Pakistan Medical Commission

National Licensing Examination 2021

for

Medical Graduates
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<td>95-96</td>
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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.
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
Weightage of Applied Basic Sciences disciplines in the theory (MCQs) component of NLE 2021 will be as follows:

<table>
<thead>
<tr>
<th>Basic Sciences weightage: 30%</th>
<th># of MCQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total MCQs: 60</td>
<td></td>
</tr>
<tr>
<td>Applied Pathology</td>
<td>16</td>
</tr>
<tr>
<td>Applied Anatomy</td>
<td>12</td>
</tr>
<tr>
<td>Applied Physiology</td>
<td>10</td>
</tr>
<tr>
<td>Clinical Pharmacology</td>
<td>8</td>
</tr>
<tr>
<td>Applied Biochemistry</td>
<td>6</td>
</tr>
<tr>
<td>Community Medicine</td>
<td>6</td>
</tr>
<tr>
<td>Forensic Medicine &amp; Toxicology</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>Clinical Sciences weightage: 70%</th>
<th># of MCQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total MCQs: 140</td>
<td></td>
</tr>
<tr>
<td>Medicine and allied</td>
<td>52</td>
</tr>
<tr>
<td>Surgery and allied</td>
<td>48</td>
</tr>
<tr>
<td>Obstetrics &amp; Gynaecology</td>
<td>14</td>
</tr>
<tr>
<td>Paediatrics</td>
<td>14</td>
</tr>
<tr>
<td>Ophthalmology (Eye)</td>
<td>6</td>
</tr>
<tr>
<td>Otorhinolaryngology (ENT)</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>140</strong></td>
</tr>
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</table>

Syllabus for Clinical Sciences:

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

<table>
<thead>
<tr>
<th>Discipline</th>
<th># of stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicine and allied</td>
<td>7</td>
</tr>
<tr>
<td>Surgery and allied</td>
<td>7</td>
</tr>
<tr>
<td>Obstetrics &amp; Gynaecology</td>
<td>2</td>
</tr>
<tr>
<td>Paediatrics</td>
<td>2</td>
</tr>
<tr>
<td>Ophthalmology (Eye)</td>
<td>1</td>
</tr>
<tr>
<td>Otorhinolaryngology (ENT)</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total stations</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>
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, omphalocele)
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  
xii. 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  
v. Pontine hemorrhage  
viii. Midbrain trauma  
vii. 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, hematocoele, 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. **Porphyrrins 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.

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:
      o Reservoir and source of infection, escape of organism, mode of
      o Transmission, entry into the body, susceptible host, immunity
      o Control of infection:
      o Controlling the reservoir-notification, early diagnosis treatment,
      o Isolation, quarantine, disinfections.
      o Interruption of transmission.
      o The susceptible host (active and passive immunization, chemoprophylaxis)
   iii. Health advice to travelers.

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.

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)
vi. 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:
   o Infanticide
   o Non accidental injuries and death of new born/ infants/ child
   o 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.

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.


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:

   o Gram positive cocci:
     ▪ Enterococci
     ▪ Gonococci
     ▪ Gram negative cocci
     ▪ Meningococci
     ▪ Staphylococci
     ▪ Streptococci

   o Gram positive rods:
     ▪ Bacillus
     ▪ Clostridia
     ▪ Diphtheria
     ▪ Listeria

   o Spirochetes:
     ▪ Borrelia
     ▪ Leptospira
     ▪ Treponema pallidum

   o Mycobacteria:
     ▪ MTB, M. Leprae, Atypical Mycobacteria

   o Gram negative rods:
     ▪ Bacteroides
     ▪ Bordetella
     ▪ E. coli
     ▪ H. influenza
     ▪ Klebsiella
     ▪ Legionella
     ▪ Proteus
     ▪ Pseudomonas
     ▪ Salmonella
     ▪ Shigella

   o Chlamydia, rickettsia
   o Mycoplasma
   o Actinimycetes
PARASITOLOGY

i. Characteristics, identifying features and clinical conditions caused by:
   - Ascaris
   - D. Latum
   - Dracunculus
   - Echinococcus
   - Entamoeba
   - Entrobius
   - 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, coccidioiodes, blastomyces, candida, aspergillus, mucor, rhizopus, cryptocoecus
1. **BLOOD VESSELS AND HEART**

i. Differentiation between atherosclerosis, monkeberg’s medial calcific sclerosis and arteriolosclerosis.

