



Pakistan Medical Commission

National Licensing Examination 2021

for

Medical Graduates

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SECTION I: PREAMBLE

Pakistan Medical Commission (PMC) will be conducting Pakistan's first professional exit examination – National Licensing Examination (NLE) at a national level. This examination is being held based on section 20 of the Pakistan Medical Commission Act No XXXIII of 2020.

As per section 13 (d) of the PMC Act, the National Medical and Dental Academic Board has developed the structure and standards of the National Licensing Examination (NLE) 2021.

SECTION II: FORMAT AND STRUCTURE OF NLE 2021

The National Licensing Examination (NLE) 2021 has been designed under PMC ACT Section 20. It has been developed and will be administered to gauge the ability of MBBS graduates' competence to practice independently. Passing the NLE (both the theory and clinical skills examination components) is mandatory for obtaining a full license to practice as General Practitioner.

Eligibility:

Candidates who have successfully graduated from PMC approved Pakistani medical colleges with an MBBS degree are eligible to sit for NLE 2021. Foreign medical graduates will be required to follow the regulations as given in the licensing pathways available on the PMC website.

Centres:

NLE 2021 will be conducted at multiple centres across Pakistan to facilitate the candidates. It is envisaged that NLE will be offered certain international centres as well.

Frequency:

The NLE will be held at least twice a year.

Number of attempts:

There is no bar on the number of times a candidate can attempt the complete NLE.

Structure

The NLE will consist of (i) a theory component and (ii) a skill-based, clinical component – Clinical Skills Examination (CSE):

- i. The theory component will consist of MCQs targeting higher cognition and will check a candidate's ability to apply knowledge. The theory component will have 200 MCQs in which 70% will be from clinical sciences disciplines and 30% from basic sciences disciplines. NLE will be computer-based. Only candidates qualifying in the theory (MCQs) component of NLE will be eligible for the CSE.
- ii. The Clinical Skills Examination (CSE) is meant to assess essential clinical skills required for practice by a general medical practitioner. The format of CSE will be similar to that of an Objective Structured Clinical Examination (OSCE).

Passing criteria:

Candidates will have to pass both the theory and the CSE components separately in order to be declared successful in NLE.

The minimum pass percentage in the theory (MCQs) component is 70% and the minimum pass percentage in the CSE is 70%. There will be three mandatory stations in the CSE. Candidates

must clear all three mandatory stations in order to be declared as pass in the CSE. There will be no negative marking in both components of the NLE.

If a candidate obtains an aggregate of 70% or above in the CSE yet fails even one mandatory station, s/he will be declared as fail in the entire CSE.

Candidates who pass the theory (MCQs) component but fail the CSE will have to re-appear in the CSE component only. Such candidates will re-register for the CSE only.

If a candidate fails in three consecutive attempts of the CSE, s/he will have to appear in both the theory (MCQs) and CSE components on the fourth attempt. That is, after every three failed attempts at the CSE, candidates will have to sit the entire NLE.

Validity

Passing of the theory (MCQs) component of NLE will remain valid for five (5) years from the date of passing the theory (MCQs) component. CSE component must be passed within five (5) years of passing the theory (MCQs) component of NLE. If a candidate fails the CSE in three consecutive attempts, s/he will have to reappear in both the theory and CSE components of the NLE. That is, after every three failed attempts at the CSE, candidates will have to retake the entire NLE.

SECTION III: APPLIED BASIC SCIENCES DISCIPLINES IN NLE 2021

Basic Sciences disciplines in NLE 2021 will include the following. However, the Basic Sciences content of the theory examination will be largely but not exclusively based on applied aspects of the following subjects:

- Applied Anatomy
- Applied Physiology
- Applied Biochemistry
- Applied Pathology
- Clinical Pharmacology
- Community Medicine
- Forensic Medicine & Toxicology



SECTION IV: WEIGHTAGE OF APPLIED BASIC SCIENCES DISCIPLINES IN NLE**2021**

Weightage of Applied Basic Sciences disciplines in the theory (MCQs) component of NLE 2021 will be as follows:

Basic Sciences weightage: 30%	# of MCQs
Total MCQs: 60	
Applied Pathology	16
Applied Anatomy	12
Applied Physiology	10
Clinical Pharmacology	8
Applied Biochemistry	6
Community Medicine	6
Forensic Medicine & Toxicology	2
Total	60

Syllabus for Applied Basic Sciences:

For details on Applied Basic Sciences syllabus for NLE 2021, please see Appendix 1

SECTION V: CLINICAL SCIENCES DISCIPLINES IN NLE 2021

Clinical Sciences disciplines in NLE 2021 will comprise of the following:

- Medicine and allied
- Surgery and allied
- Obstetrics & Gynaecology
- Paediatrics
- Ophthalmology (Eye)
- Otorhinolaryngology (ENT)

SECTION VI: WEIGHTAGE OF CLINICAL SCIENCES DISCIPLINES IN NLE 2021

Weightage of Clinical Sciences disciplines in the theory (MCQs) component of NLE 2021 will be as follows:

Clinical Sciences weightage: 70%	# of MCQs
Total MCQs: 140	
Medicine and allied	52
Surgery and allied	48
Obstetrics & Gynaecology	14
Paediatrics	14
Ophthalmology (Eye)	6
Otorhinolaryngology (ENT)	6
Total	140

Syllabus for Clinical Sciences:

For details on Clinical Sciences syllabus for NLE 2021, please see Appendix 2

SECTION VII: CLINICAL SKILLS EXAMINATION (CSE)

CSE aims to assess the essential clinical skills that would include interpretation of clinical data, including the diagnostic data, formulation of diagnosis and development of management plans. CSE would also include examination skills and key procedural skills.

The format of CSE will be similar to that of an Objective Structured Clinical Examination (OSCE). The duration of CSE shall be approximately 3 hours and 30 minutes (including the initial briefing) and will consist of 20 stations. There will be three stations defined as mandatory stations. Failure in any one or more of the mandatory stations will constitute a failure in the entire CSE. Pass percentage is fixed at 70% for the final result of the CSE (with the provision that the candidate has to pass each one of the three mandatory stations).

Each CSE station shall be assigned 8 minutes with 2 minutes for the changeover. The details about the content and conduct of CSE (duration, number of stations, pass percentage and the number and type of mandatory stations) remain subject to change at the discretion of PMC. Provided, any such change is notified and displayed on the PMC website at least 12 weeks prior to the date of commencement of the CSE.

Distribution of disciplines for CSE:

Distribution of disciplines for stations for CSE will be as follows:

Discipline	# of stations
Medicine and allied	7
Surgery and allied	7
Obstetrics & Gynaecology	2
Paediatrics	2
Ophthalmology (Eye)	1
Otorhinolaryngology (ENT)	1
Total stations	20

Mandatory stations in CSE:

As mentioned above, there will be three stations defined as mandatory stations in CSE. Failure in any one or more of the mandatory stations will constitute a failure in the entire CSE. The three mandatory stations will be from (one from each) the following disciplines:

- Medicine and allied
- Surgery and allied
- Obstetrics and Gynaecology or Paediatrics



APPENDIX 1

SYLLABUS FOR APPLIED BASIC SCIENCES COMPONENT OF NLE 2021

APPLIED ANATOMY

1. DEVELOPMENTAL ANATOMY

1.0 Development of the Nervous System

- i. Congenital anomalies of brain and spinal cord
- ii. Neural tube defects
- iii. Hypophyseal defects

1.1 Development of Head and Neck

- i. Ectopic thymus and parathyroid tissue
- ii. Branchial fistulas, branchial sinuses, cysts
- iii. 1st arch syndrome (Treacher Collins syndrome, Pierre Robin Syndrome)
- iv. Neural crest cells and craniofacial defects
- v. Tongue-Tie, macro and micro-glossia and bifid tongue
- vi. Thyroglossal duct and congenital thyroid abnormalities (congenital hypothyroidism, accessory thyroid and thyroidal agenesis)
- vii. Facial clefts (facial and palatal clefts, including anterior and posterior clefts of lips and palates)
- viii. Developmental anomalies of nasolacrimal duct
- ix. Tooth abnormalities
- x. Deafness and external ear abnormalities
- xi. Eye abnormalities (colobomas, congenital cataracts, cyclopia)

1.2 Development of Digestive & Urogenital System

- i. Esophageal abnormalities (esophageal atresia, tracheoesophageal fistulas)
- ii. Stomach abnormalities (pyloric stenosis)
- iii. Liver and gall bladder abnormalities (accessory hepatic ducts and duplication of the gallbladder, extrahepatic biliary atresia, intrahepatic biliary duct atresia and hypoplasia)
- iv. Pancreatic abnormalities (annular pancreas and accessory pancreatic tissue)
- v. Abnormalities of mesenteries
- vi. Body wall defects (umbilical hernia, gastroschisis, omphelocele)
- vii. Gut rotation defects
- viii. Gut atresia and stenosis

- ix. Hindgut abnormalities (recto anal atresia, and fistulas, imperforate anus, congenital megacolon)
- x. Renal tumors and congenital defects (renal cystic disease, accessory kidney, malrotation, renal agenesis)
- xi. Abnormal location of the kidneys
- xii. Urinary bladder defects
- xiii. Uterine and vaginal defects
- xiv. Defects of male Internal and external genitalia
- xv. Defects in sex differentiation
- xvi. Hernias and cryptorchism
- xvii. Diaphragmatic hernias

1.3 Development of Musculoskeletal System

- i. Craniofacial defects and skeletal dysplasias
- ii. Limb defects (meromelia, phocomelia, amelia, micromelia, polydactyly, ectrodactyly, syndactyly)
- iii. Cleft hand and foot
- iv. Clubfoot
- v. Congenital absence or deficiency of the radius
- vi. Amniotic bands
- vii. Congenital hip dislocation
- viii. Vertebral defects

1.4 Development of Cardiovascular System

- i. Abnormalities of cardiac looping
- ii. Endocardial cushions and heart defects
- iii. Atrial septal and ventricular septal defects
- iv. Ectopia cordis & dextrocardia
- v. Arterial and venous system defects

1.5 Development of Respiratory System

- i. Tracheoesophageal fistulas, tracheal stenosis and atresia
- ii. Respiratory distress syndrome
- iii. Congenital cysts of the lung

1.6 Development of Integumentary System

- i. Keratinization of the skin & disorders of keratinization
- ii. Hypertrichosis
- iii. Polythelia, polymastia and inverted nipples

1.7 General Embryology

- i. Genetic disorders
- ii. Infertility
- iii. Ectopic pregnancy
- iv. Twinning
- v. Placental abnormalities
- vi. Abortion
- vii. Anomalies of oogenesis and fetal period
- viii. Artificial insemination and In vitro fertilization

2. NEUROANATOMY

2.0 Organization of Nervous System

- i. Spinal cord injuries at different spinal levels
- ii. Spinal Nerve Injuries (disease and the intervertebral foramina)
- iii. Herniated intervertebral discs
- iv. Spinal tap
- v. Caudal anaesthesia
- vi. Intracranial hemorrhage (epidural, subdural, subarachnoid, cerebral)
- vii. The shaken-baby syndrome

2.1 Spinal cord lesions

- i. Injury to the ascending tracts within the spinal cord
- ii. Upper motor neuron lesions
- iii. Lower motor neuron lesions
- iv. Types of paralysis
- v. Spinal shock syndrome
- vi. Complete cord transection syndrome
- vii. Brown-Séquard syndrome or hemi-section of the cord
- viii. Syringomyelia
- ix. Poliomyelitis
- x. Multiple sclerosis
- xi. Amyotrophic lateral sclerosis

2.2 Brain stem lesions

- i. Arnold-Chiari phenomenon
- ii. Vascular disorders of the medulla oblongata (lateral and medial medullary syndromes)
- iii. Tumors of the pons
- iv. Pontine hemorrhage
- v. Midbrain trauma
- vi. Infarctions of the pons

- vii. Blockage of the cerebral aqueduct
- viii. Vascular lesions of the midbrain

2.3 Cerebellar diseases

- i. Signs and symptoms of cerebellar disease
- ii. Cerebellar syndromes

2.4 Cerebral diseases

- i. Lesions of the internal capsule
- ii. Lesions of motor and sensory cortex of cerebrum
- iii. Epilepsy

2.5 Diseases of basal ganglia

- i. Chorea
- ii. Huntington's disease
- iii. Sydenham chorea,
- iv. Hemiballismus
- v. Parkinson disease
- vi. Athetosis

2.6 Cranial nerve lesions

- i. Signs and symptoms of cranial nerve lesions

2.7 Lesions of the thalamus

- i. Sensory loss
- ii. Thalamic pain
- iii. Thalamic hand

2.8 Clinical disorders associated with hypothalamic lesions

- i. Obesity and wasting
- ii. Sexual disorders
- iii. Hyperthermia and hypothermia
- iv. Diabetes insipidus
- v. Disturbances of sleep
- vi. Emotional disorders

2.9 Diseases Involving the autonomic nervous system

- i. Diabetes mellitus
- ii. Horner syndrome
- iii. Argyll Robertson pupil
- iv. Hirschsprung's disease and other common autonomic disorders
- v. Autonomic reflex bladder

2.10 Diseases involving meninges

- i. Meningitis

2.11 Diseases involving ventricular system

- i. Hydrocephalus
- ii. Brain trauma and the blood-brain barrier
- iii. Drugs and the blood-brain barrier

3. REGIONAL ANATOMY

3.1 Upper limb

- i. Fractures of clavicle, humerus, radius, ulna, scaphoid & hamate
- ii. Injuries to brachial plexus, cords & branches of brachial plexus, axillary, musculocutaneous, radial, median & ulnar nerves
- iii. Dupuytren's contracture, hand infections & palmar wounds with surgical incisions
- iv. Dislocation of sternoclavicular, shoulder, acromioclavicular, elbow, radioulnar & wrist joints
- v. Rotator cuff injuries, frozen shoulder & calcific supraspinatus tendinitis
- vi. Use of vessels for cannulation & coronary angiography
- vii. Carcinoma of breast & its spread, surgical incisions of breast & mastectomy, mammography

3.2 Lower limb

- i. Fractures of hip bone, femur, tibia, fibula, calcaneum & talus
- ii. Neurological examination of leg
- iii. Varicose veins, cannulation & lacerations of femoral artery, saphenous cutdown,
- iv. Femoral hernias, groin & hamstring injuries, calcanean tendinitis, rupture & bursitis,
- v. Injuries to femoral, sciatic, superior gluteal, inferior gluteal, tibial & common fibular nerves, planter nerves morton's neuroma
- vi. Dislocation of hip joint, patella, hip & knee joint replacement, bursitis in knee region, pes planus & clubfoot
- vii. Ankle sprain, bunion, hallux valgus and varus

3.3 Abdomen and pelvis

- i. Abdominal & inguinal hernias, laparoscopic surgery, abdominal incisions, hydrocele, hematocele, varicocele & carcinoma of testes & scrotum
- ii. Peritonitis & ascites, peritoneal adhesions, paracentesis, intraperitoneal injections & spread of pathological fluids in various peritoneal compartments with their surgical approach
- iii. Esophageal varices, hiatal hernia, gastroesophageal reflux, barret esophagus, pyloric stenosis, gastric & peptic ulcers, carcinoma stomach, applied endoscopy, barium swallow
- iv. Visceral referred pains, duodenal ulcers, appendicitis, meckel's diverticulum, colonoscopy, diverticulosis & volvulus, applied barium meal
- v. Rupture of spleen & splenectomy, splenic needle biopsy
- vi. Blockage of hepatopancreatic ampulla & pancreatitis, endoscopic retrograde cholangiopancreatography, pancreatic cancer, subphrenic abscess, hepatic lobectomies & segmentectomy, cirrhosis of liver, liver biopsy, gall stones & cholecystectomy & portosystemic shunts
- vii. Vasculature of abdomen: abdominal aortic aneurysm(stent or graft),abdominal lymph node surgery, chronic thrombosis of inferior vena cava
- viii. Perinephric abscesses, renal & ureteric calculi with referred pain & renal transplantation
- ix. Diaphragm & referred pain, injury to phrenic nerve, aortic aneurysm, psoas abscess & diaphragmatic hernia
- x. Pelvic fractures & variations of male & female pelvic girdles, pelvimetry, bone marrow biopsy, sacroiliac joint involvement
- xi. Cystoscopy, rupture of male & female urethra, catheterizations (supra pubic and urethral), bladder cancer
- xii. Benign prostatic hyperplasia, prostatic cancer, vasectomy
- xiii. Hysterosalpingography, tubal ligation, ectopic pregnancy, uterine prolapse, hysterectomy, carcinoma of uterus, cervix & ovaries, vaginal fistulae, culdoscopy & culdocentesis
- xiv. Disruption of perineal body, episiotomy, cystocele & rectocele, bartholin abscesses & cysts
- xv. Rectal examination, anal fissures & perianal abscesses, hemorrhoids, anorectal incontinence
- xvi. Pudendal block
- xvii. Disc prolapse

3.4 Head and neck

- i. Head injuries (fractures and vascular) & intracranial hemorrhages, fracture of mandible,
- ii. Scalp injuries & infections,
- iii. Facial lacerations & incisions, facial palsy, trigeminal neuralgia
- iv. Pulsations of arteries in face & scalp, compression of facial artery, carcinoma of lips
- v. Orbital tumors & fractures, injury to nerves supplying eyelids & extraocular muscles, retinal detachment, presbyopia, cataract, glaucoma, corneal ulcers & transplants, horner's syndrome
- vi. Infection of parotid gland , tumor of parotid gland and parotid gland stone, mandibular & inferior alveolar nerve block, dislocation of temporomandibular joint
- vii. Horner syndrome
- viii. Cleft lip & palate, lingual carcinoma
- ix. Deflected nasal septum, epistaxis, sinusitis
- x. Acute otitis externa & media, tympanic membrane perforations, mastoiditis, motion sickness, hearing loss, meniere syndrome, blockage of pharyngotympanic tube
- xi. Torticollis, right cardiac catheterization, surgical dissection of carotid triangle
- xii. Enlargement of thyroid gland, thyroidectomy, injury to laryngeal & recurrent laryngeal nerve, laryngoscopy, aspiration of foreign bodies from laryngopharynx, tracheostomy, tonsillectomy, adenoiditis, esophageal cancer, tracheo-esophageal fistula
- xiii. Cranial nerves injuries and palsies

3.5 Thorax

- i. Fractures of sternum, ribs & vertebrae, cervical rib
- ii. Flail chest, thoracotomy, supernumerary ribs, sternal biopsy, thoracic outlet syndrome, dislocation of ribs, paralysis of diaphragm
- iii. Intercostal nerve block, thoracocentesis
- iv. Pulmonary collapse, pneumothorax, hydrothorax, hemothorax, insertion of chest tube, pleuritis, aspiration of foreign bodies, bronchoscopy, lung resection. Segmental atelectasis, pulmonary embolism, hemoptysis, bronchogenic carcinoma, carcinoma of lungs, pleural pain
- v. Surgical significance of transverse pericardial sinus, pericarditis, pericardial rub & pericardial effusion, cardiac tamponade, pericardiocentesis
- vi. Cardiac catheterization, percussion & auscultation of heart, valvular heart diseases, coronary angiography, echocardiography, myocardial infarction, coronary artery disease, angina pectoris, coronary bypass graft, coronary angioplasty, artificial cardiac pacemaker, fibrillation of heart, cardiac referred pain
- vii. Central venous line.

