of psychiatric illnesses in Sri Lanka
9. learn promotion of mental health and prevention of mental illnesses in the community
10. learn to provide comprehensive and personalized care for mentally ill in primary health care

11. to work as a member and a leader of multidisciplinary team

Learning objectives

At the end of each session, students should be able to

13.1 First Psychiatry appointment

13.1.1 display good student – patient relationship (good rapport) and proper conduct showing respect, politeness, care and concern to patients

13.1.2 maintain confidentiality regarding any information relevant to the patient and his illness

13.1.3 be competent in taking a relevant and complete history and recording it in a systematic manner (see student history sheet)

13.1.4 be able to perform a proper Mental State Examination using correct techniques and record them in a systematic manner

13.1.5 be able to differentiate normal Mental State from abnormal Psychopathology and interpret the latter

13.1.6 be able to use the findings in history and Mental State Examination to arrive at a possible diagnosis or differential diagnoses

13.1.7 be able to list the relevant investigations that will assist in patient management, have knowledge about expected results and actions taken based on results

13.1.8 be able to list psychiatric medications used in the ward and their side effects

13.1.9 be able to list psychological therapies used in the ward

13.1.10 be able to understand the management plan made for their patients by the psychiatric team

13.1.11 be able to recall important steps that are carried out in the management of psychiatric emergencies

13.1.12 observe ward procedures and familiarize with diagnosis cards, and other forms used in a psychiatric ward

13.1.13 be able to understand the contributions made by the multidisciplinary team in the patient management

13.2 Communication skills training

13.2.1 good communication skills (written, verbal and nonverbal) needed in doctor- patient relationship

13.2.2 empathy, ability to obtain informed consent and maintain confidentiality in dealing with patients and their families

13.2.3 respect to patient's rights

13.2.4 manage a defined range of difficult situations (breaking bad news, angry/abusive patients/ caregivers/ team members/ administrators etc.)

13.2.5 ethical behaviours when dealing with patients and families

13.3 Rural Health appointment

13.3.1 to explore cultural beliefs in relation to illnesses and cultural practices people observe to cope in the circumstances of illness

13.4 Professorial psychiatry appointment

13.4.1 conduct a comprehensive psychiatric interview

13.4.2 conduct a mental state examination using correct technique

13.4.3 document and present the essential components of the psychiatric history in a structured manner

13.4.4 perform a relevant physical examination and request relevant investigations

13.4.5 perform a risk assessment

13.4.6 formulate a problem list including psychiatric, medical and psychosocial problems and make a diagnosis/differential diagnosis based on the history and mental state examination findings

13.4.7 formulate a management plan based on a biopsychosocial approach with the inputs from the multidisciplinary team

13.4.8 practice and demonstrate good communication skills and team work (especially with the MDT

13.4.9 practice and demonstrate skills in psycho- education and counseling skills in defined range of clinical conditions (DSH, Alcohol, breaking bad news, grief counseling)

13.4.10 discuss ethical, legal and psycho-social issues and rehabilitation in relation to psychiatry

13.4.11 practice and demonstrate the skills of managing the psychiatric emergencies

13.5 Organic psychiatric disorders

13.5.1 define organic psychiatric disorder

13.5.2 list the types of organic psychiatric disorders

- Delirium
- Dementia
- Symptomatic mental disorders (organic psychotic disorders, organic affective disorders, organic personality disorders)

13.5.2.1 **Delirium**

13.5.2.1.1 make a diagnosis (history, mental state examination, physical examination and investigations) of delirium based on ICD-10 diagnostic criteria

13.5.2.1.2 elicit clinical features of delirium

13.5.2.1.3 differentiate delirium from intoxication with psychoactive substances, dementia affective and psychotic disorders

13.5.2.1.4 describe the epidemiology and aetiology of delirium

13.5.2.1.5 select relevant investigations to identify the cause of delirium

13.5.2.1.6 perform risk assessment of a patient with delirium

13.5.2.1.7 manage (physical, psychological, and social) a patient with delirium

13.5.2.1.8 describe the course and prognosis of delirium

13.5.2.2 **Dementia**

13.5.2.2.1 make a diagnosis (history, mental state examination, mini mental state examination, physical examination and investigations) of dementia based on ICD-10 diagnostic criteria

13.5.2.2.2 elicit clinical features of dementia

13.5.2.2.3 differentiate dementia from depression and delirium

13.5.2.2.4 differentiate following types of dementia

a) Alzheimer's dementia
b) Vascular dementia
c) Normal pressure hydrocephalus

13.5.2.2.5 describe the epidemiology and aetiology of dementia

13.5.2.2.6 select relevant investigations to identify the cause of dementia

13.5.2.2.7 perform risk assessment of a patient with dementia

13.5.2.2.8 manage (physical, psychological, and social) a patient with dementia

13.5.2.2.9 describe the course and prognosis of dementia

13.6 Psychoactive substance use disorders

13.6.1 define acute intoxication, harmful use, dependence syndrome withdrawal state, tolerance

13.7 Alcohol, nicotine, cannabis, opioids, prescribed medications and other substance use disorders

13.7.1 elicit clinical features related to each of the above-mentioned clinical conditions

13.7.2 make a diagnosis of

a) Acute intoxication
b) Withdrawal state
c) Psychotic disorder
d) Dependence syndrome
e) Amnesic syndrome

based on ICD-10 diagnostic criteria

13.7.3 describe the epidemiology and aetiology of above disorders

13.7.4 identify predisposing, precipitating and maintaining factors of above disorders

13.7.5 describe the genetic, neurobiological and psychological basis of above disorders

13.7.6 perform risk assessment of a patient with above disorders

13.7.7 perform a motivational interview

13.7.8 manage (physical, psychological, and social) a patient with above disorders

13.7.9 describe the course and prognosis of above disorders

13.7.10 describe individual and community based preventive measures for above substance use

13.8 Schizophrenia

13.8.1 elicit clinical features of schizophrenia

13.8.2 make a diagnosis of schizophrenia based on ICD-10 diagnostic criteria

13.8.3 define the subtypes of schizophrenia-paranoid, hebephrenic, catatonic, simple and post schizophrenic depression

13.8.4 differentiate schizophrenia from organic disorders (delirium, dementia), psychoactive substance use disorders, mood disorders and personality disorders

13.8.5 describe the epidemiology of schizophrenia

13.8.6 identify predisposing, precipitating and maintaining factors of schizophrenia

13.8.7 describe the genetic, neurobiological and neuro-developmental basis of schizophrenia

13.8.8 perform risk assessment of a patient with schizophrenia

13.8.9 manage (physical, psychological, and social) a patient with schizophrenia

13.8.10 describe the course and prognosis of schizophrenia

13.9 Affective disorders

13.9.1 describe the classification of affective disorders

13.10 Depression

13.10.1 elicit clinical features of depression

13.10.2 make a diagnosis of depression based on ICD-10 diagnostic criteria

13.10.3 differentiate depression from normal sadness, grief, anxiety, adjustment disorder, psychoactive substance use disorders, negative features of schizophrenia and post schizophrenic depression

13.10.4 describe the epidemiology of depression

13.10.5 identify predisposing, precipitating and maintaining factors of depression

13.10.6 describe the genetic, neurobiological and neuro-developmental basis of depression

13.10.7 perform risk assessment of a patient with depression

13.10.8 manage (physical, psychological, and social) a patient with depression

13.10.9 describe the course and prognosis of depression

13.11 Bipolar affective disorder

13.11.1 elicit clinical features of mania and its subtypes

13.11.2 make a diagnosis of mania and its subtypes based on ICD-10 diagnostic criteria

13.11.3 differentiate mania/bipolar affective disorder from organic disorders, psychoactive substance use disorders, schizophrenia, agitated depression, obsessive compulsive disorder and personality disorders