1. Proteins

- i. Principle and applications of electrophoresis
- ii. Immunoglobulins and their biomedical significance
- iii. Plasma proteins and their clinical significance
- iv. Structure and functional relationship of proteins e.g. malfunction of protein receptors within membranes result in disease like diabetes mellitus type ii.
- v. Nutritional importance of proteins, e.g. protein malnutrition related conditions

2. Lipids and fatty Acids

- i. Eicosanoids and their functions in health and disease
- ii. Steroids and their biomedical significance
- iii. Lipid peroxidation and its significance
- iv. Essential fatty acids and their significance

3. Enzymes

- i. Isozymes and their clinical importance
- ii. Therapeutic uses and application of enzymes in clinical diagnosis

4. Porphyrins and hemoglobin

- i. Major steps in biosynthesis of porphyrins and related disorders
- ii. Degradation of heme, hyperbilirubinemia, biochemical causes and differentiation
- iii. Biochemical causes of hemoglobinopathies (hemoglobin s disease, hemoglobin c disease, hemoglobin sc disease, methemoglobinemia, thalassemia)

5. Vitamins and minerals

- i. Hypo- and hyper-vitaminosis
- ii. Sources and biochemical importance of sodium, potassium, chloride, calcium, phosphorus, iodine, iron, & zinc

6. Nutrition

- i. Caloric requirements of the body
- ii. Balanced diet, essential amino acids and essential fatty acids
- iii. Nutritional requirements in pregnancy, lactation, newborn, young and elderly subjects
- iv. Nutritional disorders and protein energy malnutrition (obesity, Marasmus, Kwashiorkor and Marasmic-Kwashiorkor)

7. Bioenergetics and biological oxidation

- i. Un-couplers and their biochemical effects
- ii. Site-specific inhibitors of electron transport chain and their effects

8. Metabolism of carbohydrates

- i. Disorders of glycogen metabolism (glycogen storage diseases)
- ii. Importance of hexose mono-phosphate (hmp) shunt and glucose-6-phosphate dehydrogenase deficiency
- iii. Disorders related to metabolism of fructose and galactose
- iv. Regulation of blood glucose level
- v. Causes of hyperglycemia and hypoglycemia
- vi. Biochemistry of diabetes mellitus, its laboratory findings and diagnosis

9. Metabolism of lipids

- i. Ketosis and its mechanism
- ii. Hypercholesterolemia and atherosclerosis
- iii. Plasma lipoproteins (VLDL, LDL, HDL, and chylomicrons): their functions and importance in health and disease

10. Metabolism of proteins and amino acids

- i. Congenital and acquired causes of hyperammonemia
- ii. Biochemical explanation for ammonia intoxication
- iii. Metabolic defects in amino acid metabolism (phenylketonuria, maple syrup urine disease, albinism, homocystinuria, alkaptonuria)

11. Metabolism of nucleotides

- i. Causes and consequences of hyperuricemia (gout)

12. Biochemical genetics

- i. Disorder related to DNA repair (xeroderma pigmentosum)
- ii. Various types of mutations and their consequences
- iii. Steps and applications of polymerase chain reaction (PCR)

13. Biochemistry of endocrine system

- i. Biosynthesis and mechanism of action of hormones
- ii. Effects of hormones on carbohydrate, lipid, protein, and mineral metabolism

14. Biochemistry of water and electrolyte imbalance and acid-base balance

- i. Body buffers and their mechanism of action
- ii. Acid base regulation in human body and related disorders



1. Health Systems in Pakistan

- i. Health Policy and planning in Pakistan. “Health for all”,
- ii. Primary health care: concepts and progress.
- iii. The national disease control programs; policies, strategies and operations.
- iv. Health system in Pakistan: the role of federal and provincial governments in health care.
- v. The district health system, in the context of devolution.
- vi. Health planning: planning cycle
- vii. Planning-programming-budgeting system
- viii. Management and administration
- ix. Management methods and techniques
- x. Health management information system
- xi. The physician as a manager: functions of manager, management of material, human and financial resources.
- xii. Leadership and motivation.
- xiii. Partners in health: the public and private sector. Non-governmental organizations and international agencies.

2. General Epidemiology and Research Methodology

- i. Basic measurements in epidemiology (morbidity, mortality, disability and fatality).
- ii. Epidemiological methods (descriptive, analytic and experimental).
- iii. Epidemiological transition. Association and causation.
- iv. Investigation of an outbreak or an epidemic.
- v. Screening for disease.
- vi. Community diagnosis.
- vii. Research and survey methodology.
- viii. Introduction to quantitative & qualitative research methodology.

3. Biostatistics

- i. Concepts and uses
- ii. Data and its types
- iii. Rates, ratios and proportions
- iv. Crude, specific and standardized rates.
- v. Collection and registration of vital events in Pakistan
- vi. Sources of health-related statistics
- vii. Measures of central tendency, (Mean, Median, Mode),
- viii. Measures of dispersion (Range, Standard deviation, Standard error)
- ix. Normal Distribution curve.
- x. Methods of data presentation (tables, graphs & diagrams)
- xi. Interpretation of data (t-test and Chi-square test)
- xii. Sampling and its various techniques.

4. Demography and Population dynamics

- i. Concept, demographic principles and demographic processes
- ii. Census, definition, methodology, types
- iii. Determinants of fertility, mortality
- iv. Population pyramid, and its interpretation
- v. Demographic transition, demographic trap and its public health importance
- vi. Demographic and social implication of high population growth
- vii. Social mobilization
- viii. Urbanization

5. Prevention and control of Infectious diseases

- i. Surveillance, control, eradication, elimination
- ii. Dynamics of infections, disease transmission:
 - Reservoir and source of infection, escape of organism, mode of
 - Transmission, entry into the body, susceptible host, immunity
 - Control of infection:
 - Controlling the reservoir-notification, early diagnosis treatment,
 - Isolation, quarantine, disinfections.
 - Interruption of transmission.
 - The susceptible host (active and passive immunization, chemoprophylaxis)
- iii. Health advice to travelers.
- iv. National case management guidelines.

6. Disaster and Accidents

- i. Definition, classification (natural disasters like earthquake, floods, manmade disasters & thermo nuclear warfare.
- ii. Magnitude and effects of disaster and public health consequences.
- iii. Disaster: preparedness and management.
- iv. Accidents: Definition, classification, prevention.

7. Issues of Nutritional Health

8. Issues of Reproductive Health

9. Common endemic Communicable diseases (Diagnosis & management)

- i. Dengue
- ii. Malaria
- iii. Tuberculosis
- iv. Typhoid

10. Common endemic Non-Communicable diseases (Diagnosis & management)

- i. Asthma
- ii. Diabetes Mellitus
- iii. Hypertension
- iv. Ischemic Heart diseases
- v. Nutritional Deficiency Anemia
- vi. Pneumonia
- vii. Thalassemia



FORENSIC MEDICINE

1. Law

1.1 Pakistan's legal system

- i. Organization and functioning of courts
- ii. Application of relevant sections of law of Pakistan e.g., PPC/CrPC
- iii. Documentation and certification for legal procedures
- iv. Protocol of court evidence

1.2 Law in relation to physicians

- i. Physician patient relationship
- ii. Professional secrecy and privileged communication
- iii. Bio-ethics and its application
- iv. Professional misconduct
- v. Certification of cause of death
- vi. Transplantation of organs and tissues: its medicolegal scope and relevant laws
- vii. Regulatory/accrediting bodies: Their functioning and mandate
- viii. Healthcare Commission Act, Consumer Protection Act

2. Personal identification

- i. Determination of parameters of personal identification in living and dead
- ii. Use of special techniques and methodologies for identification
- iii. Certification of age
- iv. Relevant laws

3. Autopsy and exhumation

- i. Types, objectives, rules and techniques of autopsy
- ii. Estimation of fatal and post mortem period
- iii. Risks and hazards associated with autopsy
- iv. Autopsy protocol for collection/ recovery, preservation, labeling and dispatch of biological and non-biological material
- v. Unrewarding (negative) autopsy
- vi. Exhumation (protocol, procedure, scope and limitation)
- vii. Autopsy in special situations (putrefied, dismembered, mass disaster)
- viii. Post-mortem artifacts and their medico-legal significance
- ix. Autopsy certificate
- x. Relevant laws

4. Thanatology

- i. Concept of death
- ii. Medicolegal aspects of brain death
- iii. Indicators of death
- iv. Early and late corporeal post-mortem changes, their interpretation and significance
- v. Inter-relationship of cause, mechanism, mode and manner of death
- vi. Post-mortem chemical changes
- vii. Forensic entomology
- viii. Flow cytometry
- ix. Sudden and unexpected deaths
- x. Certification of death as per WHO guidelines
- xi. Relevant laws

5. Asphyxia

- i. Bio mechanics and indicators of asphyxial deaths
- ii. Anatomy of asphyxia
- iii. Biochemistry and patho-physiology of asphyxia
- iv. Suffocation
- v. Gagging and choking
- vi. Traumatic asphyxia
- vii. Hanging, strangulation, throttling
- viii. Postural asphyxia
- ix. Relevant laws

6. Drowning

- i. Pathophysiology of drowning
- ii. Autopsy findings (external, internal)
- iii. Medicolegal aspects (identification, weather the person drowned, injuries in water, diatoms)
- iv. Mechanisms of drowning in different media
- v. Relevant laws

7. Traumatology

- i. Biomechanics of wound production
- ii. Examination, interpretation and medicolegal significance of:
 - Blunt force trauma
 - Sharp force trauma
 - Firearm and blast injuries
 - Thermal injuries (generalized and local)
 - Custodial torture and death
 - Transportation injuries

- Electrical injuries
- Injuries due to cold
- Regional injuries (head, vertebral column, neck, chest. Abdomen and their contents, limbs and musculoskeletal system)
- iii. Differentiation between ante mortem and post mortem wounds
- iv. Determination of the manner of injury
- v. Examination of injured person, documentation of injuries and certification
- vi. Sequelae of injuries
- vii. Dating of injuries
- viii. Manner of causation of injuries
- ix. Relevant laws

8. Forensic sexology

- i. Interpretation and medicolegal significance of virginity, pregnancy and delivery
- ii. Abortion: Types, methods to procure,
- iii. Examination and certification of such cases, in living and dead
- iv. Relevant laws

9. Sexual offences

- i. Medicolegal aspects of natural and unnatural sexual offences
- ii. Sexual perversions
- iii. Examination of victim and assailant
- iv. Collection of specimens and their dispatch
- v. Documentation and certification of injuries and violations
- vi. Relevant laws

10. Forensic pediatrics

- i. Medicolegal aspects of:
 - Infanticide
 - Non accidental injuries and death of new born/ infants/ child
 - Sudden infant death syndrome (SIDS)
- ii. Relevant laws

11. Forensic psychiatry

- i. Diagnosis and certification of mental illness
- ii. Procedures for restraint of mentally ill
- iii. Differentiation between true and feigned insanity
- iv. Testamentary capacity
- v. Relevant laws

12. Forensic serology

- i. Examination of biological specimen
- ii. Methods of their collection, preservation and dispatch to concerned labs

13. Role of Forensic Science in crime detection

- i. Principles and methods of crime scene investigation
- ii. Finger prints
- iii. DNA
- iv. Examination of firearms and tool marks evidence
- v. Examination of broken glass
- vi. Role of Chemistry and specialized techniques
- vii. Relevant laws

14. Forensic odontology

- i. Role of dental evidence in identification
- ii. Bite marks and their analysis
- iii. Dental evidence: Trauma and Poisoning
- iv. Basic dental charting/record
- v. Relevant laws

TOXICOLOGY

1. General principles of toxicology

- i. Law relevant to toxicology
- ii. Factor influencing the manifestation of poisoning
- iii. Collection and dispatch of evidentiary material, in living and dead
- iv. Drug dependence
- v. Diagnosis and treatment of acute and chronic poisoning in living
- vi. Diagnosis of acute and chronic poisoning in dead
- vii. Medicolegal certification (in living and dead)

2. Special toxicology

- i. Volatile poisons and corrosives (carbon monoxide, hydrocarbons, cyanides, sulphuric acid, oxalic acid, carbolic acid, alkalis)
- ii. Inorganic elements (arsenic, lead, mercury, copper, phosphorus)
- iii. Poisonous plants (aconite, belladonna, hyoscyamus, stramonium, digitalis, ergot, nux vomica, oleander, tobacco)
- iv. Venomous animals
- v. Alcohols
- vi. Opiates, opioids and other narcotics
- vii. Salicylates, Paracetamol and other medicinal poisons
- viii. Hypnotics and sedatives
- ix. Stimulants (cocaine, cannabis)
- x. Pesticides, herbicides and insecticides



GENERAL PATHOLOGY

1. Cell injury

- i. Clinical causes of irreversible and reversible cell injury & role of free radical.
- ii. Apoptosis versus necrosis and types of necrosis with examples.
- iii. Clinical aspects of intracellular accumulations e.g. dystrophic and metastatic calcification along with clinical significance and examples.
- iv. Clinical aspects of cellular adaptations with examples. Atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia.

2. Inflammation and repair

- i. Vascular and cellular events and chemical mediators of acute inflammation.
- ii. Morphological patterns & clinical outcomes of acute inflammation.
- iii. Transudate vs exudate with clinical examples.
- iv. Types of chronic inflammation (simple and granulomatous) with clinical examples.
- v. Define repair, regeneration, growth factors and scar formation
- vi. Factors affecting wound healing & pathological aspects of complications of wound healing.
- vii. Clinical aspects of healing by primary and secondary intention.

3. Neoplasia

- i. Nomenclature with clinical examples of benign and malignant tumors.
- ii. Define protooncogenes and oncogenes with clinical examples.
- iii. Clinical aspects of carcinogenesis, carcinogenic agents, tumor metastasis and tumor markers
- iv. Clinical aspects of grading and staging of tumors with laboratory diagnostic methods of tumors.

4. Disorders of circulation

- i. Clinical aspects with types and examples of hemorrhage, infarction, thrombosis, emboli, oedema and shock.

IMMUNOLOGY

- ii. Clinical aspects of innate and acquired immunity. Active and passive immunity.
- iii. Types of cells taking part in immune response (phagocytes, T cells, B cells & NK cells) and their clinical importance

- iv. Complement activation pathways and their role in immune response to infections, autoimmunity, transplant rejection and immune deficiency diseases.
- v. MHC & their role in clinical diseases.
- vi. Types and clinical aspects of antibodies.
- vii. Clinical aspects of hypersensitivity reactions (infectious diseases and autoimmune diseases).
- viii. Types of transplant rejections & graft Vs host disease
- ix. Clinical aspects of autoimmunity and autoimmune diseases.

GENETICS

- i. Types of mutation.
- ii. Clinical aspects of x linked diseases, autosomal dominant & autosomal recessive diseases with clinical examples.
- iii. Clinical aspects of down syndrome, turner syndrome, klinefelter syndrome, ehlers danlos syndrome & marfan syndrome.

MICROBIOLOGY

1. GENERAL BACTERIOLOGY

- i. Important components of bacterial cell (cell wall, cell membrane, nucleoid, ribosomes, villi, flagella, plasmids, transposons, spores).
- ii. Exotoxins vs endotoxin.
- iii. Mechanisms of actions of exotoxins and their clinical outcomes.
- iv. Classification of important groups of bacteria.
- v. Bacterial growth curve
- vi. Classification of culture media.
- vii. Colonization resistance and clinically important bacteria of normal flora.
- viii. Clinical aspects of sterilization process and its various methods and uses of disinfectants in various clinical settings.
- ix. Clinical aspects of conjugation, transduction and transformation.
- x. Clinical uses of bacterial vaccines.
- xi. Clinical aspects of antimicrobial resistance.
- xii. Clinical aspects of antimicrobial mechanisms of actions.

2. SPECIAL BACTERIOLOGY:

i. Characteristics, identifying features and clinical conditions caused by:

- Gram positive cocci:
 - Enterococci
 - Gonococci
 - Gram negative cocci
 - Meningococci
 - Staphylococci
 - Streptococci
- Gram positive rods:
 - Bacillus
 - Clostridia
 - Diphtheria
 - Listeria
- Spirochetes:
 - Borrelia
 - Leptospira
 - Treponema pallidum
- Mycobacteria:
 - MTB, M. Leprae, Atypical Mycobacteria
- Gram negative rods:
 - Bacteroides
 - Bordetella
 - E. coli
 - H. influenza
 - Klebsiella
 - Legionella
 - Proteus
 - Pseudomonas
 - Salmonella
 - Shigella
- Chlamydia, rickettsia
- Mycoplasma
- Actinomycetes

PARASITOLOGY

i. Characteristics, identifying features and clinical conditions caused by:

- Ascaris
- D. Latum
- Dracunculus
- Echinococcus
- Entamoeba
- Entrobium
- Giardia
- Hook worm
- Leishmania
- Plasmodium
- Schistosomes
- Taenia saginata
- Taenia solium
- Teniasaginata
- Teniasolium
- Toxoplasma,
- Trichomonas
- Trichuris
- Trypanosomes,
- Wuchereria

VIRUSES

- i. Viral structure and replication
- ii. Classification of viruses with clinical conditions caused by each:
- Adenoviruses
 - Corona viruses
 - Dengue
 - Hepatitis
 - Herpes viruses
 - Human Immunodeficiency Virus (HIV)
 - Influenza virus
 - Measles, mumps, rubella
 - Polio virus
 - Pox virus
 - Rabies
 - Rhinoviruses

MYCOLOGY

- i. Fungal structure and classification of clinically important fungi.
- ii. Clinical aspects of dermatophytes, tinea versicolor, sporothrix, histoplasma, coccidioides, blastomyces, candida, aspergillus, mucor, rhizopus, cryptococcus



SYSTEMIC PATHOLOGY

1. BLOOD VESSELS AND HEART

- i. Differentiation between atherosclerosis, Monckeberg's medial calcific sclerosis and arteriosclerosis.
- ii. Etiology, pathogenesis & complications of atherosclerosis.
- iii. Types of primary and secondary hypertension and vascular changes in hypertension.
- iv. Common pathogenic mechanisms of vasculitis.
- v. Aneurysms, classification, and aetiology and pathogenesis of atherosclerotic aneurysm
- vi. Pathology of varicose veins
- vii. Benign and malignant tumors of blood vessels.
- viii. Pathogenesis of ischemic heart disease including etiological factors, pathogenesis, diagnosis and complications of Myocardial infarction.
- ix. Causes of sudden cardiac death
- x. Cor-pulmonale and list the predisposing disorders
- xi. Rheumatic fever with respect to aetiology, pathogenesis, morphological and clinical features. The sequelae of Rheumatic Fever.
- xii. Infective endocarditis with respect to aetiology, pathogenesis, morphological and clinical features, and its sequelae
- xiii. Myocarditis: causes and its morphological and clinical features
- xiv. Cardiomyopathy: clinico-pathological groups and diagnosis
- xv. Causes of pericarditis and its clinical and morphological features
- xvi. Primary and secondary cardiac tumors
- xvii. Main features of Fallot's tetralogy and coarctation of aorta, valvular heart disease and mitral valve prolapse
- xviii. The concept of cardiac transplantation

2. HAEMATOPOIETIC AND LYMPHOID SYSTEMS

- i. Stages in the formation of red blood cells (RBCs), white blood cells (WBCs), platelets and correlate hematopoiesis with various hematopoietic growth factors including morphology of a normal bone marrow.
- ii. Normal values of red cell count, hemoglobin level, packed cell volume, MCH, MCV, MCHC, WBC count and platelet count.
- iii. Anemias, classification on the basis of morphology and underline pathogenesis of RBC production.
- iv. Causes and clinical features, clinical presentation, and diagnosis of hypochromic anemia, Megaloblastic Anemia, Anemia of chronic disease, Hereditary spherocytosis, Aplastic anemia and Hemolytic Anemias.
- v. Aetiology, pathogenesis, clinical types, diagnosis of thalassemia with emphasis on incidence, common mutations, associated psychosocial problems and prevention.

- vi. Inheritance, clinical features, lab diagnosis of von Willebrand's disease, hemophilia A& B and polycythemia.
- vii. Mechanisms which can cause neutropenia/agranulocytosis.
- viii. Differentiation between infective and malignant causes of leucocytosis with special reference to infectious mononucleosis, acute and chronic non-specific lymphadenitis.
- ix. Non-Hodgkin's lymphoma, classification and diagnosis.
- x. Classification, aetiology, pathogenesis and clinical stages of Hodgkin's disease
- xi. Aetiology, clinical features, laboratory diagnosis and prognostic factors of acute and chronic lymphoblastic and myeloblastic leukemia.
- xii. Multiple myeloma with respect to aetiology, pathogenesis, morphology, clinical features and diagnosis.
- xiii. Disseminated intravascular coagulation with respect to aetiology, pathogenesis, clinical features and laboratory diagnosis
- xiv. Causes of decreased production and decreased survival of platelets with special reference to the pathogenesis of idiopathic & thrombotic thrombocytopenic purpura
- xv. The value of coagulation profile in the assessment of bleeding disorders
- xvi. ABO and Rhesus blood groups, their clinical importance and method of group typing.
- xvii. Common indications of blood products (red cells, platelets and plasma) and hazards of blood transfusion and methods of their prevention.

3. RESPIRATORY SYSTEM

- i. Differentiation between pleural effusion, hemothorax, hydrothorax, pleuritis, pneumothorax and chylothorax.
- ii. Classification of atelectasis on the basis of underlying mechanisms.
- iii. Etiology, pathogenesis, morphology and clinical features and diagnosis of asthma.
- iv. Disorders associated with airflow obstruction disease with reference to their aetiology, Pathogenesis, morphology and diagnosis
- v. Restrictive lung diseases including sarcoidosis, pulmonary eosinophilia, with reference to their aetiology, Pathogenesis, morphology and clinical diagnosis
- vi. Pathogenesis, morphology and clinical features of adult respiratory distress syndrome.
- vii. Clinical features of Goodpasture's syndrome based on the pathology.
- viii. Morphology & clinical features of pulmonary infarction.
- ix. Causes of pulmonary hypertension and vascular sclerosis.
- x. Etiology, pathogenesis, morphology and clinical features, complications and clinical diagnosis of acute and chronic pneumonias including atypical pneumonia.
- xi. Etiology, pathogenesis and clinical features, clinical diagnosis of tuberculosis of the lung.

- xii. Classification, aetiology, pathogenesis and clinical features of different lung tumors.

4. GASTROINTESTINAL TRACT AND LIVER

- i. Risk factors, clinical and morphological features and diagnosis of oral cancer with special reference to early lesions like leucoplakia.
- ii. Benign and malignant tumors of salivary glands.
- iii. Different types of esophagitis and its relation with carcinoma of the esophagus.
- iv. Predisposing factors, pathogenesis, morphological and clinical features of acute and chronic gastritis and peptic ulcer disease.
- v. Gastric carcinoma with respect to risk factors, pathogenesis, clinical and morphological features and prognosis; and differentiate from gastric lymphoma and gastrointestinal stromal tumor (GIST).
- vi. Clinical and morphological features of Hirschsprung's disease.
- vii. Pathogenesis, morphological and clinical features of malabsorption diseases.
- viii. Predisposing conditions, clinical and morphological features of ischemic bowel disease.
- ix. Crohn's disease and ulcerative colitis including major causes of intestinal obstruction.
- x. Clinico-pathological features, clinical presentation and diagnosis of bacterial and parasitic diseases of intestines.
- xi. Benign and malignant tumors of intestines with reference to etiological factors, pathogenesis, diagnosis and prognosis.
- xii. Types of jaundice with respect to the causes, clinical features and laboratory diagnosis
- xiii. Causes, morphological and clinical features and complications of hepatic failure
- xiv. Causes, pathogenesis, complications of cirrhosis
- xv. Route of transmission, Incubation period, clinical features and complications of acute and chronic viral hepatic infection.
- xvi. Liver abscess: causes, clinical features, diagnosis
- xvii. Pathogenesis, clinical features and diagnosis of alcohol liver disease.
- xviii. Clinico-morphological features and diagnosis of deposition diseases of liver.
- xix. Neonatal hepatitis.
- xx. Epidemiology, pathogenesis, morphological and clinical features of hepatocellular carcinoma.
- xxi. Pathogenesis and risk factors of cholelithiasis and acute and chronic cholecystitis.
- xxii. Features of gall bladder cancer.
- xxiii. Acute and chronic pancreatitis with respect to aetiology, pathogenesis, clinical and morphological features.
- xxiv. Clinical and morphological features of carcinoma of pancreas.

5. RENAL AND MALE REPRODUCTIVE SYSTEM

- i. Etiology, pathogenesis, clinical features and complications of; azotemia, uremia, acute renal failure, chronic renal failure
- ii. Polycystic kidney disease (and its Classification)
- iii. Glomerulonephritis and (its Classification)
- iv. Nephrotic and nephritic syndrome
- v. Acute and chronic pyelonephritis.
- vi. Hydronephrosis
- vii. Pathogenesis and clinical course of acute tubular necrosis.
- viii. Benign and malignant nephrosclerosis
- ix. Characteristics of various types of renal stones
- x. Pathogenesis, clinical features and lab diagnosis of nephrolithiasis
- xi. Epidemiology, morphology, clinical features and prognosis of Wilm's tumor
- xii. Classification, Epidemiology, morphology, clinical features and prognosis of renal cell carcinoma
- xiii. Etiology, morphology & clinical features of cystitis.
- xiv. Clinical features, etiology and morphology of transitional cell carcinoma of the urinary bladder.
- xv. Etiology, route of infection, pathogenesis and methods of diagnosing gonococcal and non-gonococcal urethritis
- xvi. Etiology, pathogenesis, diagnosis of prostatitis, prostatic hyperplasia and prostatic carcinoma
- xvii. Inflammatory disease and tumors of testis and epididymis
- xviii. Causes, pathogenesis and investigations of male infertility.

6. FEMALE GENITAL SYSTEM AND BREAST

- i. Causes, routes of infection and methods of diagnosis of sexually transmitted diseases: micro-organisms involved, route of infection, pathogenesis and methods of diagnosis
- ii. Vulvar and vaginal squamous intraepithelial lesions
- iii. Neoplasms of Cervix with reference to cervical intraepithelial neoplasia.
- iv. Causes, pathogenesis and clinical features of dysfunctional uterine bleeding and its relation with endometrial hyperplasia, endometrial polyp and carcinoma.
- v. Clinical features and pathogenesis of adenomyosis and endometriosis.
- vi. Tumors of endometrial stroma and myometrium.
- vii. Tumors of the ovary: classification, etiological factors, pathogenesis, diagnosis and prognosis.
- viii. Etiology, clinical features and pathogenesis of ectopic pregnancy and toxemia of pregnancy.
- ix. Gestational trophoblastic tumors
- x. Causes of nipple discharge and lump breast and its differentiation on the basis of aetiology, pathogenesis, morphology, clinical features, diagnosis and complications

- xi. Benign breast diseases proliferative and non- proliferative
- xii. Carcinomas of the breast: Epidemiology, classification, aetiology and pathogenesis, diagnosis and prognosis
- xiii. Gynecomastia and list its causes.

7. MUSCULOSKELETAL SYSTEM

- i. Pathogenesis, clinical features and diagnosis of genetic and metabolic bone diseases.
- ii. Causes of osteoporosis, its pathogenesis, morphological and clinical features.
- iii. Acute and chronic Osteomyelitis with respect to causative organisms, routes of spread, and complications.
- iv. Benign and malignant bone forming tumors
- v. Benign and malignant cartilaginous tumors
- vi. Pathogenesis, morphological and clinical features of Degenerative Arthritis
- vii. Pathogenesis, morphological and clinical features of immune mediated arthritis
- viii. Pathogenesis, morphological and clinical features of crystal deposition diseases.
- ix. Pathogenesis, morphological and clinical features and diagnosis of muscular dystrophies
- x. Pathogenesis, morphological and clinical features and diagnosis of inflammatory myopathies
- xi. Clinico-pathological features of myasthenia gravis
- xii. Classification and important distinguishing points of soft tissue tumors

8. ENDOCRINE SYSTEM

- i. Causes, pathogenesis, and diagnosis of anterior and posterior pituitary hormone defects.
- ii. Adrenal cortex and medulla
- iii. Causes, aetiology, pathogenesis and lab. diagnosis of adrenal cortical medullary hyper and hypo-function.
- iv. List the aetiology and clinical features, types, diagnosis of different thyroid diseases
- v. Causes of solitary thyroid nodule and outline of clinical diagnostic approach.
- vi. Etiology, pathogenesis, morphology and diagnosis of thyroid tumors
- vii. Types of MEN syndromes.
- viii. Investigation, clinical features, aetiology of parathyroid dysfunction
- ix. Diabetes mellitus: Type 1 and 2, pathogenesis, morphology, clinical features, laboratory diagnosis and complications.

9. SKIN

- i. Morphological and clinical features of different types of dermatitis
- ii. Pathogenesis, morphological and clinical features of bullous disease of the skin
- iii. Types of warts and their most frequent locations.
- iv. Predisposing factors for squamous cell carcinoma of skin.
- v. Etiology, pathogenesis, morphology, diagnosis and prognosis of squamous cell carcinoma and its differentiation from basal cell carcinoma.
- vi. Different types of Nevi, with reference to clinical and morphological features, and diagnosis of malignant melanoma

10. NERVOUS SYSTEM

- i. Clinical and morphological features of intra-cranial hemorrhage.
- ii. Acute and chronic meningitis including tuberculous meningitis
- iii. Brain abscesses, its clinical and morphological features and diagnosis
- iv. Clinico-pathological features of Guillain-Barre syndrome.
- v. Types of intracranial tumors including common metastatic tumors to the brain

11. CHEMICAL PATHOLOGY

- i. Biochemical markers of ischemic heart disease
- ii. Renal function tests.
- iii. Causes of proteinuria and its laboratory diagnosis.
- iv. Lab diagnosis of acid base disorders.
- v. Lab diagnosis of diabetes mellitus.
- vi. Liver function tests.
- vii. Laboratory diagnosis of hyperlipidemia and its clinical interpretation.
- viii. Role of enzymes in diagnosis of pancreatitis.
- ix. Laboratory diagnosis/investigations of endocrine disorders
- x. Role of hormone estimation in diagnosis of infertility & growth disorders

1. General Pharmacology

- i. Definition of drug, drug nomenclature & sources of drugs.
- ii. Dosage forms and doses of drugs.
- iii. Pharmacokinetics: basic principles and their clinical application
 - Route of drug administration.
 - Absorption of drugs and bioavailability
 - Drug reservoirs, distribution and redistribution of drugs, plasma protein binding and volume of distribution.
 - Bio-transformation of drugs.
 - Excretion of drug, enterohepatic recirculation, plasma half-life, clearance
- iv. Pharmacodynamics
 - Mechanism of drug action.
 - Receptors and post receptor molecular mechanism of drug action
 - Mechanism of drug action other than mediated through drug receptors.
 - Factors modifying action and doses of drugs.
 - Pharmacogenetics.
 - Adverse drug reactions & drug toxicity/poisoning
 - Drug-drug Interactions

2. Locally Acting Drugs

- i. Dermatological and topical drugs
- ii. Anti-seborrhoeics, locally acting enzymes.
- iii. Antiseptics and disinfectants.

3. Autacoids

- i. Histamine & antihistamines
- ii. Introduction to other mediators:
 - Eicosanoids
 - Serotonin
 - Substance P
 - Bradykinin

4. Drugs Acting on Gastrointestinal Tract

- i. Emetics and anti-emetics.
- ii. Pharmacotherapy of peptic ulcer disease
- iii. Pharmacotherapy of constipation
- iv. Pharmacotherapy of diarrhea
- v. Pharmacotherapy of irritable bowel syndrome
- vi. Prokinetics

5. Drugs Acting on Autonomic Nervous System

- i. Parasympathetic nervous system
 - Parasympathomimetics
 - Parasympatholytics
 - Autonomic ganglionic stimulants and blockers
 - Skeletal muscle relaxants
- ii. Sympathetic nervous system
 - Sympathomimetics
 - Sympatholytics
 - Adrenergic neuron blockers

6. Drugs acting on renal system

- i. Diuretics
- ii. Anti-Diuretics
- iii. Drugs for acid base and electrolyte balance

7. Drugs acting on Cardiovascular System

- i. Anti-hypertensive drugs.
- ii. Anti-anginal drugs
- iii. Drug management of C Heart F and inotropic drugs.
- iv. Thrombolytics/anticoagulants/antiplatelets.
- v. Anti-arrhythmic drugs.
- vi. Antihyperlipidemic drugs.
- vii. Drugs used in anemias

8. Drugs Acting on Respiratory System

- i. Pharmacotherapy of cough:
 - Anti-tussives, expectorants and mucolytics.
 - Bronchial asthma.

9. Drugs Acting on Endocrine System

- i. Pituitary-hypothalamic drugs.
- ii. Thyroid antithyroid drugs.
- iii. Pancreatic hormones and anti-diabetic drugs.
- iv. Adrenocorticoids.
- v. Anabolic steroids.
- vi. Reproductive hormones: testosterone, estrogen, progesterone,
- vii. Contraceptives

10. Drugs acting on Central Nervous System

- i. Sedative-hypnotics, pharmacotherapy of sleep disorder
- ii. Pharmacotherapy of epilepsy, parkinsonism, migraine.
- iii. Psychopharmacology: antipsychotics, antidepressants, anxiolytics,
- iv. Anti-mania drugs
- v. Anesthetics: local and general anesthetics.
- vi. CNS stimulant drugs
- vii. Pharmacotherapy of pain and inflammation:
 - Opioids and non-steroidal anti-inflammatory drugs (NSAIDs)
 - Pharmacotherapy of gout, rheumatoid arthritis
- viii. Drugs for movement disorder/muscle relaxant.