13.11.4 describe the epidemiology of bipolar affective disorder

13.11.5 identify predisposing, precipitating and maintaining factors of bipolar affective disorder

13.11.6 describe the genetic, neurobiological and neuro-developmental basis of bipolar affective disorder

13.11.7 perform risk assessment of a patient with bipolar affective disorder

13.11.8 manage (physical, psychological, and social) a patient with bipolar affective disorder

13.11.9 describe the course and prognosis of bipolar affective disorder

13.12 Suicide and parasuicide (Deliberate self-harm-DSH)

13.12.1 differentiate suicide from DSH

13.12.2 describe the epidemiology of suicide in Sri Lanka and in the world

13.12.3 identify aetiological factors of suicide

13.12.4 perform risk assessment of a patient presenting with DSH

13.12.5 to manage (psychological and social) a patient with DSH

13.12.6 identify and refer a patient with DSH for specialized care

13.12.7 to manage (physical, psychological, and social) a patient with risk of suicide

13.12.8 describe the principles of prevention of suicide

13.12.9 identify the resources available in the community which can help in prevention of suicide

13.13 Neurotic and other stress related anxiety disorders

13.13.1 explain the concept of neurosis

13.13.2 describe the epidemiology, aetiology and prognosis of neurosis.

13.13.3 classify the anxiety disorders

13.13.4 describe the genetic, neurobiological and neuro-developmental basis of neurosis

13.14 Generalized anxiety disorder (GAD)

13.14.1 elicit clinical features of GAD

13.14.2 make a diagnosis of GAD based on ICD 10 diagnostic criteria

13.14.3 differentiate GAD from depressive disorder, alcohol and other psychoactive substance use disorders and medical causes

13.14.4 identify predisposing, precipitating and maintaining factors of GAD

13.14.5 manage physiological, psychological and social aspects of a patient with GAD

13.14.6 describe the course and prognosis of GAD

13.14.7 identify and refer to appropriate specialized care

13.15 Panic disorder

13.15.1 elicit clinical features and make a diagnosis of panic disorder based on ICD 10 diagnostic criteria

13.15.2 differentiate panic disorder from phobic disorders, depressive disorder, alcohol and other psychoactive substance use disorders and medical causes

13.15.3 identify predisposing, precipitating and maintaining factors of panic disorder

13.15.4 manage physiological, psychological and social aspects of a patient with panic disorder

13.15.5 describe the course and prognosis of panic disorder

13.15.6 identify and refer to appropriate specialized care

13.16 Phobic disorders

13.16.1 elicit clinical features of phobic disorders

13.16.2 make a diagnosis of specific phobias, agoraphobia and social phobia, based on ICD 10 diagnostic criteria

13.16.3 identify predisposing, precipitating and maintaining factors of phobias

13.16.4 manage physiological, psychological and social aspects of a patient with phobic disorders

13.16.5 describe the course and prognosis of phobic disorders

13.16.6 identify and refer to appropriate specialized care

13.17 Obsessive-Compulsive Disorder (OCD)

13.17.1 elicit clinical features of OCD

13.17.2 make a diagnosis of OCD based on ICD 10 diagnostic criteria

13.17.3 differentiate OCD from depressive disorder, schizophrenia, organic psychosis, personality disorders and other anxiety disorders

13.17.4 identify predisposing, precipitating and maintaining factors of OCD

13.17.5 manage physiological, psychological and social aspects of a patient with OCD

13.17.6 describe the course and prognosis of OCD

13.17.7 identify and refer to appropriate specialized care

13.18 Reaction to stress and adjustment disorders

13.18.1 elicit clinical features and make a diagnosis of acute stress reaction, adjustment disorder and Post Traumatic Stress Disorder (PTSD) based on ICD 10 diagnostic criteria

13.18.2 differentiate stress reaction, adjustment disorders and PTSD from depression

13.18.3 manage physiological, psychological and social aspects of a patient with stress reactions, adjustment disorders and PTSD

13.18.4 describe the course and prognosis of above disorder

13.18.5 identify and refer to appropriate specialized care

13.18.6 be able to identify depression, anxiety and other psychological problems in physically ill patients

13.18.7 be able to provide psychological support for physically ill patients and their caregivers

13.19 Dissociative (conversion) and somatoform disorders

13.19.1 elicit clinical features of dissociative (conversion) disorder

13.19.2 make a diagnosis of dissociative (conversion) disorder based on ICD 10 Diagnostic criteria

13.19.3 differentiate dissociative (conversion) disorder from neurological and medical disorders

13.19.4 identify predisposing, precipitating and maintaining factors of dissociative (conversion) disorder

13.19.5 know the basic principles of management of dissociative (conversion) disorder

13.19.6 describe the course and prognosis of dissociative (conversion) disorder

13.19.7 identify and refer to appropriate specialized care

13.20 Somatoform disorders and medically unexplained symptoms

13.20.1 identify medically unexplained symptoms

13.20.2 make a diagnosis of somatization disorders and hypochondriacal disorder based on ICD-10 diagnostic criteria

13.20.3 identify predisposing, precipitating and maintaining factors of somatoform disorders

13.20.4 know the basic principles of management of somatoform disorders

13.20.5 describe the course and prognosis of somatoform disorders

13.20.6 identify and refer to appropriate specialized care

13.21 Child and Adolescent Psychiatry

13.21.1 take a comprehensive history of an infant/ child/ adolescent

13.21.2 assess childhood developmental stages and identify risk factors for the development of behavioural /emotional disorders

13.21.3 diagnose following Behavioral and emotional disorders with onset usually occurring in childhood and adolescence according to ICD 10 diagnostic criteria

a) Hyperkinetic disorders
b) Conduct disorders
c) Mixed disorders of conduct and emotions

d) Emotional disorders with onset specific to childhood
e) Disorders of social functioning with onset specific to childhood and adolescence
f) Tic disorders
g) Other behavioral and emotional disorders with onset usually occurring in childhood and adolescence

13.21.4 describe the epidemiology, clinical features and etiology of above disorders

13.21.5 do the initial management of above disorders and refer appropriately for specialized care

13.22 Forensic Psychiatry

13.22.1 understand the fundamental concepts in forensic psychiatry (assessing competence/ capacity and breaching of confidentiality)

13.22.2 mental illness and crime

13.22.3 describe the procedure following a death in a psychiatric unit

13.22.4 understand the “Mental health act” and other legal issues related to psychiatry

13.23 Liaison Psychiatry

13.23.1 identify common psychiatric presentations of organic illnesses

13.23.2 identify psychiatric presentations in medical illnesses

13.23.3 identify physical manifestations of psychological morbidities

13.23.4 practice and demonstrate followings

a) Breaking bad news
b) Communication with other disciplines
c) Shared care

13.23.5 elicit clinical features of grief, bereavement and pathological grief

13.23.6 identify psychological consequences of chronic and recurrent diseases

13.23.7 understand psychology of death and dying

13.23.8 identify psychiatric and psychological aspects in, terminal illness, palliative care and end of life care decisions

13.23.9 understand the concepts of sick role, illness behaviour and doctor’s role

13.23.10 understand principles of psycho pharmacological treatment in physically ill patients

14. Department of Paediatrics

Vision

To be a health care leader in improving the lives of children by providing excellent clinical care, education and research

Mission

Provide excellent clinical service with the interest of children and adolescents recognizing their needs and rights in the context of their families and communities and provide excellent teaching and leadership for undergraduate and post graduate students to become good health care professional and encourage research to uplift the health status in the country