11. Drugs Acting on Uterus

- i. Drugs increasing and drugs decreasing uterine motility
- ii. Drugs decreasing uterine motility

12. Chemotherapy

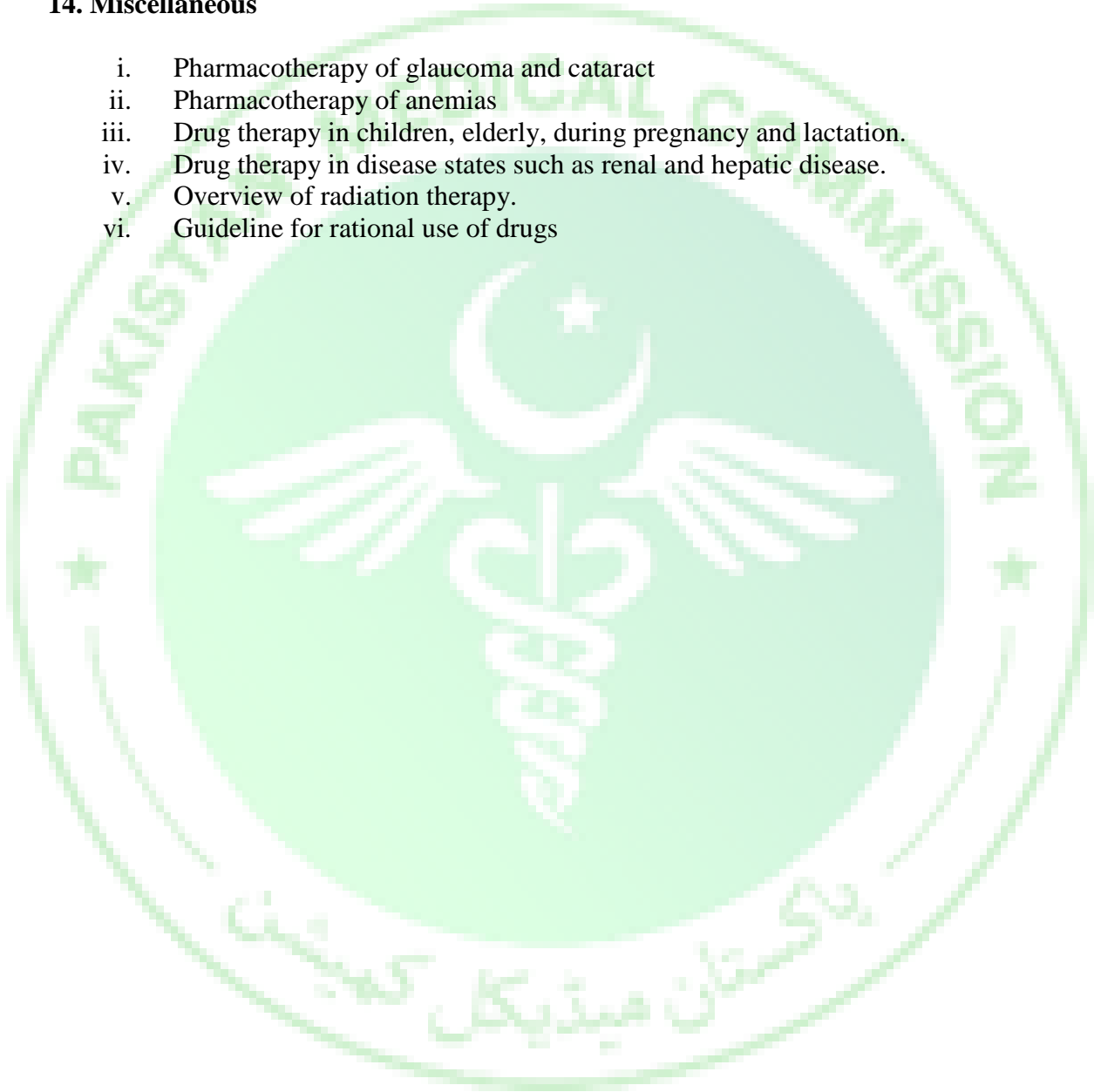
- i. Introduction to chemotherapy
- ii. Antimicrobials acting on cell wall
- iii. Protein synthesis inhibitors
- iv. Nucleic acid synthesis inhibitors
- v. Antifolates
- vi. Gyrase inhibitors
- vii. Anti-mycobacterial drugs.
- viii. Anti-fungal drugs.
- ix. Antiviral drugs.
- x. Anti-protozoal drugs: antimalarial and anti-amoebic drugs.
- xi. Chemotherapy for sexually transmitted diseases (STDs)
- xii. Cancer chemotherapy: principle and general consideration,
- xiii. treatment approach in some common malignancies

13. Immunopharmacology

- i. Immunostimulants including probiotics
- ii. Immunosuppressants
- iii. Vaccines and sera

14. Miscellaneous

- i. Pharmacotherapy of glaucoma and cataract
- ii. Pharmacotherapy of anemias
- iii. Drug therapy in children, elderly, during pregnancy and lactation.
- iv. Drug therapy in disease states such as renal and hepatic disease.
- v. Overview of radiation therapy.
- vi. Guideline for rational use of drugs



1. Homeostasis

- i. Control systems in the body
- ii. Intercellular connections
- iii. Cell organelles
- iv. Membrane transport including active transport, passive transport,
- v. simple and facilitated diffusion
- vi. Importance of selectively permeable membranes, osmosis and
- vii. Osmotic pressure, surface tension, viscosity also in relation to body fluids

1.1 Clinical/Applied Concepts

- i. Failure of homeostasis (Illness)
- ii. Abnormalities of the cell and its organelles (apoptosis, mutation, cancer and aging)

2. Blood

- i. Composition and functions
- ii. Plasma proteins: albumin, globulin fibrinogen, and their functions
- iii. Hemoglobin and blood indices, iron metabolism, fate of hemoglobin.
- iv. White blood cells, leucopoiesis, functions
- v. Platelets
- vi. Haemostasis, clotting factors, anticoagulants
- vii. Blood groups, blood transfusion and complications
- viii. Reticuloendothelial system – spleen

2.1 Clinical/Applied Concepts

- i. Anemia and its types, polycythemia
- ii. Blood indices in various disorders thalassemia
- iii. Leucopenia, Leucocytosis, leukemia, AIDS, allergy, vaccination
- iv. Thrombocytopenia
- v. Clotting disorders (hemophilia etc.)
- vi. Blood grouping/cross matching and significance
- vii. Effect of anemia on cardiac output and on the CVS

3. Nerve and muscle

- i. Properties of nerve fibers
- ii. Physiology of action potential including compound action potentials
- iii. Conduction of nerve impulse, nerve degeneration and regeneration Synapses
- iv. Types of muscle, functions
- v. Skeletal muscle contraction
- vi. Isometric and isotonic contraction

- vii. Smooth muscle contraction
- viii. Neuromuscular junction
- ix. Excitation-contraction coupling
 - x. Motor unit
 - xi. Neuromuscular junction blockers

3.1 Clinical/Applied Concepts

- i. Nerve conduction studies
- ii. Electromyograms (EMG)
- iii. Nerve injury
- iv. Rigor mortis and contractures
- v. Myasthenia gravis
- vi. Myopathies/neuropathies

4. Cardiovascular system

- i. Properties of cardiac muscle
- ii. Action potential in atrial and ventricular muscle and pace-maker potential
- iii. Artificial pacemaker
- iv. Cardiac impulse- origin and propagation
- v. Cardiac cycle regulation of cardiac functions
- vi. ECG-recording and interpretation
- vii. Arrhythmias- mechanism of development
- viii. Functional types of blood vessels
- ix. Hemodynamics of blood flow
 - x. Local control of blood flow
 - xi. Systemic circulation - basic principles/characteristics and control
 - xii. Cardiac output (regulation/measurement) peripheral resistance and its regulation
 - xiii. Arterial pulse
 - xiv. Arterial blood pressure (short/long term regulation)
 - xv. Heart sounds/murmurs
 - xvi. Venous return and its regulation
 - xvii. Coronary circulation
 - xviii. Splanchnic circulation
 - xix. Cerebral circulation
 - xx. Cutaneous circulation-triple response
 - xxi. Fetal circulation and readjustments at birth
 - xxii. Cardiovascular changes during exercise

4.1 Clinical/Applied Concepts

- i. Blood pressure monitoring
- ii. Correlation of cardiac cycle with electrocardiogram (ECG) and heart sounds
Echocardiogram
- iii. Significance of apex beat / abnormalities

- iv. ECG interpretation in cardiac muscle abnormalities and cardiac arrhythmias
- v. Flutter, fibrillation, ectopic beats
- vi. Conduction defects
- vii. Radial/other pulses
- viii. Hypertension, types and effects
- ix. Clinical evaluation of heart sounds and murmurs
- x. Jugular venous pulse
- xi. Ischemic heart disease
- xii. Cerebrovascular accidents
- xiii. Types of heart failure and circulatory shock

5. Respiratory system

- i. Functions of lungs (respiratory and non-respiratory)
- ii. Mechanics of breathing, pulmonary pressure changes
- iii. Surfactant and compliance
- iv. Protective reflexes
- v. Lung volumes and capacities
- vi. Dead spaces
- vii. Diffusion of gases (gas laws, composition)
- viii. Pulmonary circulation ventilation / perfusion
- ix. Transport of O₂ in blood O₂/CO₂ disassociation curves
- x. Transport of CO₂ in blood
- xi. Regulation of respiration (nervous/chemical)
- xii. Abnormal breathing
- xiii. Hypoxia-types and effects
- xiv. Physiology of cyanosis
- xv. Physiology of high altitude, space, deep sea diving
- xvi. Oxygen debt
- xvii. Respiratory changes during exercise

5.1 Clinical/Applied Concepts

- i. Types of respiration (intrapleural pressure, pneumothorax, effusion)
- ii. Atelectasis
- iii. Lung function tests (Spirometry)
- iv. Sneezing, yawning, cough
- v. Obstructive / restrictive lung disease (FEV₁/FVC)
- vi. Abnormal ventilation / perfusion
- vii. Respiratory failure: Types I & II
- viii. Asphyxia
- ix. Hypoxia, cyanosis, dyspnea, hypo- and hypercapnia
- x. Artificial respiration
- xi. Oxygen therapy and its toxicity
- xii. Caisson's disease, Acute Mountain Sickness

6. Body fluids and kidneys

- i. Compartments of body fluids and measurement
- ii. Tissue and lymph fluids
- iii. Fluid excess / depletion
- iv. General functions of kidney
- v. GFR-factors regulating
- vi. Formation of urine, filtration, reabsorption, secretion
- vii. Plasma clearance
- viii. Concentration and dilution of urine
- ix. Electrolyte balance
- x. Water balance
- xi. Regulation of blood pressure by kidneys
- xii. Hormones of kidneys
- xiii. Acidification of urine
- xiv. Acid-Base balance
- xv. Micturition

6.1 Clinical/Applied Concepts

- i. Renal function tests
- ii. Renal failure/uremia
- iii. Nephrotic syndrome
- iv. Dialysis: artificial kidney/hemodialysis/ peritoneal dialysis
- v. Metabolic acidosis/alkalosis
- vi. Abnormalities of micturition including incontinence

7. Gastrointestinal Tract (GIT)

- i. Enteric nervous system (gut, brain)
- ii. Mastication, swallowing and their control
- iii. Functions and movements of stomach
- iv. Functions of pancreas
- v. Functions and movements of small intestine
- vi. Functions and movements of large intestine
- vii. Hormones of GIT
- viii. Vomiting and its pathway
- ix. Defecation and its pathway
- x. Regulation of feeding and energy Expenditure
- xi. Functions of liver/gall bladder

7.1 Clinical/Applied Concepts

- i. Dysphagia, achalasia of esophagus
- ii. Examination of abdomen in acute and chronic pain
- iii. Gastric function tests
- iv. Vomiting and its effects
- v. Diarrhea, constipation
- vi. Jaundice, liver functions tests and their interpretation

8. Nervous system

- i. Organization of nervous system
- ii. Classification of nerve fibers
- iii. Properties of synaptic transmission
- iv. Neurotransmitters and neuropeptides
- v. Types and function of sensory receptors
- vi. Functions of spinal cord and tracts
- vii. Reflex action/reflexes
- viii. Muscle spindle/muscle tone
- ix. Tactile, temperature and pain sensations
- x. Sensory Cortex
- xi. Motor Cortex
- xii. Motor pathways (pyramidal and extra pyramidal)
- xiii. Basal ganglia, connections and functions
- xiv. Cerebellum, connections and functions
- xv. Vestibular apparatus/regulation of posture and equilibrium
- xvi. State of brain activity Reticular formation
- xvii. Physiology of sleep
- xviii. Electroencephalogram (EEG) physiology of memory
- xix. Physiology of speech
- xx. Thalamus- nuclei and functions
- xxi. Hypothalamus and limbic system
- xxii. Cerebrospinal fluid
- xxiii. Regulation of body temperature
- xxiv. Memory & learning
- xxv. Autonomic nervous system

8.1 Clinical/Applied Concepts

- i. Significance of dermatomes
- ii. Receptors and neurotransmitters (applied aspect)
- iii. Interpretation of reflexes
- iv. Injuries and diseases of spinal cord, analgesia system
- v. Disorders of cranial nerves
- vi. Hemiplegia / paraplegia, Upper and lower motor neuron lesions: features and localization
- vii. features and localization

- viii. Parkinsonism and other lesions of basal ganglia
- ix. Cerebellar disorders
- x. Postural disorders
- xi. Epilepsy
- xii. Sleep disorders
- xiii. Higher mental function assessment
- xiv. Alzheimer's disease
- xv. Abnormalities of speech
- xvi. Thalamic syndrome
- xvii. Lesion of hypothalamus
- xviii. Hydrocephalous
- xix. Heat Stroke

9. Special senses

- i. Physiological structure and functions of eyeball
- ii. Principles of optics
- iii. Accommodation of eye
- iv. Visual acuity
- v. Photochemistry of vision
- vi. Colour vision
- vii. Dark and light adaptation neural function of retina
- viii. Visual pathway, light reflex and pathway visual cortex
- ix. Eye movements and control
- x. Physiological anatomy of cochlea
- xi. Functions of external and middle ear
- xii. Functions of inner ear- organ of Corti
- xiii. Auditory pathway
- xiv. Physiology of smell - receptors and pathway
- xv. Physiology of taste
- xvi. Olfaction/taste abnormalities

9.1 Clinical/Applied Concepts

- i. Glaucoma, Cataract
- ii. Errors of refraction
- iii. Colour blindness, fundoscopy
- iv. Field of vision and lesions of visual pathway, visual evoked potentials and electroretinogram
- v. Rinne's and weber's tests
- vi. Hearing test audiometry, types of deafness, auditory evoked potentials (endocochlear potential, with reference to Meniere's disease)

10. Endocrinology

- i. General principles (classification, mechanism of action, feedback control)
- ii. Physiology of growth
- iii. Biosynthesis, transport, metabolism, actions and control of secretion of hormones of:
 - a. Hypothalamus
 - b. Anterior pituitary
 - c. Posterior pituitary
 - d. Thyroid gland
 - e. Parathyroid, calcitonin and calcitriol
 - f. Adrenal cortex & medulla
 - g. Pancreas
 - h. GIT
 - i. Pineal gland
 - j. Thymus
 - k. Kidney

10.1 Clinical/Applied Concepts

- i. Hormonal assays
- ii. Panhypopituitarism, dwarfism acromegaly, gigantism, Sheehan's syndrome
- iii. Diabetes insipidus, syndrome of inappropriate ADH secretion
- iv. Myxedema, cretinism, thyrotoxicosis
- v. Tetany, hypercalcemia
- vi. Pheochromocytoma
- vii. Cushing's syndrome, Conn's syndrome, Addison's disease, adrenogenital syndrome
- viii. Diabetes mellitus and hypoglycemia, Zollinger Ellison's syndrome

11. Reproduction

- i. Erection and ejaculation
- ii. Testosterone
- iii. gonads and oogenesis
- iv. Estrogen and progesterone
- v. Menstrual cycle
- vi. Puberty and menopause
- vii. Pregnancy- physiological changes in mother's body during pregnancy
- viii. Placenta
- ix. Parturition
- x. Lactation
- xi. Fetal and neonatal physiology

11.1 Clinical/Applied Concepts

- i. Semen analysis
- ii. Chromosomal abnormalities
- iii. Male infertility
- iv. Female infertility
- v. Contraception
- vi. Pregnancy Tests

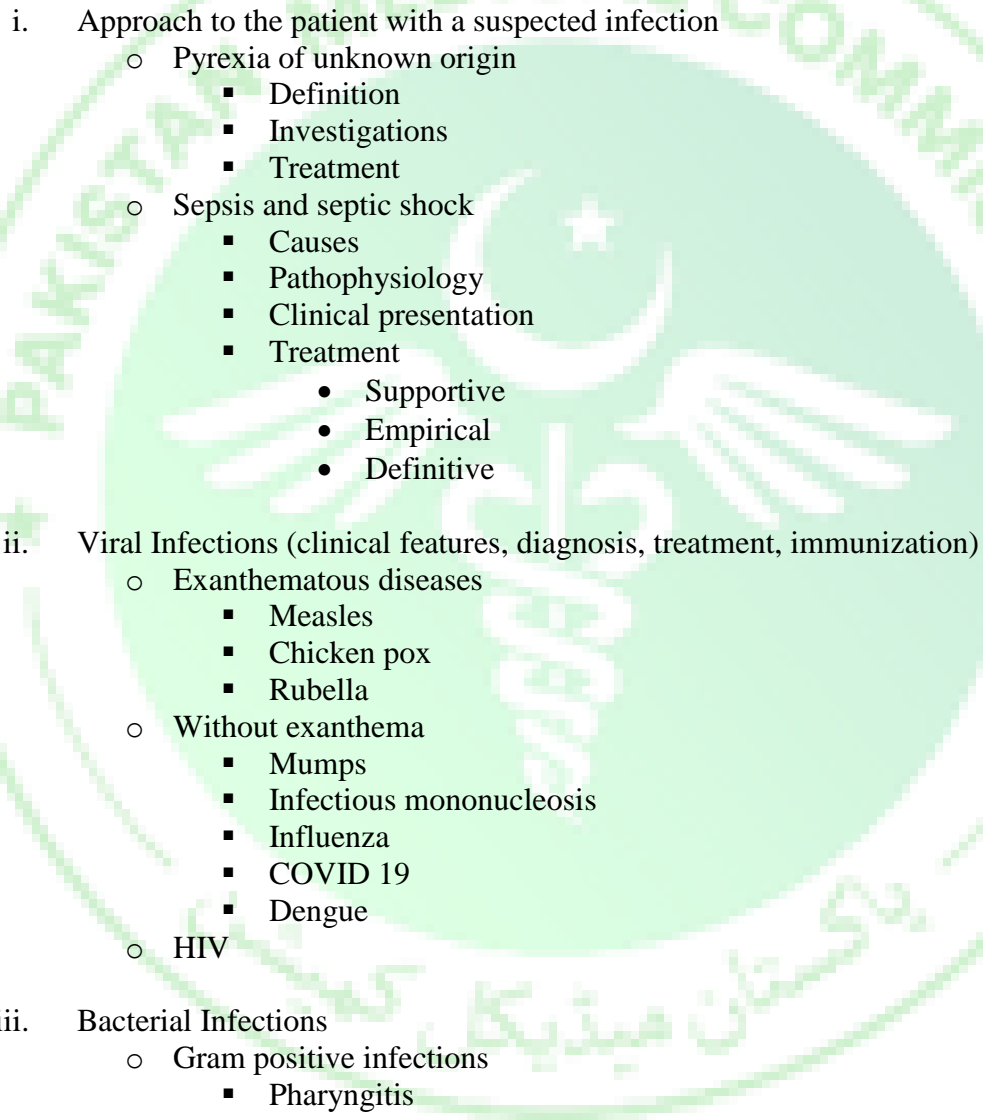


APPENDIX 2

SYLLABUS FOR CLINICAL SCIENCES COMPONENT OF NLE 2021

MEDICINE & ALLIED

1. INFECTIOUS DISEASES

- 
- i. Approach to the patient with a suspected infection
 - Pyrexia of unknown origin
 - Definition
 - Investigations
 - Treatment
 - Sepsis and septic shock
 - Causes
 - Pathophysiology
 - Clinical presentation
 - Treatment
 - Supportive
 - Empirical
 - Definitive
 - ii. Viral Infections (clinical features, diagnosis, treatment, immunization)
 - Exanthematous diseases
 - Measles
 - Chicken pox
 - Rubella
 - Without exanthema
 - Mumps
 - Infectious mononucleosis
 - Influenza
 - COVID 19
 - Dengue
 - HIV
 - iii. Bacterial Infections
 - Gram positive infections
 - Pharyngitis
 - Skin infections
 - Toxic shock syndrome
 - Pneumonia
 - Meningitis
 - Clostridial infections
 - Botulism