General objectives

At the end of the course, students should be able to,

1. contribute to the promotion of health, preventive health, and to provide patient centered care that is compassionate, appropriate and effective for the prevention and management of health problems in the paediatric age group in the community, within the family
2. demonstrate knowledge of established and evolving biomedical, clinical, epidemiological and social-behavioral sciences, as well as the application of this knowledge to patient care in the paediatric age group
3. demonstrate the ability to improve patient care based on scientific evidence, constant self-evaluation and reflective life-long learning
4. demonstrate interpersonal communication and collaborative skills that result in the effective exchange of information and collaborations with the community, patients, their families, and health professionals
5. demonstrate the ability to carry out responsibilities in a professional and ethical manner

Learning objectives

At the end of each session, students should be able to

14.1 Lecture Objectives

14.1.1 Childhood obesity

14.1.1.1 describe global statistics

14.1.1.2 describe Sri Lankan statistics

14.1.1.3 describe the definitions and their limitations

14.1.1.4 describe the aetiology

14.1.1.5 describe complications

14.1.1.6 describe how to investigate a child with obesity

14.1.1.7 describe management of childhood obesity

14.1.2 Dengue viral infection

14.1.2.1 recall epidemiology of dengue (prior knowledge)

14.1.2.2 describe pathogenesis of dengue fever, DHF and DSS

14.1.2.3 describe the definition in dengue

14.1.2.4 discuss the clinical features of DF, DHF, DSS

14.1.2.5 differentiate DHF and DSS from DF

14.1.2.6 list other dengue like illnesses (DD)

14.1.2.7 discuss the investigations helpful in dengue fever

14.1.2.8 describe the management of DF, DHF and DSS

14.1.2.9 describe the importance of public health measures in the prevention of dengue

14.1.3 HIV in children

14.1.3.1 describe problem of HIV /AIDS in children

14.1.3.2 describe methods of transmission

14.1.3.3 describe clinical features of HIV/AIDS

14.1.3.4 describe diagnosis and management of HIV

14.1.3.5 describe high risk groups for paediatric HIV/AIDS

14.1.3.6 describe preventive measures for HIV/AIDS for vertical transmission

14.1.4 Non-accidental injuries

14.1.4.1 describe definition

14.1.4.2 describe types of child abuse

14.1.4.3 describe warning signs in the history and examination

14.1.4.4 describe relevant investigations and warning signs

14.1.4.5 describe indications for admission

14.1.4.6 describe protocols following admitting to the hospital

14.1.5 **Poisoning**

14.1.5.1 describe the types

14.1.5.2 describe principals of management of acute poisoning

14.1.5.3 describe clinical features and management of specific common poisons

- Paracetamol
- Aspirin
- Kerosene
- Lead
- Iron
- Bleaches
- Organophosphates
- Paraquate
- Anti Epileptic Drugs

14.1.6 **Pertusis**

14.1.6.1 describe the history

14.1.6.2 describe epidemiology

14.1.6.3 describe the aetiology

14.1.6.4 describe clinical features

14.1.6.5 describe differential diagnosis

14.1.6.6 describe investigations

14.1.6.7 describe the management

14.1.6.8 describe complications

14.1.6.9 describe prevention

14.1.7 **Micro-nutrient deficiencies**

14.1.7.1 describe the definition

14.1.7.2 describe functions, dietary sources, deficiency features and treatment of

- Vitamin A
- Vitamin D
- Iron
- Iodine
- Zinc
- Folic acid

14.1.8 **Prematurity**

14.1.8.1 give the definition

14.1.8.2 describe classification

14.1.8.3 describe aetiologies

14.1.8.4 describe diagnosis

14.1.8.5 describe specific complications, clinical features and management

14.1.9 **Measles**

14.1.9.1 discuss the pathogenesis of measles

14.1.9.2 describe clinical features of measles and identify its appearance in chronological order

14.1.9.3 diagnose measles and its complications

14.1.9.4 list differential diagnosis of measles and identify features, which help to differentiate those from measles

14.1.9.5 describe immediate and late complications of measles

14.1.9.6 discuss management of measles and its complications

14.1.9.7 discuss preventive measures and its importance

14.1.10 **Prevention of disease through immunization**

14.1.10.1 describe the immunization schedule (EPI) of Sri Lanka

14.1.10.2 discuss the vaccines available in Sri Lanka outside the EPI schedule and make recommendations when needed

14.1.10.3 identify vaccines used in special circumstances.

14.1.10.4 recommend catch up immunization schedule for defaulters

14.1.10.5 discuss true contraindications for vaccination

14.1.10.6 discuss false contraindications/ myths for immunization

14.1.11 **Hematological malignancies**

14.1.11.1 list common hematological malignancies seen in children - Leukaemia and lymphoma

14.1.11.2 list different types of Leukaemia and lymphoma

14.1.11.3 describe the clinical spectrum of the hematological malignancies- diversity of the clinical presentation

14.1.11.4 describe the investigations and their expected results diagnose and staging the disease.

14.1.11.5 emphasize the concepts of the treatment.

14.1.11.6 list bad prognostic features

14.1.11.7 explain the complications of the disease and the treatment

14.1.12 **Solid malignancies -Wilms tumour, Neuroblastoma, brain tumours**

14.1.12.1 describe the clinical presentation of the common solid malignancies

14.1.12.2 understand the diversity of the clinical spectrum specially in Neuroblastoma

14.1.12.3 describe the staging of the above solid tumours

14.1.12.4 describe the investigations and their interpretation that are helpful to diagnose and staging

14.1.12.5 describe the treatment and prognosis

14.1.12.6 achieve a background knowledge on rare solid malignancies such as craniopharyngiomas, soft tissue sarcoma, hepatoblastoma and retinoblastoma

14.1.13 **Stridor**

14.1.13.1 list common pediatric conditions that are presented with upper airway obstruction-croup and epiglottitis

14.1.13.2 describe the etiology and the pathophysiology of croup and epiglottitis

14.1.13.3 describe the clinical features of croup and epiglottitis

14.1.13.4 compare and differentiate epiglottitis and croup in their clinical presentation

14.1.13.5 list the Investigations and describe the expected results to diagnose epiglottitis and croup

14.1.13.6 describe the emergency management of acute epiglottitis and croup (SLCP guidelines)

14.1.13.7 upgrade their knowledge on other conditions in pediatric practice that are presented with stridor- peritonsillar abscess, retropharyngeal abscess

14.1.13.8 expand the knowledge on congenital laryngeal stridor

14.1.14 **Bronchiolitis**

14.1.14.1 explain the aetiology and the pathophysiology of the disease

14.1.14.2 describe the clinical presentation of the disease

14.1.14.3 understand the grading of the severity

14.1.14.4 explain the complications of the disease

14.1.14.5 describe the investigations that are helpful to diagnose the disease

14.1.14.6 describe the principles of management

14.1.14.7 enumerate the steps in the management of an infant with severe respiratory distress (SLCP guidelines)

14.1.15 **Bronchial asthma**

14.1.15.1 Acute asthma

14.1.15.1.1 understand the pathophysiology of bronchial asthma

14.1.15.1.2 describe the diverse presentation of childhood bronchial asthma

14.1.15.1.3 describe the clinical features of acute severe asthma

14.1.15.1.4 explain the clinical parameters that are considered to grade the severity of asthma

14.1.15.1.5 explain the diagnostic criteria of bronchial asthma

14.1.15.1.6 enumerate the steps in the management of acute severe asthma (SLCP guidelines)

14.1.15.1.7 describe the complications and their management

14.1.15.2 Chronic asthma

14.1.15.2.1 describe the criteria to diagnose chronic asthma

14.1.15.2.2 enumerate the stepwise management of chronic asthma (GINA guidelines)

14.1.15.2.3 describe the concept of the inhaler therapy

14.1.15.2.4 expand the knowledge on pharmacological treatment of chronic asthma

14.1.15.2.5 educate and train the mother and the child on inhaler therapy

14.1.15.2.6 explain other conditions that mimic or aggravate chronic asthma

14.1.15.2.7 explain non- pharmacological treatment of chronic asthma

14.1.16 **Pneumonia**

14.1.16.1 explain the etiology and pathophysiology of pneumonia

14.1.16.2 describe the different types of classification

14.1.16.3 describe the signs and symptoms of the disease

14.1.16.4 list and interpret the investigations that support the diagnosis of pneumonia

14.1.16.5 enumerate the steps in the management of pneumonia

14.1.16.6 describe the complications and their management

14.1.16.7 upgrade the knowledge on invasive pneumococcal disease, staphylococcal disease and mycoplasma infection which yields extra-pulmonary manifestations

14.1.17 **Breastfeeding**

14.1.17.1 describe the physiology of breastfeeding

14.1.17.2 describe the composition of breast-milk

14.1.17.3 explain the criteria for ‘good attachment’

14.1.17.4 describe the advantages and disadvantages of breastfeeding - both to the infant and the mother

14.1.17.5 compare breast milk, unmodified cow's milk and formula milk

14.1.17.6 describe the ten steps of successful breastfeeding

14.1.17.7 learn the concept of re-lactation and induced lactation

14.1.18 **Infant and Young Child feeding & Failure to Thrive**

14.1.18.1 understand the rationale behind starting complementary feeds at 6 months

14.1.18.2 discuss the principals of infant and young child feeding

14.1.18.3 explain methods of feeding during illnesses

14.1.18.4 list causes of failure to thrive

14.1.18.5 evaluate a child with failure to thrive

14.1.19 **Childhood Undernutrition**

14.1.19.1 classify different types of malnutrition

14.1.19.2 compare and contrast nutritional assessments methods in children

14.1.19.3 describe clinical features of severe acute undernutrition

14.1.19.4 formulate a management plan for a child with undernutrition

14.1.19.5 understand and manage complications related to nutritional rehabilitation

14.1.20 **Birth Injuries**

14.1.20.1 classify different types of birth injuries

14.1.20.2 identify risk factors for birth injuries

14.1.20.3 describe clinical features of birth injuries

14.1.20.4 outline the management plan for common birth injuries

14.1.21 **Headache**

14.1.21.1 differentiate primary and secondary headaches in children

14.1.21.2 list causes of headache in children

14.1.21.3 identify Red-flags in a child with headache

14.1.21.4 evaluate a child with headache

14.1.21.5 formulate a management plan for childhood migraine

14.1.22 **Learning disorders in children**

14.1.22.1 list types of learning disorders

14.1.22.2 list causes of intellectual disability

14.1.22.3 evaluate a child with intellectual disability

14.1.22.4 formulate a management plan for a child with ID

14.1.22.5 recognize key features of dyslexia

14.1.23 **Neonatal Infections**

14.1.23.1 classify neonatal sepsis

14.1.23.2 list etiological factors for neonatal sepsis

14.1.23.3 identify risk factors for neonatal sepsis

14.1.23.4 plan investigations in a case of suspected neonatal sepsis

14.1.23.5 outline the management of neonatal sepsis

14.1.24 **Neonatal Jaundice**

14.1.24.1 list causes of neonatal jaundice

14.1.24.2 differentiate physiological jaundice from pathological jaundice

14.1.24.3 describe the pathophysiology of neonatal jaundice

14.1.24.4 understand the principal behind phototherapy

14.1.24.5 list complications related to phototherapy

14.1.24.6 formulate a management plan in case of above exchange level hyperbilirubinemia

14.1.25 **Pulmonary disorders in newborn**

14.1.25.1 list pulmonary disorders in newborn

14.1.25.2 define respiratory distress in newborn

14.1.25.3 define apnea in newborn

14.1.25.4 describe clinical features of common pulmonary disorders in newborn

14.1.25.5 outline investigations and management of common pulmonary disorders in newborn

14.1.26 **Paediatric endocrinology - Hypothyroidism**

14.1.26.1 recall the embryology thyroid gland, physiology biosynthesis of thyroxin and control mechanisms – (prior knowledge)

14.1.26.2 list the causes of congenital hypothyroidism

14.1.26.3 describe the clinical features of congenital hypothyroidism

14.1.26.4 list the investigations, which are helpful in the diagnosis and management of congenital hypothyroidism

14.1.26.5 describe the treatment and follow up of a child with hypothyroidism

14.1.26.6 discuss the prognosis of congenital hypothyroidism

14.1.26.7 list the causes of acquired hypothyroidism

14.1.26.8 describe the clinical features of acquired hypothyroidism

14.1.26.9 list the investigations and describe the management of acquired hypothyroidism

14.1.27 **Paediatric endocrinology – Diabetes Mellitus (DM)**

14.1.27.1 recall the physiological action of Insulin (prior knowledge)

14.1.27.2 discus pathophysiology of DM

14.1.27.3 list the types of DM seen in children

14.1.27.4 define diagnostic criteria in DM in children

14.1.27.5 discuss the presenting clinical features of DM in children

14.1.27.6 describe management of DM in children

14.1.27.7 discuss the types of Insulin used to treat DM (prior knowledge)

14.1.27.8 discuss the management of acute complications of DM

14.1.27.9 list the long-term complication of DM

14.1.27.10 discuss the management of DM in special situations (e.g., illness)

14.1.27.11 discuss the role of the parents and health care workers in managing children with DM

14.1.28 **Paediatric endocrinology – Growth disorders**

14.1.28.1 describe the different phases and factors influence the normal linear growth in children (Physiology)

14.1.28.2 discuss the methods used to assess growth of a child

14.1.28.3 monitor the linear growth of a child and predict the final adult height of the child

14.1.28.4 define short stature and discuss the causes of short stature

14.1.28.5 asses a child presents with short stature

14.1.28.6 plan investigations in a child with short stature

14.1.28.7 discuss management of children with short stature

14.1.29 **Paediatric endocrinology – Pubertal disorders**

14.1.29.1 describe physiology of puberty in girls and boys

14.1.29.2 define precocious puberty

14.1.29.3 list causes of precocious puberty

14.1.29.4 define delayed puberty

14.1.29.5 list causes of delayed puberty

14.1.30 **Neonatology - Neonatal Infections**

14.1.30.1 discuss the role of each component of the immune system in the prevention of infection and why newborn babies are at high risk of infection

14.1.30.2 discuss organisms responsible for intrauterine infections.

14.1.30.3 outline risk factors for neonatal bacterial infections.

14.1.30.4 list signs and symptoms of neonatal sepsis

14.1.30.5 discuss diagnostic tests used in diagnosis of sepsis

14.1.30.6 describe the treatment modalities of neonatal sepsis

14.1.30.7 list the complications of neonatal sepsis and prevention of complications

14.1.30.8 discuss the importance of surveillance of complications

14.1.31 **Genetic disorders**

14.1.31.1 importance of genetics in paediatrics

14.1.31.2 list common syndromes associated with chromosomal abnormalities in paediatric practice

14.1.31.3 describe cytogenetics, clinical features and management of Down syndrome and Turner syndrome

14.1.31.4 list single gene disorders seen in paediatric practice

14.1.31.5 draw and understand a pedigree

14.1.31.6 discuss the importance of genetic counselling

14.1.32 **Acute gastroenteritis**

14.1.32.1 list enteropathogens which cause diarrhea in childhood

14.1.32.2 discuss the pathogenesis of diarrhea by different enteropathogens

14.1.32.3 describe clinical features of different types of diarrhoea

14.1.32.4 describe the management of gastroenteritis

14.1.32.5 list complications of gastroenteritis

14.1.33 **Management of dehydration in children**

14.1.33.1 describe why children are at risk of severe dehydration

14.1.33.2 understand the fluid balance in normal children

14.1.33.3 discuss classifications of dehydration

14.1.33.4 describe clinical features of dehydration and use the knowledge to grade the degree of dehydration of a child

14.1.33.5 discuss the principles of management of dehydration

14.1.33.6 calculate the fluid requirements for dehydrated children with different types of clinical presentation

14.1.33.7 discuss the type, amount and route of fluid therapy in the treatment of dehydration

14.1.34 **Central Nervous System (CNS) infections**

14.1.34.1 have knowledge regarding different infective organisms that can cause CNS infection in different age groups.