- Gas gangrene
- Gram negative infections
 - Enteric fever
 - E. coli gastroenteritis
 - Cholera
 - Dysentery
- Syphilis
- Food poisoning
- iv. Mycobacterial
 - Pulmonary and abdominal TB under respective systems
- v. Fungal infections
- vi. Protozoal infection
 - Acute and chronic amoebiasis
 - Clinical features
 - Investigations
 - Treatment
- vii. Helminthic infections
 - Ascariasis
 - Hook worm
 - Life cycle
 - Clinical features
 - How it causes anemia
 - Treatment and prevention
 - Tapeworm
 - Hydatid cyst
 - Clinical features with area of involvement
 - Treatment
 - Medical
 - Surgical

2. GASTROINTESTINAL SYSTEM

i. Diseases of pharynx and esophagus

- Gastro-esophageal reflux disease / non-ulcer dyspepsia (NUD)
 - Symptomatology
 - Diagnosis
 - Role of endoscopy
 - Treatment
- Esophagitis and Barret's esophagus
- Vomiting
 - Causes
 - Investigations
 - Treatment
- Hematemesis
 - Differential diagnosis
 - Investigations
 - Management
 - Hemodynamic assessment
 - Resuscitation
 - Medical treatment
 - Therapeutic interventions
- Carcinoma esophagus
- Achalasia

ii. Diseases of stomach and duodenum

- Types of gastritis, diagnosis, treatment
- Peptic ulcer disease
 - Etiology
 - Pylori, NSAID's
 - Clinical features, complications
 - Treatment
- Carcinoma stomach

iii. Diseases of small intestine

- Acute diarrhea's
 - Infective
 - Osmotic
 - Irritable bowel syndrome
- Malabsorption disorders
 - Celiac disease
 - Tropical sprue
 - Enzyme deficiencies
 - Whipple disease

- iv. Diseases of large intestine
 - Inflammatory bowel disease (differential of the two, clinical features, investigations and treatment)
 - Crohn's disease
 - Ulcerative colitis
 - Carcinoma colon
 - Pseudo-membrane colitis
- v. Functional GI disorders (irritable bowel syndrome)

3. LIVER AND PANCREATIC DISEASES

- i. Jaundice
 - Types
 - Congenital
 - Pre-hepatic
 - Hepatocellular
 - Cholestatic
 - Differentiation
 - Investigations
 - Treatment
- ii. Acute and chronic hepatitis with clinical features, complications, investigations, serology and treatment and vaccination
 - Hepatitis A Virus
 - Hepatitis B Virus
 - Hepatitis C Virus
 - Hepatitis E Virus
 - Auto-immune hepatitis
- iii. Metabolic liver disease
 - Hemochromatosis
 - Wilson disease
 - Alpha 1 trypsin deficiency
 - Non-Alcoholic fatty liver disease, non-alcoholic steatohepatitis
- iv. Fulminant hepatic failure
 - Causes and differentiation
 - Investigations
 - Treatment
- v. Cirrhosis
 - Causes
 - Viral B, C
 - Alcoholic liver disease
 - Metabolic causes
 - Primary biliary

- Complications with clinical features, investigations and treatment of each
 - Ascites
 - Hepatorenal syndrome
 - Variceal bleed
 - Hepatic encephalopathy
 - Spontaneous bacterial peritonitis
 - Hepatocellular Carcinoma (HCC)
- vi. Liver Abscess
- vii. Liver tumor, Hepatocellular carcinoma
- viii. Acute and chronic pancreatitis
 - Clinical features
 - Risk assessment
 - Complications
 - Investigations
 - Treatment
- ix. Pregnancy and liver
 - Acute Fatty Liver of Pregnancy
 - Intrahepatic cholestasis
 - Pre-eclampsia and HELLP

4. HEMATOLOGICAL DISEASE

- i. Anemias
 - Microcytic
 - Iron deficiency (clinical features, investigations, treatment)
 - Thalassemia
 - Alpha
 - Beta thalassemia
 - Macrocytic
 - B12 deficiency anemia
 - Pernicious anemia (clinical features, investigation, treatment)
 - Other causes
 - Folic acid deficiency
 - Normocytic
 - Hemolytic anemias
 - Classification
 - Autoimmune hemolytic (Coomb positive and negative)
 - Enzyme deficiency
 - Membrane disorders
 - Hemoglobinopathies (sickle cell anemia)
 - Aplastic anemia

- ii. Leukemias (clinical features, differential diagnosis, investigations, treatment)
 - Acute lymphoblastic leukemia
 - Acute myeloid leukemia
 - Chronic lymphoblastic leukemia
 - Chronic myeloid leukemia
 - Myelofibrosis
 - Polycythemia
- iii. Lymphomas (classifications, diagnosis, investigations, treatment)
 - Hodgkin
 - Non-Hodgkin
- iv. Paraproteinemia
 - Multiple myeloma
 - Waldenstrom macroglobulinemia
 - Amyloidosis
- v. Diseases of Platelet and clotting factors
 - Qualitative congenital platelet disorders
 - Idiopathic thrombocytopenic purpura (ITP)
 - Disseminated intravascular coagulation
 - Thrombotic thrombocytopenic purpura (TTP) and hemolytic uremic syndrome (clinical features, differentiation, investigations, treatment)
 - Von Willebrand disease (physiology, clinical features and treatment)
 - Hemophilia A and B
- vi. Blood transfusion and bone marrow transplant

5. RHEUMATOLOGY AND BONE DISEASE

- i. Osteoarthritis (oa)
- ii. Rheumatoid arthritis (ra)
- iii. Crystal arthritis
- iv. Infections of joints and bones
- v. Autoimmune rheumatic diseases (rheumatoid arthritis, systemic lupus erythematosus, sjogren syndrome, systemic sclerosis, polymyositis, dermatomyositis)
- vi. Systemic inflammatory vasculitis (anti-neutrophil cytoplasmic antibodies-anca)
- vii. Osteoporosis
- viii. Rickets and osteomalacia

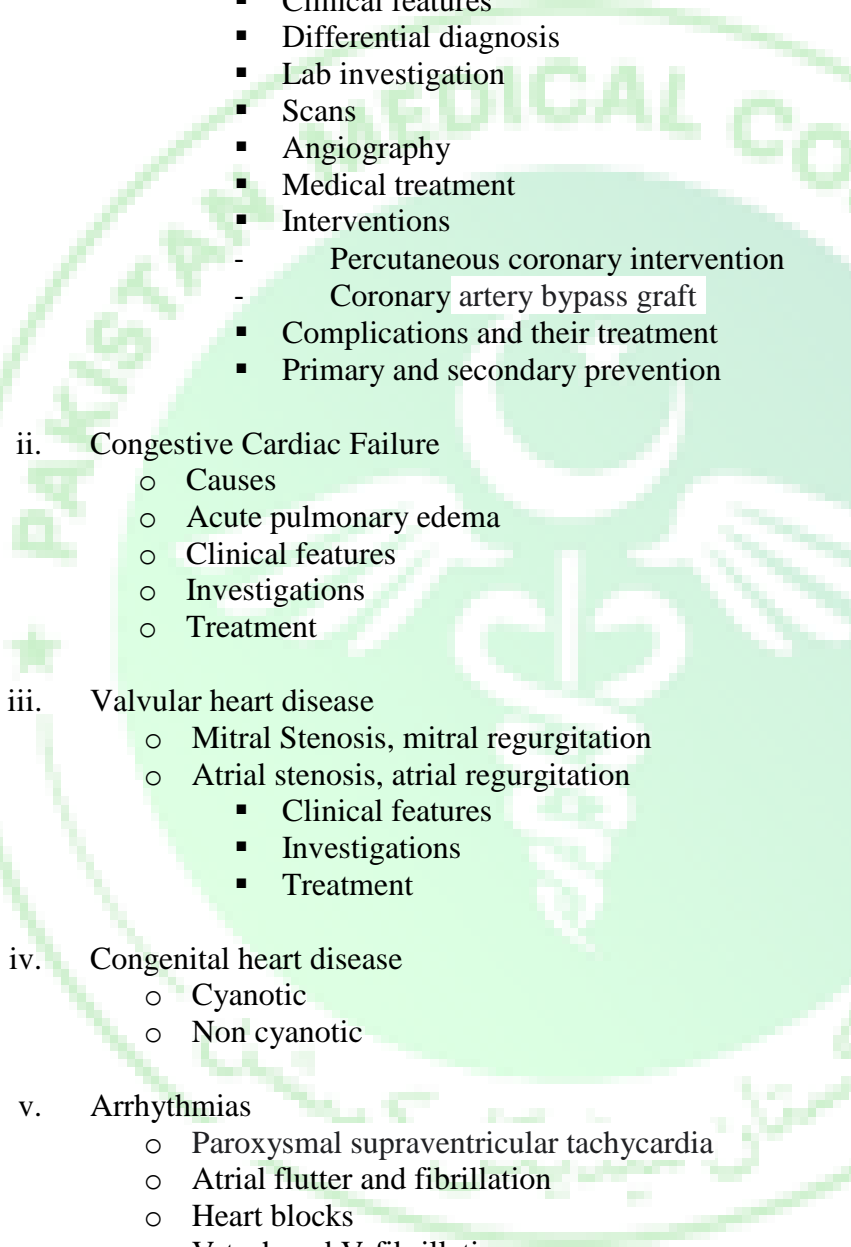
6. RENAL

- i. Glomerular diseases
 - Nephrotic (minimal Change, membranous)
 - Nephritic Syndrome (Acute Glomerulonephritis, Rapidly Progressive Glomerulonephritis, IgA, ANCA related GN, Goodpasture syndrome)
 - Acute Kidney Injury, Acute Tubular Necrosis
 - Causes
 - Clinical features
 - Natural history
 - Investigations
 - Emergency dialysis
 - Treatment
- ii. Tubular diseases
- iii. Interstitial diseases
- iv. Chronic Kidney Disease
 - Causes
 - Clinical features
 - Uremia vs azotemia
 - Bone changes
 - Mineral metabolic changes
 - CVS complications
 - Neurological complications
 - Hematological complications
- v. Kidney involvement in systemic diseases
- vi. Renal cell carcinoma

7. WATER, ELECTROLYTES AND ACID-BASE BALANCE

- i. Disorders of Electrolytes (Na, K, Ca, Cl)
- ii. Acid Base Balance (causes, clinical features, diagnosis, treatment)
 - Acidosis
 - Metabolic
 - Respiratory
 - Alkalosis
 - Metabolic
 - Respiratory

8. CVS

- 
- i. Coronary artery disease
 - Stable angina
 - Unstable angina
 - Myocardial infarction
 - Clinical features
 - Differential diagnosis
 - Lab investigation
 - Scans
 - Angiography
 - Medical treatment
 - Interventions
 - Percutaneous coronary intervention
 - Coronary artery bypass graft
 - Complications and their treatment
 - Primary and secondary prevention
 - ii. Congestive Cardiac Failure
 - Causes
 - Acute pulmonary edema
 - Clinical features
 - Investigations
 - Treatment
 - iii. Valvular heart disease
 - Mitral Stenosis, mitral regurgitation
 - Atrial stenosis, atrial regurgitation
 - Clinical features
 - Investigations
 - Treatment
 - iv. Congenital heart disease
 - Cyanotic
 - Non cyanotic
 - v. Arrhythmias
 - Paroxysmal supraventricular tachycardia
 - Atrial flutter and fibrillation
 - Heart blocks
 - V-tach and V-fibrillation
 - Cardiac arrest
 - Basic life support, acute cardiac life support
 - Classification of antiarrhythmic drugs
 - vi. Infective endocarditis

- vii. Cardiomyopathies
 - Dilated cardiomyopathy
 - Hypertrophic obstructive cardiomyopathy
 - Restrictive
- viii. Diseases of Pericardium
- ix. Hypertension
 - Classification
 - Definition
 - Clinical features
 - Classification and treatment with antihypertensive drugs
- x. Peripheral vascular disease

9. PULMONOLOGY

- i. Asthma
 - Clinical features
 - Complications
 - Grading
 - Emergency treatment
 - Long term management
- ii. Chronic Obstructive Pulmonary Disease
 - Chronic bronchitis
 - Emphysema
 - Differences
 - Clinical features
 - Investigations
 - Treatment
- iii. Pneumonia
 - Community acquired
 - Etiology
 - Clinical features
 - Treatment
 - Hospital acquired
- iv. Tuberculosis (TB)
 - Types
 - Causative agents
 - Clinical features
 - Investigations
 - Primary vs post primary

- Cultures
- Treatment
 - Non complicating cases
 - Multi-drug resistant TB
- v. Diffuse parenchymal lung disease
 - Interstitial pneumonias
 - Extrinsic allergic alveolitis
 - Sarcoidosis
- vi. Type 1 and type II respiratory failures
- vii. Primary pulmonary hypertension
- viii. CA bronchus
- ix. Occupational Lung disease
- x. Diseases of Pleura

10. POISONING AND ENVIRONMENTAL MEDICINE

- i. Benzodiazepine poisoning
- ii. Drowning
- iii. Electric shock
- iv. Heavy metal poisoning
- v. Hyperthermia
- vi. Organophosphate poisoning
- vii. Snake bite
- viii. Wheat pill poisoning

11. ENDOCRINOLOGY AND DIABETES MELLITUS

- i. Diseases of Pituitary
 - Anterior and posterior pituitary hormones
 - Diabetes insipidus
 - Dwarfism
 - Gigantism, acromegaly
 - Sheehan syndrome
- ii. Diseases of Thyroid
 - Grave's disease
 - Lab Diagnosis, scans
 - Treatment
 - Medical
 - Radioactive iodine
 - Treatment during pregnancy
 - Myxedema
- iii. Diseases of Adrenal

- Cushing's disease and syndrome
 - Addison's disease and crisis, diagnosis and treatment
- iv. Diseases of parathyroid
- v. Diseases of reproduction and sex
- vi. Diabetes mellitus
- Types (1,2 and Gestational Diabetes Mellitus)
 - Maturity onset diabetes of the young, endocrinopathies
 - Clinical features
 - Diagnostic criteria (for 1 and 2 and gestational diabetes mellitus)
 - Investigations
 - Complications
 - Microvascular
 - Nephropathy
 - Retinopathy
 - Neuropathy
 - Macrovascular
 - Treatment of diabetes
 - Oral drugs
 - Classification of various groups
 - Mechanisms, side effects and doses
 - Insulins
 - Human insulins
 - Analogs
 - Coma's
 - Diabetic KetoAcidosis
 - Clinical features
 - Interpreting ABG's
 - Treatment steps
 - Hyperglycaemic hyperosmolar non-ketotic coma (HONK)
 - Lactic acidosis
 - Hypoglycemia
- vii. Disorders of Lipids
- Hyperlipidemias

12. CNS

- i. Unconsciousness and coma
- Causes
 - Metabolic
 - Diabetic
 - Hypoglycemia
 - Uremia

- Hepatic encephalopathy
 - Respiratory failure
 - Vascular
 - Encephalitis
 - Infective
 - Autoimmune
 - Tumors / raised intracranial pressure
 - Drugs / poisoning
- ii. Cerebrovascular disease
- Ischemic stroke
 - Subarachnoid hemorrhage and intracerebral bleed
 - Control of BP
 - Differentiation
 - Immediate resuscitation
 - Investigations
 - Surgery
 - Therapeutic options for both
- iii. Headache
- Classification
 - Migraine
 - Cluster headaches
 - Differentiating points
 - Role of CT
 - Treatment
- iv. Epilepsy
- v. Movement disorders
- Tics
 - Chorea
 - Huntington
 - Parkinson's disease
- vi. Multiple sclerosis
- vii. CNS infections
- Meningitis
 - Encephalitis
- viii. Paraplegia
- Spinal cord disorders
 - Autoimmune
 - Tumors
 - Vascular

- Vertebral disorders
 - Fracture
 - Collapse / stress
- Disc disorder
- ix. Neurodegenerative diseases
 - Alzheimer
 - Motor neuron diseases
- x. Neuropathies
 - Autoimmune
 - Hereditary
 - Hereditary motor sensory neuropathy I to IV
 - Fredrick ataxia
 - Guillian-Barre Syndrome (GBS)
 - Systemic disease
 - Toxic
- xi. Myopathies
- xii. Myasthenia gravis

13. SKIN

Diagnosis and management of:

- i. Itching and Pruritus:
 - Scabies, Pediculosis
 - Eczemas: Atopic, Seborrheic, Contact dermatitis
 - Urticaria
- ii. Acne Vulgaris
- iii. Psoriasis
- iv. Lichen Planus
- v. Erythema Multiforme, Steven Johnsons syndrome, toxic epidermal necrolysis
- vi. Infections:
 - Acute Bacterial: staphylococcal, streptococcal
 - Chronic Bacterial: tuberculosis, leprosy
 - Viral: Warts, M.Cs, herpes simplex, herpes zoster
 - Fungal: tinea, pityriasis versicolor
 - Protozoal: leishmaniasis

- vii. Bullous Disorders:
 - Immune mediated: pemphigus, pemphigoid, dermatitis herpetiformis
 - Genetic: epidermolysis bullosa
- viii. Pigmentary disorders
 - Vitiligo
 - Melasma
- ix. Hair disorders
 - Alopecia Areata
 - Androgenic Alopecia
- x. Cutaneous tumors
 - Basal cell carcinoma
 - Squamous cell carcinoma
 - Malignant melanoma

14. PSYCHIATRY

- i. Anxiety & depression
- ii. Psychiatric emergencies
- iii. Psychosis & bipolar diseases
- iv. Schizophrenia

1. METABOLIC RESPONSE TO INJURY, SHOCK, AND BLOOD TRANSFUSION

- i. Basic concepts in homeostasis
- ii. Graded nature of response to injury
- iii. Mediators of the metabolic response to injury
- iv. Metabolic stress response to surgery and trauma: the 'ebb and flow' model
- v. Changes in body composition following injury
- vi. Avoidable factors that compound the response to injury.
- vii. Pathophysiology of Shock
- viii. Classification of shock
- ix. Cardiovascular and metabolic characteristics of shock
- x. Severity and consequences of shock
- xi. Resuscitation, fluid therapy, blood and blood components for shock.
- xii. Hemorrhage, types of hemorrhage, degree and classification of hemorrhage, indications for transfusion, transfusion of blood and blood components for hemorrhage, hazards of massive blood transfusion, transfusion reactions.

2. WOUND HEALING

- i. Factors influencing wound healing
- ii. Classification of wound closure and healing
- iii. Phases of normal wound healing
- iv. Abnormal wound healing
- v. Types of wounds
- vi. Hypertrophic Scar, Keloids and their treatment
- vii. Differentiation between acute and chronic wounds
- viii. Management of acute and chronic wounds, scars, contracture
- ix. Compartment syndrome.