14.1.34.2 describe modes of presentation and clinical features in different circumstances

14.1.34.3 appreciate the condition as a medical emergency to prevent future devastating complications

14.1.34.4 have knowledge about empirical therapy in CNS infections

14.1.34.5 have knowledge regarding the appropriate investigations and the ability to interpret the results

14.1.34.6 have knowledge regarding the supportive therapy and monitoring, prevention and management of acute complications

14.1.34.7 have knowledge about the long-term complications of CNS infections

14.1.35 **Cerebral palsy**

14.1.35.1 understand that it is the most common neurological disability with children

14.1.35.2 understand that it is an evolving neurological disability in young children where the damage to the brain is static

14.1.35.3 have knowledge about different etiological conditions that leads to cerebral palsy

14.1.35.4 have knowledge about how we describe the motor disability in a child with cerebral palsy

14.1.35.5 understand that the associated disabilities to the motor dysfunction is sometimes more disabling

14.1.35.6 describe how to formulate a management plan in a multidisciplinary team and contribution by each specialty

14.1.36 **Constipation**

14.1.36.1 appreciate that it's a common poorly understood condition

14.1.36.2 understand the physiology behind defecation dynamics

14.1.36.3 have knowledge regarding underlying conditions that could lead to chronic constipation

14.1.36.4 appreciate that functional constipation is the most common presentation

14.1.36.5 describe the symptomatology regarding constipation and be mindful about the great suffering they undergo due to this condition

14.1.36.6 have knowledge regarding how to manage constipation in children

14.1.36.7 appreciate that treatment failures are very common in children

14.1.37 **Malabsorption and chronic diarrhea**

14.1.37.1 have knowledge regarding diverse presentation of malabsorptive disorders

14.1.37.2 have knowledge regarding different investigations that could be employed when confronted with the challenge of diagnosing a malabsorptive disorder

14.1.37.3 have knowledge about disorders that can lead to villous atrophy

14.1.37.4 have detailed knowledge regarding specific disorders that can lead to villous atrophy

14.1.37.5 have basic knowledge regarding inflammatory bowel disorders (IBD)N and their presentation

14.1.37.6 describe major differences between Chron's disease and ulcerative colitis

14.1.37.7 describe how to investigate a suspected IBD

14.1.37.8 describe therapeutic options in treating IBD

14.1.38 **Neural tube defects**

14.1.38.1 appreciate that the neural tube defects occur very early during the fetal life

14.1.38.2 understand the spectrum of disorders associated with spinal dysraphism

14.1.38.3 associated problems and the prognostic indicators that influence the prognosis and future quality of life

14.1.38.4 have knowledge regarding the preventive aspects of neural tube defects

14.1.39 **Hydrocephalus**

14.1.39.1 gain knowledge of normal CSF circulation in the CNS

14.1.39.2 gain knowledge about conditions that can lead to a larger than normal sized head

14.1.39.3 gain knowledge about clinical presentation of the condition

14.1.39.4 gain knowledge about different conditions that lead to hydrocephalus

14.1.39.5 gain knowledge about confirmation of the diagnosis, management and the complications

14.1.40 **Neurocutaneous disorders**

14.1.40.1 appreciate the common developmental origin of both central nervous system and skin

14.1.40.2 learn the different manifestations of neurocutaneous syndromes

14.1.40.3 gain knowledge about the complications that occur due to neurocutaneous disorders

14.1.41 **Neuromuscular disorders**

14.1.41.1 learn how children can present with muscle weakness

14.1.41.2 learn how to differentiate abnormalities that occur at various levels from anterior horn cell to muscle fiber itself

14.1.41.3 describe characteristics of presentation and clinical features of various disorders

14.1.41.4 describe how to investigate and find the cause for muscle weakness

14.1.41.5 gain knowledge about patterns of inheritance and management

14.1.42 **Normal childhood development and developmental disorders**

14.1.42.1 understand the basic principles in developmental progress

14.1.42.2 emphasize the importance of the assessment of developmental progress in children during a very dynamic period of their change in body habitus and neurological maturation

14.1.42.3 describe how to make a pragmatic approach in studying the developmental progress by making subdivisions

14.1.42.4 understand the stereotypic progress of development and the concept of mile stones and limit ages

14.1.42.5 gain a general understanding of areas of abnormal development and common examples of such presentations in a clinical setting

14.1.43 **Seizure disorders**

14.1.43.1 understand that seizures are a common presentation in children

14.1.43.2 define epilepsy

14.1.43.3 describe the different types of classifications and importance of syndromic epilepsy

14.1.43.4 gain knowledge about clearly defined epileptic syndromes in children

14.1.43.5 gain knowledge regarding common paroxysmal events that can masquerade as seizure disorders

14.1.44 **Febrile seizures and status epilepticus**

14.1.44.1 gain knowledge regarding definition, differentiation, natural history and prognosis of febrile seizures

14.1.44.2 gain knowledge regarding extended spectrum of febrile seizures that can give rise to diagnostic confusion

14.1.44.3 describe the working definition of status epilepticus and the importance of such definition

14.1.44.4 gain knowledge about different disorders that present as status epilepticus

14.1.44.5 explain different types of clinical presentation of status

14.1.44.6 gain knowledge of basic algorithm and investigative procedures associated with successful control of status epilepticus

14.1.45 **Nephrology – Urinary Tract Infection**

14.1.45.1 define urinary tract infection (UTI)

14.1.45.2 explain the aetiology of UTI

14.1.45.3 explain the precipitating factors

14.1.45.4 explain how you investigate an attack of UTI

14.1.45.5 explain how you manage an attack of UTI

14.1.45.6 explain how you follow up a patient with UTI

14.1.45.7 describe vesicoureteral reflux

14.1.45.8 explain how do you manage a child with vesicoureteral reflux

14.1.45.9 explain the complications of UTI

14.1.45.10 explain how you prevent those complications

14.1.46 **Nephrology – Acute Glomerular Nephritis (AGN)**

14.1.46.1 explain what is acute glomerular nephritis

14.1.46.2 explain what is the aetiology

14.1.46.3 explain how you investigate a child with suspected AGN

14.1.46.4 explain how you treat a child with AGN

14.1.46.5 explain how you monitor a child with AGN in the ward

14.1.46.6 explain the complications of AGN

14.1.46.7 explain how you manage those complications

14.1.47 **Nephrology – Nephrotic syndrome**

14.1.47.1 define nephrotic syndrome

14.1.47.2 describe the aetiology of nephrotic syndrome

14.1.47.3 explain how you investigate a child with nephrotic syndrome

14.1.47.4 describe the steroid therapy in nephrotic syndrome

14.1.47.5 explain the complications of nephrotic syndrome

14.1.47.6 describe the treatment categories of nephrotic syndrome

14.1.47.7 state when to start immunosuppresive therapy in nephrotic syndrome

14.1.47.8 describe the adverse effects of medications of nephrotic syndrome

14.1.48 **Nephrology – Acute Renal Failure (ARF)**

14.1.48.1 describe acute renal failure

14.1.48.2 explain the causes of acute renal failure

14.1.48.3 state the clinical features

14.1.48.4 explain how you manage a child with ARF

14.1.48.5 explain how you manage hyperkalaemia

14.1.48.6 describe the indications for dialysis

14.1.48.7 explain how you prevent AKF

14.1.48.8 explain the outcome of AKF

14.1.49 **Nephrology – Chronic Renal Failure (CRF)**

14.1.49.1 explain what is chronic renal failure

14.1.49.2 explain the causes of CRF

14.1.49.3 explain the clinical features of CRF

14.1.49.4 explain how do you investigate a child with CRF

14.1.49.5 explain how do you manage a child with CRF

14.1.49.6 describe the diet for CRF

14.1.49.7 explain the end stage CRF

14.1.49.8 explain renal replacement therapy

14.1.50 **Haematology – deficiency anaemia**

14.1.50.1 explain what is anaemia

14.1.50.2 explain the common deficiencies

14.1.50.3 describe the causes of iron deficiency anaemia

14.1.50.4 explain how to diagnose iron deficiency

14.1.50.5 explain how to treat iron deficiency anaemia

14.1.50.6 explain what is megaloblastic anaemia

14.1.50.7 describe the causes of megaloblastic anaemia

14.1.50.8 explain how to investigate a child with megaloblastic anaemia

14.1.50.9 explain how to treat a child with megaloblastic anaemia

14.1.50.10 describe the clinical presentation, aetiology, laboratory diagnosis and the management of aplastic anaemia

14.1.50.11 explain how to follow up a child with anaemia

14.1.51 **Haematology – Haemolytic anaemia**

14.1.51.1 explain what is haemolytic anaemia

14.1.51.2 explain how to investigate a child with haemolytic anaemia

14.1.51.3 describe the classification of haemolytic anaemia

14.1.51.4 explain the clinical features, laboratory diagnosis and the management of congenital spherocytosis

14.1.51.5 explain the clinical features, laboratory diagnosis and the management of glucose 6 phosphate dehydrogenate deficiency

14.1.51.6 describe what is haemoglobinopathy and thalassaemia

14.1.51.7 explain the clinical manifestation of Beta thalassaemia

14.1.51.8 explain how to manage a child with beta thalassaemia

14.1.51.9 describe the long term complications of beta thalassaemia

14.1.51.10 explain what is sickle cell disease and sickle cell anaemia

14.1.51.11 describe the clinical manifestations of sickle cell anaemia

14.1.51.12 explain how to manage a child with sickle cell anaemia

14.1.52 **Haematology – bleeding disorders**

14.1.52.1 explain what is a bleeding disorder

14.1.52.2 describe the different manifestations of bleeding disorders

14.1.52.3 explain the causes of platelet disorders

14.1.52.4 explain how to investigate a child with thrombocytopenia

14.1.52.5 describe what is idiopathic thrombocytopenia (ITP)

14.1.52.6 explain how to manage a child with ITP

14.1.53 **Haematology – coagulation disorders**

14.1.53.1 describe the clinically important coagulation disorders

14.1.53.2 explain how to investigate a child with coagulation disorder

14.1.53.3 describe the clinical features of haemophilia

14.1.53.4 explain how to manage a child with haemophilia

14.1.53.5 describe the clinical manifestations of von Willebrand disease

14.1.53.6 explain how to manage a child with von Willebrand disease

14.1.54 **Rheumatology - juvenile idiopathic arthritis (JIA)**

14.1.54.1 describe what is juvenile idiopathic arthritis

14.1.54.2 explain the different manifestations of JIA

14.1.54.3 explain how to investigate a child with JIA

14.1.54.4 explain how to manage a child with JIA

14.1.54.5 describe the complications of JIA

14.1.54.6 explain what is the long term management of JIA

14.1.55 **Rheumatology - juvenile idiopathic arthritis**

14.1.55.1 describe the clinical features of Rheumatic fever

14.1.55.2 explain how to diagnose Rheumatic fever

14.1.55.3 explain how to manage RF

14.1.55.4 explain how to diagnose and manage rheumatic carditis

14.1.55.5 describe the long term follow up for children with rheumatic carditis

14.1.55.6 explain what is rheumatic chorea

14.1.55.7 explain how you manage a child with rheumatic chorea

14.2 First Clinical Appointment

14.2.1 take a complete paediatrics history

14.2.1.1 be familiar with the format of a paediatric history

14.2.1.2 be familiar with the information required to complete the structure

14.2.2 take a complete neonatal history

14.2.2.1 be familiar with the format a neonatal history

14.2.2.2 be familiar with the information required to complete the structure

14.2.3 recognize the differences between a paediatrics and neonatology history

14.2.3.1 recognize differences in the format of the paediatric and neonatal history

14.2.3.2 recognize differences in the information required to complete the two types of histories

14.2.4 perform complete clinical examination of a child

14.2.4.1 do a complete general examination

14.2.4.2 do a complete examination of systems

14.2.4.3 be familiar with techniques of examination of physical signs

14.2.4.4 describe the methods of performing the procedure

14.2.5 perform certain procedures skillfully in children

14.2.5.1 perform and acquire competency in certain procedures

14.2.5.2 describe the methods of performing the procedure

14.2.6 recognize certain equipment used in caring for children in Paediatrics ward

14.2.6.1 recognize certain equipment

14.2.6.2 know the purpose of its use

Annexure

Equipment

1. Incubator
2. Nebulizer
3. Hot water bag
4. Suction unit
5. Ambu bag
6. Open care system
7. Head box
8. Laryngoscope NG Tube
9. ET tube
10. IV canula
11. Needles
12. Butterfly needle
13. Face mask
14. Nasal canula
15. Forley catheters
16. Infusion sets

Procedures

Student should be able to

- do venepuncture in older child (> 5 years)
- observe venepuncture below 5 years
- observe

- NG tube
- Catheterization
- Radiological procedures

- clinical skills to acquire competence

- General examination

Measure — Height
Weight
Occioitofrontal circumference
Arm span length
Leg length

Describe — Appearance and emotional status
(happy/sad/alert/withdrawn)
Active /inactive
Nutritional status – normal / wasted /obese
State of Hydration

Identify

Skin – colour, texture, cyanosis, icterus
Erythema
Rashes (macules, papules, vesicles, pustules)
Scars
Haemangiomas
Naevus
Hypo or hyperoignentation
Skin tirgor

Palpate – lymph nodes
(location, size, tenderness, morbidity consistency)

Head – identify, fontanelles and suture lines
Frontal bossing

Neck – torticillls
Neck stiffness
Neck swelling
Goiter

Eyes – lectures

14.3 Second Clinical Appointment

14.3.1 **Improvements of skills in history taking**

14.3.1.1 improve basic skills in history taking acquired in the first appointment and to have a more problem oriented approach to the history and examination

14.3.1.2 identification of clinical problems

14.3.1.3 acquire clinical information about important and common clinical problems in Paediatrics as the opportunities arise during the appointment

- Bronchial asthma
- Lower respiratory tract infection
- Upper respiratory tract infection
- Meningitis / Encephalitis
- Bacillary dysentery /Gastroenteritis
- Congenital Heart Disease
- Rheumatic Heart Disease & Arthritis
- Haemolytic anaemia
- Iron deficiency anaemia
- Endocrine disorders / Hypothyroidism
- Growth disorders / short stature
- Febrile convulsions
- Epilepsy
- Malignancies-common malignancies like ALL
- Neonatal Jaundice
- RDS
- Neonatal sepsis
- Law birth weight
- Seizures

14.3.2 Acquire competence to

14.3.2.1 identify and present clinical problems in the patient

14.3.2.2 present a summary of the findings

14.3.2.3 discuss these clinical problems, in relation to differential diagnosis, investigation and treatment

14.3.2.4 identify social problems and find out resources available to handle these problems