3. SURGICAL INFECTIONS

- i. Microbiology of surgical infections, sources of infection,
- ii. Factors in wound infection
- iii. Risk factors for increased risk of wound infection
- iv. The decisive period
- v. Major and minor surgical site infection (SSI)
- vi. Specific local wound infections (gas gangrene, necrotizing fasciitis etc.)
- vii. Bacteremia, septicemia, and SIRS
- viii. Viral infections relevant to surgery (HIV, AIDS, hepatitis B and C)
- ix. Hospital acquired infections
- x. Tropical infections (amebiasis, ascariasis, typhoid, tuberculosis, hydatid disease)
- xi. Prevention of surgical infection
- xii. Role of antimicrobials in prevention and treatment of infection

4. PRE AND POSTOPERATIVE INVESTIGATIONS

- i. Accurate use of appropriate investigations to assist diagnosis and monitor treatment of patients (full blood count, urea and electrolytes, liver function tests, clotting screen, pregnancy test, blood glucose, HbA1c, arterial blood gases, ECG, echocardiography, Chest X-ray, urinalysis).

5. PRE-OPERATIVE ASSESSMENT OF SURGICAL PATIENT

- i. Evaluation of different diseases to assess fitness of patient before surgery
- ii. Cardiovascular diseases (hypertension, ischemic heart disease, angina, arrhythmias, Peripheral vascular disease)
- iii. Evaluation of coagulation disorders (thrombophilia etc.)
- iv. Respiratory diseases (chronic obstructive pulmonary disease, asthma, respiratory infections)
- v. Gastrointestinal diseases (peptic ulcer disease and gastro-esophageal reflux, liver disease)
- vi. Genitourinary tract (urinary tract infection and renal dysfunction)
- vii. Neurological (epilepsy, cerebrovascular accidents and transient ischemic attacks, psychiatric disorders, cognitive function)
- viii. Endocrine/metabolic (malnutrition, obesity, diabetes mellitus, thyroid dysfunction)
- ix. Locomotor system (Osteoarthritis, rheumatoid arthritis)
- x. Other diseases (human immunodeficiency virus, hepatitis, tuberculosis, malignancy, allergy)
- xi. Previous surgery (problems encountered, family history of problems with anesthesia)
- xii. Identification and assessment of high-risk patients (Patient factors that predispose to high risk of morbidity and mortality, scoring systems for identifying high-risk patients e.g., physiological and operative severity score for the enumeration of mortality and morbidity (POSSUM), The Revised Cardiac Risk Index (RCRI) of Lee, American College of Surgeons National Surgical Quality Improvement Program score- ACS NSQIP)
- xiii. Optimization of the high-risk patient before surgery
- xiv. Minimizing the impact of surgery in the high-risk patient
- xv. Consent for surgery.

6. PRINCIPLES OF ANAESTHESIA AND PAIN MANAGEMENT

- i. Key principles of general anesthesia
- ii. Pre-operative assessment of patients and pre-medication
- iii. Preparation of patient for general anesthesia
- iv. Management of airway during general anesthesia
- v. Intravenous Anesthetic agents
- vi. Inhalational Anesthetic agents

- vii. Muscle relaxation and artificial ventilation during general anesthesia
- viii. Monitoring and care of patient during general anesthesia
- ix. Recovery from Anesthesia
- x. Complications of general anesthesia and their management
- xi. Regional anesthesia (spinal, epidural, nerve blocks)
- xii. Complications of regional anesthesia and their management
- xiii. Perioperative Management
- xiv. Acute and chronic pain Management
- xv. Postoperative care
- xvi. ICU Monitoring

7. POST-OPERATIVE CARE

- i. Standards of anesthesia care in the immediate postoperative period
- ii. System specific postoperative complications (respiratory, cardiac, renal, central nervous system)
- iii. General postoperative complications (hemorrhage, Wound infection, fever, hypothermia, shivering, deep venous thrombosis, pulmonary embolism, wound dehiscence, paralytic ileus, nausea, vomiting)
- iv. Post-operative wound care

8. NUTRITION, FLUID, ELECTROLYTE AND ACID-BASE BALANCE

- i. Causes and consequences of malnutrition in the surgical patient
- ii. Nutritional status assessment techniques, nutritional requirements of surgical patients and the nutritional consequences of intestinal resection, different methods of providing nutritional support and their complications
- iii. Body fluid compartments, minimal obligatory output, daily fluid and electrolyte requirements for normal individuals, fluid and electrolyte requirements in the pre-operative, peri-operative and postoperative period (insensible fluid losses, maintenance fluid requirements, individual patient's fluid requirements, replacement fluid and electrolytes, macronutrient requirements, crystalloids and colloids fluids, isotonic, hypertonic, hypotonic fluids), management of fluid overload.
- iv. Common acid base balance disorders (diagnosis and management) (metabolic acidosis, respiratory acidosis, metabolic alkalosis, respiratory alkalosis).

9. PRINCIPLES OF MANAGEMENT OF TRAUMA PATIENTS

- i. Early assessment and management of severe trauma
- ii. Traumatic brain injury
- iii. Neck and spine trauma
- iv. Maxillofacial trauma
- v. Thoracic trauma
- vi. Abdominal trauma
- vii. Extremity trauma
- viii. Disaster surgery

10. BURN INJURIES

- i. Different types of burns
- ii. Pathophysiology of burns
- iii. Assessment of the area and depth of burns
- iv. Management of burn patients

11. ARTERIAL DISORDERS

- i. Arterial anatomy
- ii. Signs, symptoms, investigations, and treatment of acute arterial limb ischemia
- iii. Signs, symptoms, investigation and treatment of chronic arterial limb ischemia
- iv. Signs, symptoms, investigation and treatment of different types of arterial gangrene (dry gangrene, wet gangrene, diabetic gangrene)

12. VENOUS DISORDERS

- i. Venous anatomy of lower limb
- ii. Pathophysiology of veins of lower limb
- iii. Clinical features of venous hypertension of the leg
- iv. Signs, symptoms, classification, investigations and treatment of varicose vein
- v. Signs, symptoms, investigation and treatment of venous ulcers
- vi. Signs, symptoms, investigation and treatment of Venous thromboembolism

13. PRINCIPLES OF LAPAROSCOPIC AND ROBOTIC SURGERY

- i. Principles of laparoscopic and robotic surgery
- ii. Advantages and disadvantages of laparoscopic and robotic surgery
- iii. Safety issues and indications for laparoscopic and robotic surgery
- iv. The principles of postoperative care for laparoscopic and robotic surgery

14. SYSTEMIC DISEASES

Head, Face and Neck

- i. Developmental abnormalities of face, palate, lips (pathology, classification, clinical features & investigations and treatment)
- ii. Pre malignant diseases (pathology, classification, clinical features & investigations and treatment)
- iii. Oral cavity malignancies (pathology, classification, clinical features & investigations and treatment)
- iv. Benign and malignant diseases of salivary glands (parotid, submandibular and sublingual glands) (pathology, classification, clinical features & investigations and treatment)
- v. Tongue ulcer (etiology, pathology, clinical features & investigations and treatment)

Breast

- i. Surgical anatomy of breast
- ii. Clinical features and investigations of breast lumps
- iii. Triple assessment of breast lump
- iv. Diseases of nipple and areola (signs, symptoms, investigations, and treatment)
- v. Benign breast diseases (signs, symptoms, investigations, and treatment)
- vi. Malignant breast diseases (signs, symptoms, staging, prognosis, and treatment)
- vii. Breast reconstructions
- viii. Male breast carcinoma (signs, symptoms, staging, prognosis, and treatment)

Thyroid Gland

- i. Embryology & surgical anatomy
- ii. Physiology of thyroid functions
- iii. Thyroid imaging
- iv. Thyroid enlargement
- v. Hyperthyroidism
- vi. Hypothyroidism
- vii. Thyroiditis
- viii. Neoplasms of the thyroid (signs, symptoms, investigation, staging, prognosis, and treatment)
- ix. Thyroid surgery

Parathyroid Gland

- i. Embryology, anatomy, physiology, functions of parathyroid glands
- ii. Primary hyperparathyroidism
- iii. Secondary hyperparathyroidism
- iv. Tertiary hyperparathyroidism
- v. Investigations for parathyroid gland
- vi. Hypoparathyroidism
- vii. Multiple endocrine neoplasia syndrome
- viii. Parathyroid carcinoma (signs, symptoms, Staging, prognosis, and treatment)
- ix. Parathyroid surgery

Adrenal Gland

- i. Embryology, anatomy, physiology, functions of adrenal glands
- ii. Diseases of the adrenal cortex and their management (incidentaloma, primary hyperaldosteronism – Conn’s syndrome, Cushing’s syndrome, adrenocortical carcinoma, congenital adrenal hyperplasia, adrenal insufficiency)
- iii. Diseases of the adrenal medulla and neural crest derived tissue and their management (pheochromocytoma and paraganglioma, neuroblastoma, ganglioneuroma)

Thorax

- i. The anatomy and physiology of the thorax
- ii. Investigation of thoracic diseases
- iii. Benign diseases of lungs (signs, symptoms, investigations, diagnosis, and treatment)
- iv. Benign tumors of thorax (signs, symptoms, investigations, diagnosis, Staging, prognosis, and treatment)
- v. Malignant tumors of thorax (signs, symptoms, investigations, diagnosis, Staging, prognosis, and treatment)
- vi. Surgical approach to lung cancer resection
- vii. Complications of lung resection
- viii. Management of lung metastases

Peritoneum, omentum, mesentery & retroperitoneum

- i. Anatomy and physiology of the peritoneum, omentum, mesentery & retroperitoneum
- ii. Peritonitis, investigations, and management of peritonitis
- iii. Prognosis and complications
- iv. Special forms of peritonitis
- v. Intraperitoneal abscess
- vi. Ascites
- vii. Adhesions

- viii. Torsion of the omentum
- ix. Mesenteric injury
 - x. Mesenteric ischemia
 - xi. Mesenteric adenitis
- xii. Mesenteric cysts
- xiii. Retroperitoneal fibrosis
- xiv. Retroperitoneal (psoas) abscess
- xv. Tumors of the peritoneum
- xvi. Retroperitoneal tumors

Hernias, Umbilicus & Abdominal wall

- i. Basic anatomy and function related to pathology
- ii. Pathophysiology of hernia formation
- iii. Common principles in abdominal hernia
- iv. Clinical history and diagnosis in hernia cases
- v. Examination for hernia
- vi. Investigations for hernia
- vii. Management principles
- viii. Surgical approaches to hernia
- ix. Inguinal hernia
- x. Femoral hernia
- xi. Ventral hernias
- xii. Parastomal hernia
- xiii. Traumatic hernias
- xiv. Abdominal compartment syndrome

Esophagus

- i. Anatomy and physiology of the esophagus
- ii. Symptoms of esophageal diseases
- iii. Investigations for esophageal disorders
- iv. Esophageal motility disorders
- v. Premalignant conditions of esophagus
- vi. Esophageal perforations and their treatment
- vii. Paraoesophageal hernias
- viii. The clinical features, investigations, prognosis and treatment of benign diseases
- ix. The clinical features, investigations, prognosis, and treatment of malignant diseases

Stomach and duodenum

- i. Anatomy and physiology of the stomach and duodenum
- ii. Gastric mucus and the gastric mucosal barrier
- iii. Helicobacter pylori infection
- iv. Gastritis
- v. Peptic ulcer (duodenal & gastric)
- vi. Hematemesis and melaena
- vii. Stress ulceration
- viii. Gastric erosions
- ix. Mallory–Weiss tear
- x. Gastric outlet obstruction
- xi. Acute gastric dilatation
- xii. Trichobezoar and phytobezoar
- xiii. Gastric volvulus
- xiv. Gastric cancer
- xv. Gastrointestinal stromal tumors
- xvi. Gastric Lymphomas
- xvii. Duodenal obstruction
- xviii. Zollinger–Ellison syndrome
- xix. Benign and malignant duodenal tumors

Pancreas

- i. The anatomy and physiology of the pancreas
- ii. Investigations of the pancreas
- iii. Congenital abnormalities of the pancreas
- iv. Assessment and management of acute pancreatitis
- v. Assessment and management of chronic pancreatitis
- vi. Pancreatic cancer (signs, symptoms, investigations, diagnosis, staging, prognosis, and treatment)

Spleen

- i. Embryology, anatomy, physiology, functions of spleen
- ii. Investigations of spleen
- iii. Congenital anomalies of spleen
- iv. Splenic artery aneurysm
- v. Splenic infarction
- vi. Splenic rupture
- vii. Splenic abscess
- viii. Splenomegaly and hypersplenism
- ix. Causes of splenic enlargement
- x. Haemolytic anaemias
- xi. Neoplasms of spleen (signs, symptoms, investigations, diagnosis, Staging, prognosis, and treatment)
- xii. Splenectomy and complications

Gallbladder and bile ducts

- i. Anatomy and physiology of the gallbladder and bile ducts
- ii. Pathophysiology and management of gallstones
- iii. Obstructive jaundice diagnosis and its management
- iv. Unusual disorders of the biliary tree
- v. Management of bile duct injuries
- vi. Benign and malignant tumors of the biliary tree (signs, symptoms, investigations, diagnosis, staging, prognosis, and treatment)

Liver

- i. Pathology, classification, clinical features & investigations cystic liver disease
- ii. Pathology, classification, clinical features & investigations liver infections
- iii. Pathology, classification, clinical features & investigations of liver abscess
- iv. Pathology, classification, clinical features & investigations and management of hydatid disease
- v. Benign and malignant tumors of the liver (signs, symptoms, investigations, diagnosis, staging, prognosis, and treatment)

Small intestine

- i. Anatomy and physiology of the small intestine
- ii. Inflammatory bowel disease
- iii. Tuberculosis of the intestine
- iv. Intestinal diverticula
- v. Mesenteric ischemia
- vi. Stomas and their complications
- vii. Enterocutaneous fistula
- viii. Short bowel syndrome
- ix. Benign and malignant tumors of the small intestine (signs, symptoms, investigations, diagnosis, staging, prognosis, and treatment)

Large intestine

- i. Anatomy and physiology of the large intestine
- ii. Ulcerative colitis
- iii. Diverticular disease of the colon
- iv. Angiodysplasia
- v. Ischemic colitis
- vi. Irritable bowel syndrome
- vii. Benign and malignant tumors of the large intestine (Signs, symptoms, investigations, diagnosis, Staging, prognosis, and treatment)

Appendix

- i. Etiology and surgical anatomy of acute appendicitis
- ii. Signs, symptoms, investigations, diagnosis and differential diagnoses of acute appendicitis
- iii. Complications of acute appendicitis and their management
- iv. Management of acute and chronic appendicitis
- v. Benign and malignant Tumors of the appendix (signs, symptoms, investigations, diagnosis, staging, prognosis, and treatment)

Intestinal obstruction

- i. Classification and pathophysiology
- ii. Special types of mechanical intestinal obstruction
- iii. Clinical features of intestinal obstruction
- iv. Clinical features of strangulation
- v. Investigations for intestinal obstruction
- vi. Treatment of acute intestinal obstruction
- vii. Paralytic ileus
- viii. Pseudo obstruction

Rectum

- i. Surgical anatomy
- ii. clinical features of rectal disease
- iii. Injuries of the rectum and their management
- iv. Rectal prolapse and its management
- v. Rectal evacuation disorder
- vi. Rectal intussusception
- vii. Solitary rectal ulcer syndrome (SRUS)
- viii. Proctitis and its types and management
- ix. Rectal polyps
- x. Benign and malignant Rectal tumors (signs, symptoms, investigations, diagnosis, staging, prognosis, and treatment)

Anal canal

- i. Surgical anatomy of anal canal
- ii. Digital examination of the anal canal
- iii. Proctoscopy and sigmoidoscopy and their indications
- iv. Congenital anomalies of anal canal
- v. Pilonidal sinus disease, perianal abscess, anal fissure, perianal fistula, Hemorrhoids (signs, symptoms, investigations, diagnosis, and treatment)
- vi. Benign and malignant tumors of the anal canal (signs, symptoms, investigations, diagnosis, staging, prognosis, and treatment)

15. SURGICAL ETHICS, HUMAN FACTORS, PATIENT SAFETY, QUALITY IMPROVEMENT

- i. **Surgical ethics:** The importance of autonomy in good surgical practice, the moral and legal boundaries and practical difficulties of informed consent, good practice in making decisions about the withdrawal of life-sustaining treatment, the importance and boundaries of confidentiality in surgical practice, the importance of appropriate regulation in surgical research, the importance of rigorous training and maintenance of good practice standards.
- ii. **Human factors:** Understanding of human factors, what they are, and their importance in understanding and rectifying error and working together as teams.
- iii. **Patient safety:** The importance of patient safety and the scale of the problem, Medical error and its definitions including adverse events and near misses, patient safety strategies and solutions, applying the science of patient safety into clinical practice and quality improvement, patient safety as it relates to the surgeon.
- iv. **Quality improvement:** Different kinds of quality measures, quality improvement as an overarching activity designed to address gaps in the quality of healthcare delivery, the patient's surgical journey and its potential for inefficiency and waste, some of the methodologies, tools and skills needed for quality improvement.

16. ORTHOPAEDIC SURGERY

- i. History and examination of musculoskeletal disease (look, feel, move, special tests, investigations, radiology) of extremity trauma (ATLS principles)
- ii. Description and classification of soft tissue, neurological and bony extremity injuries (AO classification, growth plate injuries, open fractures)
- iii. Fracture healing (terminology and principles of treatment)
- iv. Treatment by fracture location and region
- v. Treatment in skeletally immature (paediatric fractures), osteoporotic fractures, pathological fractures and compartment syndrome
- vi. Triage and damage control surgery in orthopaedics.