14.3.3 **Communication skills**

14.3.3.1 acquire communication skills with parents and children

14.3.3.2 explain the parents about the disease

14.3.3.3 maintain a good rapport with staff, colleagues and peer groups

14.3.4 **Health education**

14.3.4.1 should be able to health educate about

a) breast feeding and weaning
b) communicable infectious diseases
c) primary & secondary prevention

14.3.5 **Procedures**

14.3.5.1 following procedures are to be done by the student

a) Drawing of blood
b) Setting up a drip
c) Nebulization
d) Pass a nasogastric tube

14.3.5.2 following procedures are to be observed by the student

- Lumbar Puncture (LP), Bone marrow, Liver Biopsy, Pleural Aspiration, inter costal (IC) tubes and its management, exchange transfusion, peritoneal dialysis.
- To involve in Cardiopulmonary resuscitation (CPR) whenever an opportunity arises should go to Neonatal Intensive Care Unit (NICU) and Intensive Therapy Unit (ITU) and learn basic of Paediatric intensive care

14.3.6 **Paediatric emergencies**

attend casualties as much as possible and learn acute management of acute respiratory emergency and asthma, convulsions and status epileptics, acute poisoning, snake bit, heart failure, dehydration, acute renal failure

14.3.7 **Clinical investigations**

14.3.7.1 observe radiological investigation such as ultra sound scanning, intravenous pyelogram (IVP) and micturating cystourethrogram (MCUG) examinations are done

14.3.7.2 should be able to interpret certain important X-rays such as,

- Chest X-rays (CXR) - Pneumonias, Pneumothorax, Pleural effusions, Cardiomegaly, Rib fractures etc.
- abdominal - intestinal obstruction, osteomyelitis, fractures in Non-accidental Injury (NAI), Rickets
- increased intra cranial pressure and calcification in skull X-rays

14.3.7.3 should examine as much blood films as possible with the help of pathologist, including Iron Deficiency Anemia (IDA) hemolytic neutrophil lecocytosis, abnormal cells, and reduced platelets.

14.3.8 **Clinics**

14.3.8.1 students should be able to take a quick history and do relevant examinations in the Paediatrics clinics

14.3.9 **Short examinations**

14.3.9.1 examine the systems, to interpret physical signs and to discuss those problems

14.3.9.2 examine a system in 5 - 6 minutes time

14.3.10 **Routine examination of the newborn**

14.3.10.1 perform a complete routine examination of new born

14.3.10.2 detect congenital abnormalities that need intervention

14.3.10.3 advice on routine care of newborn

14.3.10.4 recognize problems needing urgent attention e.g., RDS

14.3.10.5 recognize common conditions causing maternal anxiety but need no intervention

14.4 Final Year Paediatrics Appointment

14.4.1 enhance the skills of history taking and examination

14.4.2 learn to document the details of the patients properly

14.4.3 to develop the ability of critical evaluation of the clinical scenarios, to make reasonable conclusions

14.4.4 apply the knowledge to sort out the problem in diagnosis, investigation and management of the patients

14.4.5 develop skills to carry out common procedures

14.4.6 learn to manage paediatric emergencies correctly, efficiently and effectively, through observation, active participation and simulated scenarios (Advanced paediatric life support)

14.4.7 understand the child and the family to sort out social, economical and emotional difficulties they face

14.4.8 carry out effective health education

14.4.9 develop skills to counsel parents

14.4.10 communicate effectively with the children, parents and the staff of the ward

14.4.11 function harmoniously and effectively in the health care team

14.4.12 learn to become an effective leader maintaining high degree of professionalism

14.4.13 become a continuous self-learner with upgrading knowledge

15. Department of Anaesthesiology

Vision

To promote knowledge and skills in Anaesthesia and critical care among undergraduates and post graduates and to provide holistic perioperative care for the patients

Mission

To be the premier contributor for the development, upliftment and education of Anaesthesia and intensive care services in the country

General objectives

At the completion of the clinical training in Anaesthesiology, students should be able to;

1. learn the basic principles of pre-operative assessment and optimization of patients prior to surgery
2. provision of Analgesia in the perioperative period
3. understand the principles of peri-operative fluid therapy
4. be familiarized with different anaesthetic techniques
5. understand the importance of peri-operative monitoring and standard anaesthetic monitoring devices
6. recognize the common post-operative complications and their management
7. understand the concept of intensive care and basic principles of management of critically ill patients
8. demonstrate the ability to provide Basic and Advanced Life Support
9. develop professional communication skills among colleagues, other hospital staff, patients and their relatives
10. understand the importance of patient safety, respect privacy and right of patients at all times

11. work as a team with other health care workers in the operating theatre

12. appreciate the specialty of anaesthesia/ critical care as a future carrier

Learning objectives

At the end of each session, students should be able to

15.1 Lecture Objectives

15.1.1 **Pre-operative assessment and optimization**

15.1.1.1 describe the importance of doing a Pre- operative assessment

15.1.1.2 describe the components of a Pre-operative assessment

15.1.1.3 take a pertinent history, including co-existing disease, medications, allergies, previous anesthetic problems, and family history of problems with anesthesia

15.1.1.4 identify important factors which may influence the perioperative period in patients with significant co-morbidities, including respiratory and cardiovascular disease, endocrine abnormalities and obesity

15.1.1.5 perform an appropriate physical exam, including assessment of the airway, respiratory and cardiovascular systems

15.1.1.6 summarize the indications for laboratory testing and special investigations

15.1.1.7 describe how to optimize patients with common medical conditions prior to surgery

15.1.1.8 explain how to assess fluid status and the need for patient optimization

15.1.1.9 describe the rationale for pre-operative fasting, NPO guidelines, and pharmacological prophylaxis for aspiration

15.1.2 **Airway management**

15.1.2.1 perform a full airway assessment with relevant history, examination and bed side tests

15.1.2.2 determine which patient populations are at risk for difficult mask ventilation and difficult intubation

15.1.2.3 describe the indications and contraindications for the use of the supraglottic airway devices

15.1.2.4 summarize the goals/utilities of intubation

15.1.2.5 list the risk factors for aspiration.

15.1.2.6 demonstrate rapid sequence induction, explain its purpose, and describe its indications

15.1.2.7 summarize the requirements for safe extubation

15.1.3 **General Anaesthesia (GA)**

15.1.3.1 describe the Components of General anaesthesia- Hypnosis, Analgesia, induction, maintenance, muscle relaxation and attenuation of the stress response and reversal

15.1.3.2 describe the changes associated with general anaesthesia

15.1.3.3 describe the indications and contraindications for general anaesthesia

15.1.3.4 describe the complications associated with general anaesthesia

15.1.4 **Regional Anesthesia (RA)**

15.1.4.1 distinguish between epidural and spinal anesthesia.

15.1.4.2 describe the contraindications and complications of both

15.1.4.3 list the common peripheral nerve blocks, the indications for their use, and potential complications

15.1.4.4 explain the advantages/ disadvantages of RA over GA

15.1.5 **Pharmacology**

15.1.5.1 summarize the main indications and common side effects for the following: Medications that work on the autonomic nervous system. Benzodiazepines such as midazolam and lorazepam. Propofol, ketamine, and etomidate

15.1.5.2 describe the use of nitrous oxide, Halothane, isoflurane and sevoflurane

15.1.5.3 explain the concept of minimum alveolar concentration (MAC)

15.1.5.4 describe opioids such as morphine, pethidine and fentanyl, common side effects of opioids

15.1.5.5 distinguish between non-depolarizing and depolarizing blockade

15.1.5.6 describe the concept of reversal and how to evaluate the degree of neuromuscular block

15.1.5.7 describe the common LA agents- lidocaine, bupivacaine, and ropivacaine

15.1.5.8 calculate the maximal permissible dose for a patient of given weight

15.1.5.9 describe the signs and symptoms of local anesthetic toxicity and its management

15.1.6 **Monitoring**

15.1.6.1 explain the necessity and indications for monitoring a patient during the perioperative periods

15.1.6.2 list the different methods used for monitoring in the perioperative period and uses and drawbacks

a) Non- invasive blood pressure

b) Pulse oximetry
c) ECG
d) Temperature
e) End tidal CO2
f) Airway pressure
g) Central Venous pressure
h) Invasive arterial blood pressure
i) Neuoromuscular monitoring
j) Depth of anaesthesia

15.1.7 **Patient safety**

15.1.7.1 explain the concept of patient safety in relation to anaesthesia and critical care

15.1.7.2 describe the components of the WHO surgical check list

15.1.7.3 describe 'Stop before you block' concept

15.1.7.4 explain proper positioning of a patient during anaesthesia

15.1.7.5 explain the complications associated with various positions/poor positioning

15.1.8 **Fluid and electrolytes**

15.1.8.1 list the crystalloids and colloids used in the perioperative periods

15.1.8.2 describe the specific indications for the use of various crystalloids and colloids

15.1.8.3 summarize the principles of fluid management in the perioperative period and in critical care

15.1.8.4 describe the principles of blood transfusion and the associated complications

15.1.8.5 describe the use of Fresh frozen plasma, Platelets, Cryoprecipitate, Factor vii

15.1.9 **Management of pain**

15.1.9.1 describes the methods of assessing pain during the perioperative period

15.1.9.2 lists the physiological consequences of inadequate pain relief

15.1.9.3 describes the importance of the concept of multimodal analgesia

15.1.9.4 describes the WHO pain ladder

15.1.9.5 describes the methods of providing analgesia in the perioperative period

15.1.10 **Obstetric anaesthesia and analgesia**

15.1.10.1 summarize the physiological consequences of pregnancy

15.1.10.2 explain the significance of aortocaval compression syndrome and its management

15.1.10.3 list the pharmacological and non-pharmacological methods of pain relief available for labour

15.1.11 **Identification and management of post-operative complications**

15.1.11.1 describe the common postoperative complications of the respiratory, cardiovascular and renal systems

a) Hypo/ hypertension
b) Cardiac arrythmias
c) Cardiac ischaemia and failure
d) Airway obstruction
e) Agitation
f) Prolonged recovery
g) Nausea and vomiting
h) DVT and PE
i) electrolyte abnormalities

15.1.11.2 describe a structured approach to the common postoperative complications

15.1.12 **Basic Concepts of Critical care**

15.1.12.1 describe the structured approach to assess a critically ill patient

15.1.12.2 describe the indications for Intensive care admission and the concept of providing organ support

15.1.12.3 describe the methods and basic principles used to provide organ support

a) Cardiovascular
b) Respiratory
c) Renal

15.1.13 **Cardiopulmonary resuscitation**

15.1.13.1 describe the Basic Life Support protocol

15.1.13.2 describe the Advanced Life Support protocol

15.1.13.3 describe the management of cardiac arrest in special situation-

a) Pregnancy
b) Drowning
c) Local anaesthetic toxicity

15.1.14 **Sepsis**

15.1.14.1 define sepsis, septic shock, qSOFA and SOFA.

15.1.14.2 describe how to identify a patient with sepsis/ septic shock

15.1.14.3 describe the initial management of a patient with sepsis/ septic shock

15.1.14.4 describe the principles of fluid resuscitation in a patient with sepsis/ septic shock

15.1.14.5 describes the supportive management strategies in a patient with sepsis/ septic shock

15.1.15 **Nutrition and Surgery**

15.1.15.1 describe the importance of initiating early enteral nutrition

15.1.15.2 describe how to calculate the nutritional requirements in critically ill adults

15.1.15.3 list the methods of providing enteral nutrition

15.1.15.4 describe the indications for initiating parenteral nutrition

15.1.15.5 enumerate the complications of parenteral nutrition

15.1.16 **Anaphylaxis**

15.1.16.1 define anaphylaxis

15.1.16.2 list the clinical features of anaphylaxis

15.1.16.3 describe the initial management of a patient with anaphylaxis

15.1.16.4 describe the follow up of a patient with anaphylaxis

15.1.17 **Oxygen therapy**

15.1.17.1 describe the oxygen cascade and the equation for oxygen flux

15.1.17.2 describe the mechanism of hypoxaemia and hypoxia

15.1.17.3 classify the devices used for oxygen delivery

15.1.17.4 list the advantages and disadvantages of oxygen delivery devices

15.1.18 **Head Injury**

15.1.18.1 describe the Monro- Kellie doctrine

15.1.18.2 describe the factors controlling intracranial pressure

15.1.18.3 classify traumatic brain injury according to the Glasgow Coma Scale

15.1.18.4 describe the initial management of a patient with head injury

15.1.19 **Trauma**

15.1.19.1 describe the initial management of a patient with trauma according to the ATLS principals

15.1.19.2 describe the classes of haemorrhage and principles of fluid resuscitation in a patient with trauma

15.1.19.3 describe the life-threatening thoracic injuries and their management

15.1.19.4 describe the management of a patient with abdominal trauma and pelvic injuries

15.1.19.5 describe the initial management of a patient with spinal trauma

15.1.20 **Arterial blood gas analysis**

15.1.20.1 describe the indications for blood gas analysis

15.1.20.2 describe how to perform an arterial blood gas sampling

15.1.20.3 describe the components of a blood gas report

15.1.20.4 describe a structured approach for the analysis of a blood gas report

15.1.21 **Transport the of the critically ill**

15.1.21.1 list the indications for the transport of critically ill

15.1.21.2 describe how to prepare a patient for inter-hospital and intra-hospital transfer

15.1.21.3 identify the potential problems anticipated during transfer

15.2 Clinical learning

15.2.1 do pre-operative assessment and optimization of

a) fit and healthy patient
b) patient with cardiovascular disease – Ischemic Heart Disease (IHD), hypertension
c) patient with respiratory disease – Upper Respiratory Tract Infection (URTI), asthma
d) patient with endocrine disease – Diabetes Mellitus (DM), thyroid disease

15.2.2 state drugs used as premedication

15.2.3 explain common anaesthetic techniques – General Anesthesia (GA) Vs regional anaesthesia

15.2.4 state commonly used drugs in general and regional anaesthesia

15.2.5 monitor patients intra and post-operatively – CVS, RS, conscious level

15.2.6 maintain fluid and electrolyte balance

15.2.7 assess blood loss and transfusion of blood and blood products

15.2.8 explain post-operative pain relief – drugs and techniques

15.2.9 approach to a critically ill patient

15.2.10 manage a patient with head injury

15.2.11 conduct arterial blood gas analysis

15.2.12 be familiar with basic and advanced life support

15.2.13 explain principles of oxygen therapy

15.2.14 understand Sepsis and Septic Shock

15.2.15 describe nutrition in the critically ill

15.2.16 explain the basic principles of non-invasive ventilation

15.3 Clinical skills

15.3.1 perform management of airway in unconscious patient

a) Airway maneuvers
b) Bag and mask ventilation
c) Insertion of an oro-pharyngeal airway, LMA
d) Endotracheal intubation

15.3.2 perform intravenous cannulation and preparation of infusions, blood transfusions

15.3.3 observe and perform spinal taps

15.3.4 observe cannulation using central venous catheters, epidural catheterization

15.3.5 understand the use of ECG monitor, pulse oximeter, capnography

15.3.6 demonstrate basic life support

15.3.7 demonstrate the use of defibrillator safely and appropriately

15.3.8 maintain anaesthetic monitoring charts

15.3.9 write post-operative instructions

15.3.10 evaluate and present a HDU/ ICU patient