17. UROLOGY

Kidneys and ureters

- i. Embryology, surgical anatomy, congenital anomalies of kidneys and ureters
- ii. Urinary symptoms and investigations
- iii. Kidney stones (etiology, pathogenesis, investigations, treatment)
- iv. Urinary tract infection (etiology, pathogenesis, investigations, treatment)
- v. Renal and ureter trauma (epidemiology, investigations and treatment)
- vi. Benign and malignant tumors of kidneys and ureters (etiology, pathogenesis, investigations, staging, treatment)

The urinary bladder

- i. Surgical anatomy of the bladder
- ii. Congenital defects of the bladder
- iii. Bladder trauma
- iv. Cystitis (etiology, pathogenesis, investigations, treatment)
- v. Acute retention of urine
- vi. Chronic retention of urine
- vii. Urinary incontinence
- viii. Urinary bladder calculi (etiology, pathogenesis, investigations, treatment)
- ix. Urinary bladder fistulae (etiology, pathogenesis, investigations, treatment)
- x. Neoplasms of the urinary bladder (etiology, pathogenesis, staging, investigations, treatment)

The Prostate and Seminal Vesicles

- i. Embryology, surgical anatomy, physiology, of prostate gland
- ii. Lower urinary tract symptoms
- iii. Bladder outflow obstruction
- iv. Assessment of the patient with lower urinary tract symptoms
- v. Anatomical structure and biochemical function to the development and treatment of benign and malignant disease of the prostate
- vi. Benign prostatic hyperplasia (etiology, pathogenesis, investigations, treatment)
- vii. Prostatic calculi (etiology, pathogenesis, investigations, treatment)
- viii. Prostatitis (etiology, pathogenesis, investigations, treatment)
- ix. Carcinoma of prostate (pathology, staging, clinical features, investigations, treatment)

Urethra and Penis

- i. The common congenital abnormalities of the urethra
- ii. The diagnosis and management of urethral trauma
- iii. The diagnosis and management of urethral stricture
- iv. The diagnosis and management of phimosis
- v. The principles of management of a man with erectile dysfunction
- vi. The common diseases of the penis and urethra and the principles of their surgical management

Testis and scrotum

- i. Embryology, anatomy, physiology, functions of Testis
- ii. Incompletely descended testis
- iii. Testicular injury
- iv. Testicular torsion
- v. Varicocele
- vi. Spermatocele
- vii. Hydrocoele
- viii. Epididymal cysts
- ix. Epididymoorchitis
- x. Testicular tumors and their management

18. PLASTIC AND RECONSTRUCTIVE SURGERY

- i. Anatomy and physiology of tissues used in reconstruction
- ii. Types of skin grafts and their use in surgery
- iii. Types of flaps and their use in surgery
- iv. Use of plastic surgery to manage difficult and complex tissue loss

19. RADIOLOGY

- i. The basic principles of radiation protection and know the law in relation to the use of ionizing radiation
- ii. Principles of different imaging techniques and their advantages and disadvantages in different clinical scenarios (X-ray, ultrasound, CT-Scan, MRI, Fluoroscopy)
- iii. Role of imaging in directing treatment in various surgical scenarios
- iv. How to request imaging and interpreting images
- v. Hazards of imaging and ionizing radiation
- vi. Wasteful use of radiology
- vii. Typical effective doses from diagnostic medical exposure

20. PAEDIATRIC SURGERY

- i. History, examination, and resuscitation of pediatric patients
- ii. Pediatric trauma
- iii. Common pediatric surgical conditions (inguinal hernias, hydrocele, undescended testes, testicular torsion, hypospadias, midline hernias, infantile hypertrophic pyloric stenosis, intussusception, acute abdominal pain in children, acute appendicitis, acute non-specific abdominal pain, necrotizing enterocolitis)
- iv. Congenital malformations (esophageal atresia, congenital diaphragmatic hernia, intestinal atresia, gastroschisis, exomphalos, biliary atresia, Hirschsprung's disease, anorectal malformations,)

21. PRINCIPLES OF ONCOLOGY

- i. Causes of cancer formation
- ii. Screening of cancers for early detection
- iii. Diagnosis and classification of cancers
- iv. Investigations and staging of cancers
- v. Principles of nonsurgical treatment of cancer
- vi. Principles of surgical treatment of cancer
- vii. Principles of chemotherapy
- viii. Principles of radiotherapy
- ix. Follow-up for cancer patients
- x. Palliative care

1. SOCIAL AND PREVENTIVE PAEDIATRICS

- i. EPI program
- ii. Advantage of breast feeding
- iii. Child rights / abuse / neglect
- iv. IMCI / IMNCI (Integrated Management of Childhood Illnesses/ Integrated Management of Newborn and Childhood Illnesses) programs
- v. Vaccinations (other than EPI)
 - Varicella, influenza, hepatitis A
 - Meningococcal vaccine
 - Rabies
- vi. Health indicators (definitions and national statistics)
 - U5MR, IMR, neonatal mortality rate
 - Maternal mortality rate
 - Perinatal mortality rate
 - Low birth weight (intra uterine growth retardation), large for gestational age, small for gestational age, appropriate for gestational age

2. GROWTH AND DEVELOPMENT / NUTRITION

- i. Nutritional requirements
- ii. Under and over nutrition (obesity and overweight)
- iii. Malnutrition classifications
- iv. Vitamins and micronutrients deficiencies (effects, management)
- v. Normal development
- vi. Puberty and tanner's staging
- vii. Growth charts (plotting)
- viii. Factors affecting growth

3. BEHAVIOR AND PSYCHIATRIC DISORDERS

- i. Pica
- ii. Nocturnal enuresis, encopresis (clinical presentation, classification, management)
- iii. Attention-deficit/hyperactivity disorder, Autism spectrum disorder (clinical presentation, classification, management)
- iv. Tics, anorexia nervosa and bulimia nervosa

4. FLUIDS AND ELECTROLYTES

- i. Maintenance fluids / electrolytes therapy (normal requirements)
- ii. Dehydration and replacements of electrolytes (clinical types and management)
- iii. Acid-base balance and disorders

5. PAEDS SURGERY / CONGENITAL MALFORMATIO

- i. Developmental dysplasia of the hip, telepes, kyphosis, scoliosis
- ii. Biliary atresia, duodenal atresia
- iii. Tracheoesophageal fistula
- iv. Hirschsprung's disease
- v. Neural tube defects
- vi. Posterior urethral valve
- vii. Hernias
- viii. Intussusception
- ix. Cleft lip and palate

6. POISONING AND TOXICOLOGY

- i. General rules of management
- ii. Common poisoning (kerosine oil, organophosphate) (clinical presentation, management)
- iii. Poisoning with common drugs (clinical presentation, management)

7. BURN / DROWNING AND FOREIGN BODIES IN CHILDREN

8. METABOLIC DISEASE

- i. Glycogen storage diseases (types, presentation)
- ii. Galactosemia, PKU
- iii. Mucopolysaccharidoses (clinical presentation, management)

9. RHEUMATIC DISEASE / NEUROMUSCULAR DISORDERS

- i. Juvenile idiopathic arthritis
- ii. SLE / Neonatal lupus
- iii. Kawasaki Disease
- iv. Henoch-Schönlein Purpura
- v. Duchenne muscular dystrophy
- vi. Myasthenia Gravis
- vii. Floppy infant
- viii. Acute Flaccid Paralysis, GBS

10. HUMAN GENETICS

- i. Genetic counselling (general rules of genetic counselling)
- ii. Pre-natal diagnosis (methodologies)
- iii. Chromosomal disorders (trisomies, turner syndrome)
- iv. Single gene defects
- v. Polygenic (multi factorial inheritance)

11. DERMATOLOGY

- i. Atopic dermatitis
- ii. Bacterial, viral and fungal, protozoal infections of skin
- iii. Steven Jonson syndrome (presentation, management)
- iv. Scabies, ectodermal dysplasia
- v. Urticaria

12. IMMUNOLOGIC DISORDERS

- i. Evaluation of suspected immunodeficiency
- ii. Acquired immune deficiency including AIDS
- iii. Cellular, humoral and complement related immunodeficiencies
- iv. Neutrophil related defects

13. HEMATOLOGIC DISORDERS

- i. Anemias (deficiency, aplastic, hemolytic)
- ii. Hemophilias, disorders of platelets
- iii. ITP
- iv. Blood and blood products transfusions
- v. Bone marrow transplantation

14. ENDOCRINE DISORDERS

- i. Short stature
- ii. Precocious and delayed puberty
- iii. Hypothyroidisms
- iv. Hypoparathyroidisms, Addison's disease
- v. Congenital adrenal hyperplasia, Cushing syndrome, diabetes mellitus, diabetes insipidus

15. NEONATOLOGY

- i. Birth asphyxia, prematurity, neonatal jaundice, IDM (infant of diabetic mother)
- ii. Causes of respiratory distress / respiratory distress syndrome
- iii. Causes of seizures in newborn
- iv. NEC (necrotizing enterocolitis)
- v. Neonatal sepsis
- vi. TORCH infections
- vii. Hemorrhagic disease of newborn

16. INFECTIOUS DISEASES

- i. Diarrhea: etiology and management of acute and chronic diarrhea
- ii. Typhoid fever, poliomyelitis
- iii. Diphtheria, tetanus, measles, mumps
- iv. Varicella (chickenpox), tuberculosis
- v. Dengue fever
- vi. Rabies

17. RESPIRATORY DISORDERS

- i. Acute respiratory infections (ARI)
- ii. Tonsils and adenoids, epiglottitis, croup
- iii. Laryngomalacia, otitis media
- iv. Bronchiolitis, bronchopneumonia
- v. Lobar pneumonia, cystic fibrosis
- vi. Asthma, foreign body

18. GASTROINTESTINAL AND LIVER DISORDERS

- i. Vomiting, GERD,
- ii. Constipation, diarrhoea, dysentery
- iii. Approach to abdomen pain
- iv. Celiac disease, IBD, acute hepatitis
- v. Hepatic failure, Portal hypertension, liver abscess

19. CARDIOVASCULAR DISEASE

- i. Fetal and neonatal circulation
- ii. Congenital heart disease
- iii. Acquired heart diseases (rheumatic heart disease, myocarditis)
- iv. Cardiomyopathy, CCF

20. NEUROLOGICAL DISORDERS

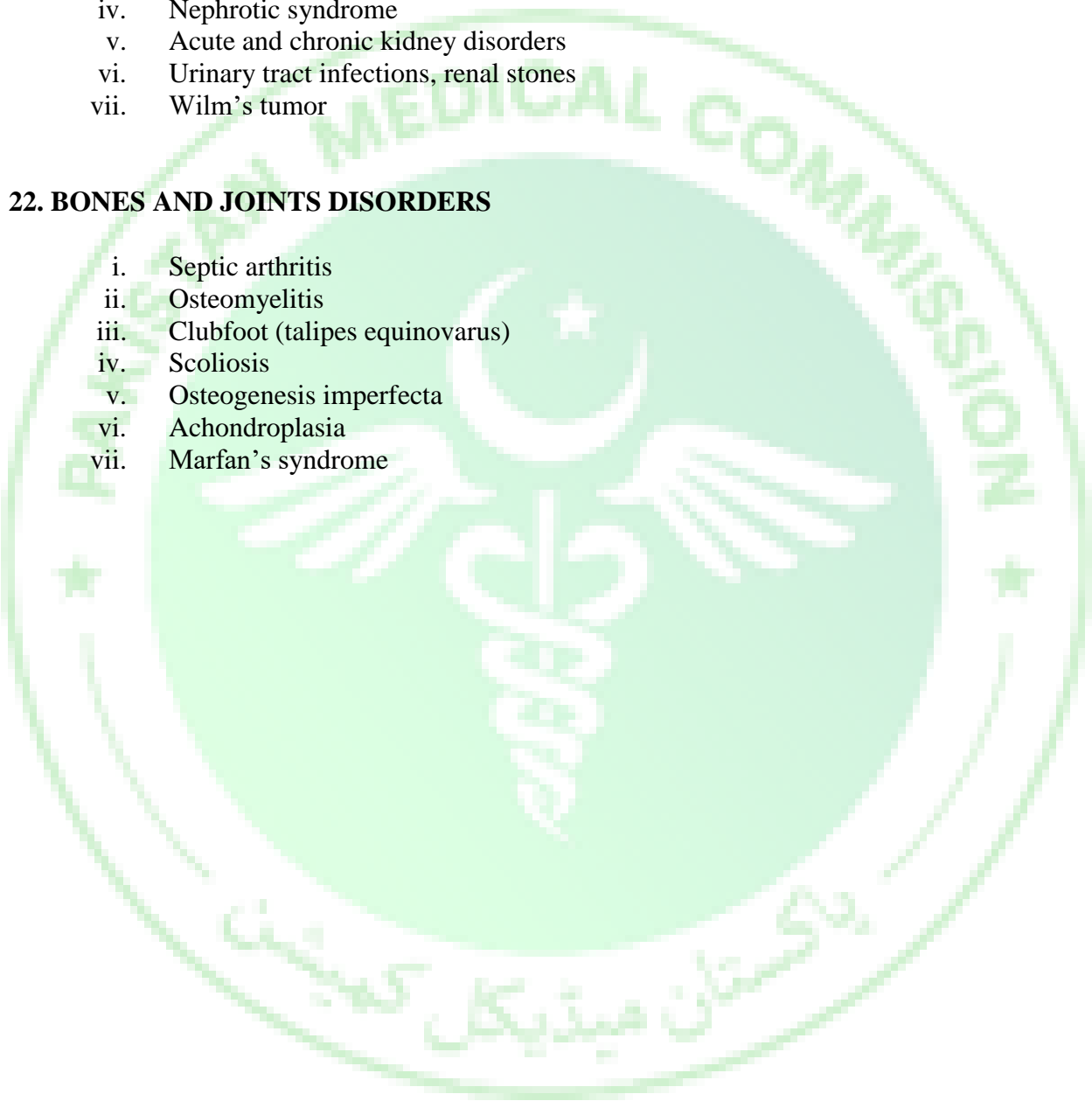
- i. Meningitis (pyogenic, tuberculous)
- ii. Encephalitis, febrile convulsions
- iii. Epilepsy, headaches / space occupying lesions
- iv. Increased intracranial pressure, hydrocephalus
- v. Cerebral palsy, microcephaly
- vi. Leukemia, lymphomas
- vii. Brain tumors, langerhans histiocytosis

21. NEPHROLOGY

- i. Laboratory evaluation and imaging of urinary tract
- ii. Congenital anomalies of kidneys and urinary tract
- iii. Acute post streptococcal glomerulonephritis
- iv. Nephrotic syndrome
- v. Acute and chronic kidney disorders
- vi. Urinary tract infections, renal stones
- vii. Wilm's tumor

22. BONES AND JOINTS DISORDERS

- i. Septic arthritis
- ii. Osteomyelitis
- iii. Clubfoot (talipes equinovarus)
- iv. Scoliosis
- v. Osteogenesis imperfecta
- vi. Achondroplasia
- vii. Marfan's syndrome



1. Contraception

- i. Principles of contraception counseling
- ii. Reversible methods of contraception
- iii. Complications associated with reversible methods
- iv. Emergency contraception
- v. Permanent methods of sterilization in male and female

2. Fertility Problems (both male and female)

- i. Causes of male and female infertility
- ii. Investigations of male and female infertility
- iii. Principles of management of an infertile couple

3. Puberty

- i. Normal pubertal development
- ii. Delayed puberty and associated endocrine problems
- iii. Precocious puberty and associated endocrine problems

4. Normal Pregnancy

- i. Physiological changes in pregnancy
- ii. Antenatal care
- iii. Pre pregnancy counseling

5. Labor

- i. Mechanism of labor
- ii. Diameters of fetal skull and female pelvis
- iii. Stages of labor and their management
- iv. Analgesia during labor

6. Abnormal Labor

- i. Abnormalities of 1st stage of labor (prolonged Labor)
- ii. Abnormalities of 2nd stage of labor (instrumental delivery)
- iii. Abnormalities in 3rd stage of labor (placental retention, inversion of uterus)
- iv. Malposition and malpresentation

7. Problems in Pregnancy

- i. Diagnosis, etiology and principles of management in pregnancy including fetal and maternal complications arising in:
 - Diabetes mellitus
 - Hypertension
 - Thyroid disease
 - Heart disease
 - Liver Disease
 - Renal disease
 - Autoimmune diseases
 - Infections

8. Bleeding in Early Pregnancy

- i. Miscarriage – etiology, diagnosis and management
- ii. Ectopic pregnancy – etiology, diagnosis and management
- iii. Molar pregnancy – etiology, diagnosis and management

9. Puerperium

- i. Etiology and management of puerperal pyrexia,
- ii. Deep vein thrombosis
- iii. Problems in lactation

10. Etiology of Bleeding in Pregnancy and Management of Shock (complications of pregnancy)

- i. Diagnosis and management of antepartum and postpartum hemorrhage

11. Essential anatomy of genital tract

12. Endocrine basis of menstrual cycle

13. Abnormal uterine bleeding – causes, diagnosis and management

14. Etiology, pathophysiology, complications and management of endometriosis

15. Etiology, pathophysiology, complications and management of fibroids

16. Etiology, pathophysiology and management of pelvic inflammatory disease

17. Etiology of premalignant diseases of the uterus

18. Principles of diagnosis and management of carcinoma of uterus

19. Benign disease of cervix

20. Principles of cervical cytology and colposcopy

21. Etiology, diagnosis and management of benign ovarian cysts

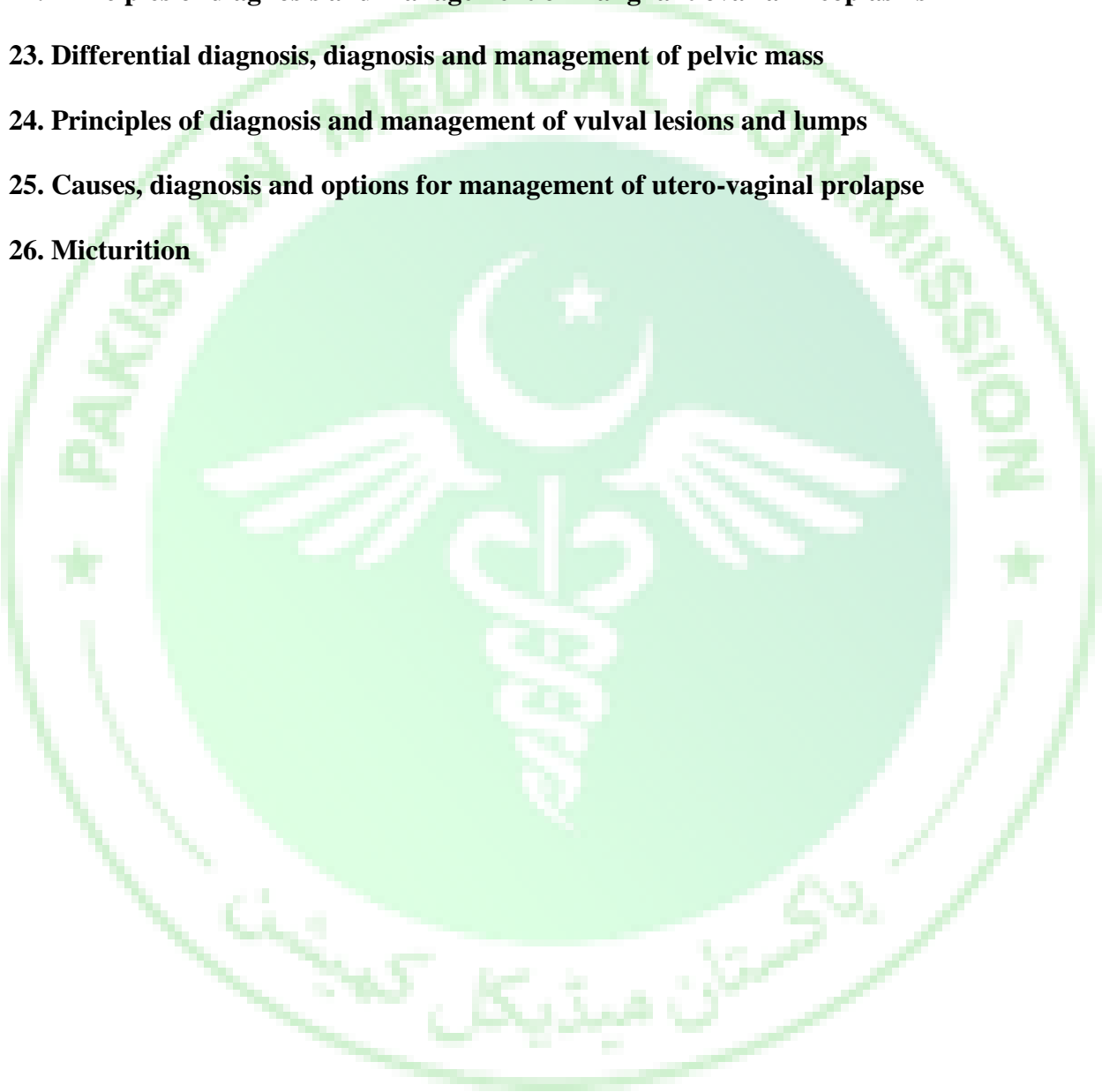
22. Principles of diagnosis and management of malignant ovarian neoplasms

23. Differential diagnosis, diagnosis and management of pelvic mass

24. Principles of diagnosis and management of vulval lesions and lumps

25. Causes, diagnosis and options for management of utero-vaginal prolapse

26. Micturition



OPHTHALMOLOGY (EYE)

1. ADNEXA & ORBIT

- i. Thyroid eye disease & orbital cellulitis

2. LACRIMAL APPARATUS

- i. Epiphora and lacrimation, Acute and chronic dacryocystitis,

3. LIDS

- i. Entropion, ectropion blepharitis, stye, chalazion, ptosis.

4. CONJUNCTIVA

- i. Dry eyes, infective and allergic conjunctivitis, and pterygium.

5. CORNEA

- i. Keratitis, corneal ulcers

6. UVEAL TRACT

- i. Uveitis, and its differential diagnosis from other causes of the red-eye.

7. PUPIL

- i. Pupil reaction – Normal and abnormal

8. LENS

- i. Cataract and its management

9. GLAUCOMA

- i. Diagnosis, and general principles of management.

10. RETINA AND VITREOUS

- i. Diabetic retinopathy and its management

11. SQUINT

- i. Paralytic and non-paralytic squint

12. NEURO-OPHTHALMOLOGY

- i. Papilledema, optic atrophy, 3rd, 4th, 6th, and 7th cranial nerve palsies.

13. OCULAR TRAUMA

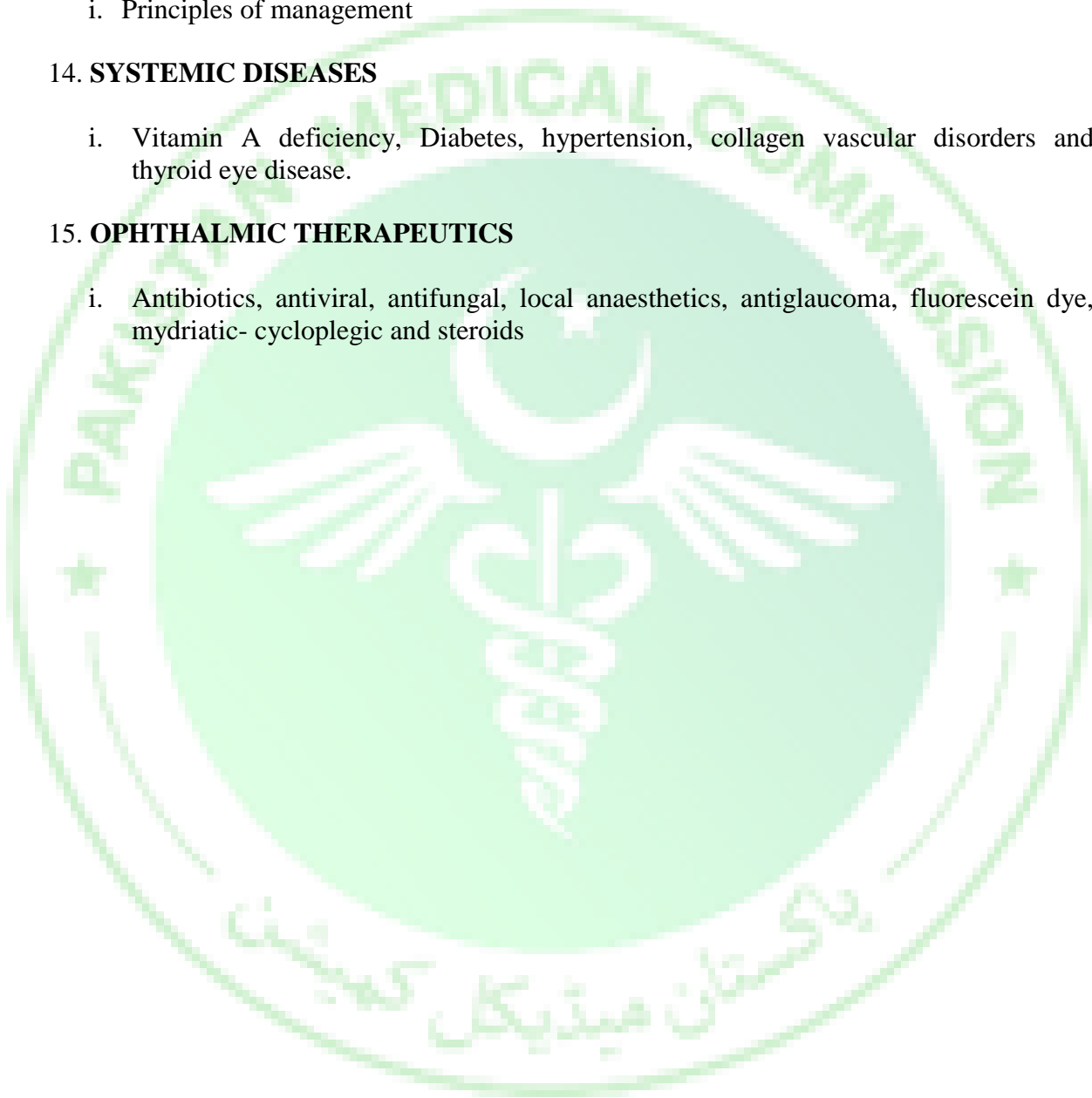
- i. Principles of management

14. SYSTEMIC DISEASES

- i. Vitamin A deficiency, Diabetes, hypertension, collagen vascular disorders and thyroid eye disease.

15. OPHTHALMIC THERAPEUTICS

- i. Antibiotics, antiviral, antifungal, local anaesthetics, antiglaucoma, fluorescein dye, mydriatic- cycloplegic and steroids



SURGICAL ANATOMY AND PHYSIOLOGY OF AUDITORY AND VESTIBULAR SYSTEM

DISORDERS OF EXTERNAL EAR

1. CONGENITAL DISORDERS

- i. Anotia.
- ii. Microtia.
- iii. Atresia of external auditory canal.
- iv. Pre-auricular sinus.

2. INFLAMMATORY CONDITIONS OF EXTERNAL EAR

Bacterial:

- i. Acute otitis externa.
- ii. Diffuse otitis externa.
- iii. Malignant otitis externa.

Fungal:

- i. Otomycosis.

Viral:

- i. Herpes zoster oticus.

3. TRAUMATIC CONDITIONS OF EXTERNAL EAR

- i. Frost bite
- ii. Haematoma auris.

4. IMPACTED WAX AND METHODS OF ITS REMOVAL

5. FOREIGN BODIES IN EAR AND THEIR MANAGEMENT

DISORDERS OF MIDDLE EAR

6. INFLAMMATORY DISORDERS:

- i. Acute otitis media.
- ii. Chronic otitis media.
- iii. Glue ear/ otitis media with effusion.

DISORDERS OF INNER EAR

7. CONGENITAL

- i. Pre-lingual sensorineural hearing loss, causes and management.

8. ACQUIRED VESTIBULAR DISORDERS:

Vertigo

- i. Benign paroxysmal positional vertigo.
- ii. Vestibular neuritis.
- iii. Meniere's disease.

9. HEARING LOSS

- i. Presbycusis.
- ii. Noise induced hearing loss.
- iii. Ototoxicity.

10. FACIAL NERVE:

- i. Surgical anatomy.
- ii. Causes of Facial paralysis.
- iii. Bell's palsy
- iv. Ramsay –Hunt syndrome
- v. Management of facial paralysis in acute and chronic otitis media.

11. NOSE AND PARA-NASAL SINUSES

- i. Surgical anatomy and physiology of nose and paranasal sinuses.

12. DISEASES OF EXTERNAL NOSE AND NASAL VESTIBULE

13. CONGENITAL DISORDERS

- i. Dermoid cyst.
- ii. Glioma.
- iii. Meningocele /meningoencephalocele.

14. RHINITIS

- i. Allergic rhinitis.
- ii. Vasomotor rhinitis.

15. EPISTAXIS:

- i. Causes and management.
- ii. Types of foreign bodies in nose and their management.
- iii. Rhinolith and its management.

16. INFLAMMATORY CONDITIONS

- i. Acute and chronic rhinosinusitis and their management.
- ii. Ethmoidal polypi and its management.
- iii. Antrochoanal polypi and its management.

17. DISORDER OF THE SEPTUM

- i. Deviated nasal septum.
- ii. Septal perforation
- iii. Septal hematoma/ abscess

18. GRANULOMATOUS DISORDERS

Bacterial:

- i. Tuberculosis
- ii. Leprosy

Fungal:

- i. Invasive aspergillosis
- ii. Mucormycotic

Autoimmune:

- i. Wegener's granulomatosis
- ii. Systemic lupus erythematosus
- iii. Sarcoidosis

19. SINO NASAL NEOPLASM

- i. Inverted papilloma
- ii. Transitional cell carcinoma

20. PHARYNX

- i. Surgical anatomy and physiology of nasopharynx, oropharynx, hypopharynx.

21. INFLAMMATORY CONDITIONS OF OROPHARYNX

- i. Acute and chronic pharyngitis.
- ii. Acute and chronic tonsillitis and its management.
- iii. Peritonsillar abscess.

22. NEOPLASMS

- i. Squamous cell carcinoma and its management.
- ii. Lymphoma and its management.

23. INFLAMMATORY CONDITIONS OF NASOPHARYNX

- i. Adenoid hyperplasia, its complications and management.

24. NEOPLASMS OF NASOPHARYNX

- i. Juvenile nasopharyngeal angiofibroma.
- ii. Nasopharyngeal carcinoma.

25. HYPOPHARYNX

- i. Plummer-vinson syndrome.
- ii. Hypopharyngeal carcinoma.

26. LARYNX

27. CONGENITAL CONDITIONS

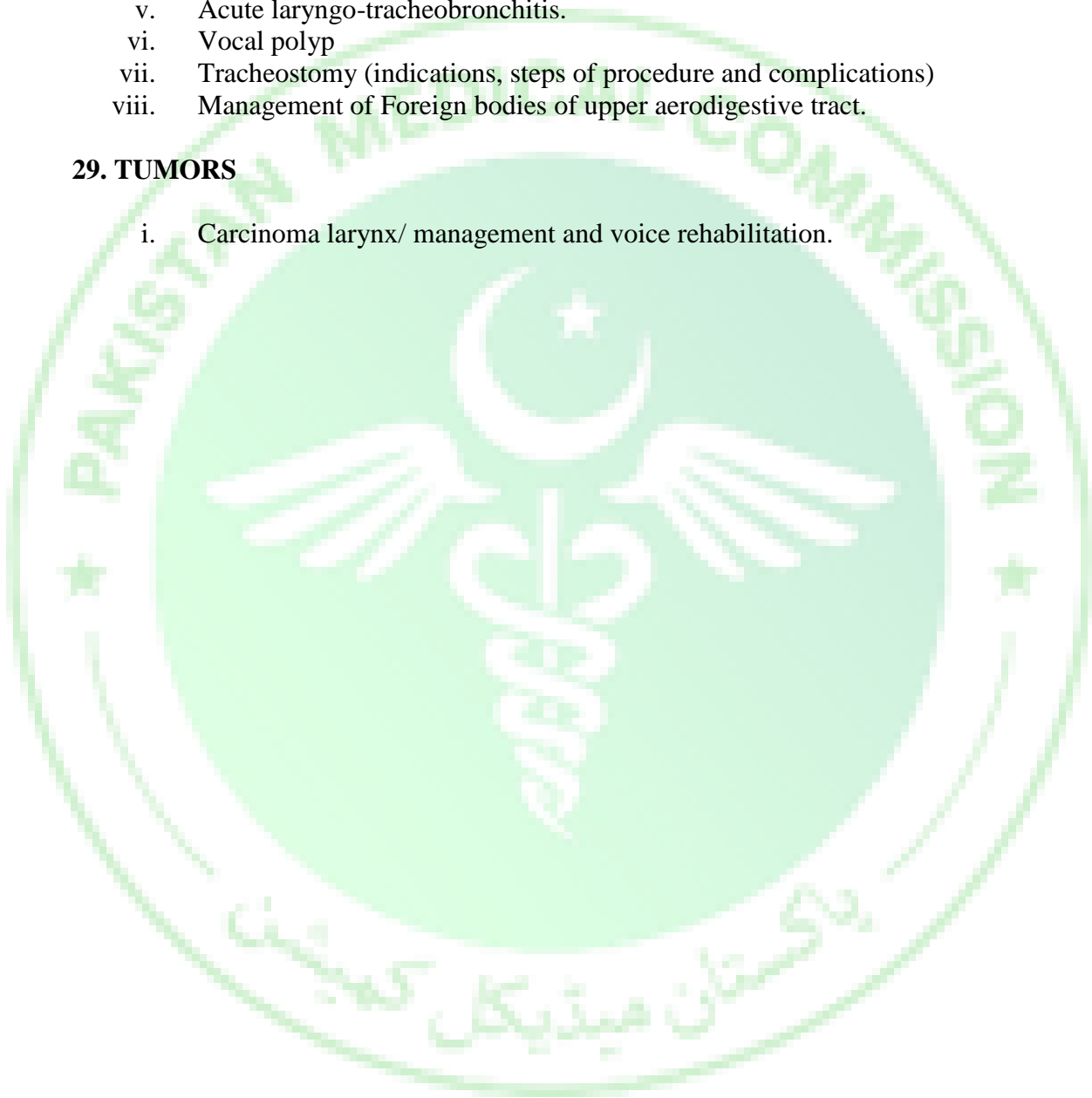
- i. Laryngomalacia
- ii. Juvenile recurrent laryngeal papillomatosis

28. ACUTE INFLAMMATION OF LARYNX

- i. Acute laryngitis
- ii. Chronic laryngitis
- iii. Vocal nodule
- iv. Acute epiglottitis
- v. Acute laryngo-tracheobronchitis.
- vi. Vocal polyp
- vii. Tracheostomy (indications, steps of procedure and complications)
- viii. Management of Foreign bodies of upper aerodigestive tract.

29. TUMORS

- i. Carcinoma larynx/ management and voice rehabilitation.



APPENDIX 3

SKILLS AND COMPETENCIES REQUIRED OF AN MBBS GRADUATE AND A HOUSE OFFICER BY THE END OF THE HOUSEJOB / INTERNSHIP / FOUNDATION YEAR

The Clinical Skills Examination (CSE) is designed to assess a candidate's competence at skills essential for a safe general physician.

Following are the competencies expected by graduating house officers and will be used to develop the Clinical Skills Examination (CSE) in conjunction with the theory syllabus above.

Clinical Skills list:

1. Obtaining an appropriate and relevant history and identifying the main findings
2. Performing systemic and mental state examination along with appropriate documentation
3. Establishing a differential diagnosis
4. Measurement of temperature, respiratory rate, pulse rate, blood pressure, oxygen saturations, NG output and urine output
5. Taking samples of venous blood to test for the growth of infectious organisms in proper culture bottles
6. Carrying out arterial blood gas and acid base sampling from the radial artery in adults
7. Perform essential lifesaving procedure (Basic Life Support, tracheostomy, endotracheal intubation and chest intubation)
8. Carrying out nasogastric tube placement
9. Measurement of central venous pressure (CVP)
10. Performing airway care including simple adjuncts (oro-pharyngeal airway or laryngeal masks, naso-tracheal airway)
11. Carrying out venepunctures
12. Measuring capillary blood glucose
13. Carrying out a urine multi-dipstick test
14. Carrying out a 3- and 12-lead electrocardiogram
15. Use the correct technique to apply sterile swabs to the nose, throat, skin and wounds
16. Requesting and interpreting the results of appropriate investigations to confirm clinical findings
17. Interpretation of X-rays of upper and lower limbs, chest, abdomen and pelvis
18. Setting up an infusion
19. Prescribing and administering oxygen
20. Preparing and administering injectable (intramuscular, subcutaneous, intravenous) drugs
21. Injecting or topically applying local anaesthetics
22. Carrying out intravenous cannulation
23. Carrying out safe and appropriate blood transfusion
24. Carrying out male and female urinary catheterization
25. Carrying out wound care and basic wound closure and dressing

26. Applying splint for fractures
27. Performing surgical scrubbing up
28. Performing digital rectal examination and Proctoscopy
29. Performing and interpreting peak flow using simple devices
30. Calculating BMI, carrying out nutritional assessment of patients and guiding them according to their caloric requirements
31. Performing basic ophthalmoscopy and identifying common abnormalities
32. Performing basic oto-scopy and identifying common abnormalities
33. Demonstrating that they are good communicators
34. Communicating with patients about the procedures
35. Demonstrating that they are sensitive (empathetic) and respond to the needs and expectations of patients irrespective of their caste, gender and economic status
36. Using the correct techniques for moving and handling patients, including those who are frail
37. Asking for patient's informed consent
38. Instructing patients in the use of devices for inhaled medication
39. Prescribing medicines safely and effectively and giving clear explanations to patients
40. Demonstrating an understanding of the safety procedures involved in prescribing controlled drugs
41. Demonstrating sound knowledge concerning confidentiality and anonymity
42. Introducing themselves to patients and colleagues with appropriate confidence and authority ensuring that patients and colleagues understand their role, remit and limitations
43. Demonstrating respect for patients' rights to refuse treatment or take part in teaching or research



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