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.


v. Aetiology, pathogenesis, clinical types, diagnosis of thalassemia with emphasis on incidence, common mutations, associated psychosocial problems and prevention.

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.


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.
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.
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.
i. 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
   
   o Route of drug administration.
   
   o Absorption of drugs and bioavailability
   
   o Drug reservoirs, distribution and redistribution of drugs, plasma
   
   o protein binding and volume of distribution.
   
   o Bio-transformation of drugs.
   
   o Excretion of drug, enterohepatic recirculation, plasma half-life,
   
   o clearance
   
iv. Pharmacodynamics
   
   o Mechanism of drug action.
   
   o Receptors and post receptor molecular mechanism of drug
   
   o action
   
   o Mechanism of drug action other than mediated through drug
   
   o receptors.
   
   o Factors modifying action and doses of drugs.
   
   o Pharmacogenetics.
   
   o Adverse drug reactions & drug toxicity/poisoning
   
   o 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:
   
   o Eicosanoids
   
   o Serotonin
   
   o Substance P
   
   o Bradykinin
4. Drugs Acting on Gastrointestinal Tract
   i. Emetics and anti-ematics.
   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
      o Parasympathomimetics
      o Parasympatholytics
      o Autonomic ganglionic stimulants and blockers
      o Skeletal muscle relaxants
   ii. Sympathetic nervous system
      o Sympathomimetics
      o Sympatholytics
      o 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:
      o Anti-tussives, expectorants and mucolytics.
      o 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.
   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:
       o Opioids and non-steroidal anti-inflammatory drugs (NSAIDs)
       o 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, polycytemia
   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:
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 electoretinogram
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
1. INFECTIOUS DISEASES

i. Approach to the patient with a suspected infection
   o Pyrexia of unknown origin
     ▪ Definition
     ▪ Investigations
     ▪ Treatment
   o Sepsis and septic shock
     ▪ Causes
     ▪ Pathophysiology
     ▪ Clinical presentation
     ▪ Treatment
       - Supportive
       - Empirical
       - Definitive

ii. Viral Infections (clinical features, diagnosis, treatment, immunization)
   o Exanthematous diseases
     ▪ Measles
     ▪ Chicken pox
     ▪ Rubella
   o Without exanthema
     ▪ Mumps
     ▪ Infectious mononucleosis
     ▪ Influenza
     ▪ COVID 19
     ▪ Dengue
   o HIV

iii. Bacterial Infections
   o Gram positive infections
     ▪ Pharyngitis
     ▪ Skin infections
     ▪ Toxic shock syndrome
     ▪ Pneumonia
     ▪ Meningitis
   o 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
   o Gastro-esophageal reflux disease / non-ulcer dyspepsia (NUD)
     ▪ Symptomatology
     ▪ Diagnosis
     ▪ Role of endoscopy
     ▪ Treatment
   o Esophagitis and Barret’s esophagus
   o Vomiting
     ▪ Causes
     ▪ Investigations
     ▪ Treatment
   o Hematemesis
     ▪ Differential diagnosis
     ▪ Investigations
     ▪ Management
       - Hemodynamic assessment
       - Resuscitation
       - Medical treatment
       - Therapeutic interventions
   o Carcinoma esophagus
   o Achalasia

ii. Diseases of stomach and duodenum
   o Types of gastritis, diagnosis, treatment
   o Peptic ulcer disease
     ▪ Etiology
     ▪ Pylori, NSAID’s
     ▪ Clinical features, complications
     ▪ Treatment
   o Carcinoma stomach

iii. Diseases of small intestine
   o Acute diarrhea’s
     ▪ Infective
     ▪ Osmotic
     ▪ Irritable bowel syndrome
   o 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 erythematosis, 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
   o Nephrotic (minimal Change, membranous)
   o Nephritic Syndrome (Acute GlomeruloNephritis, Rapidly Progressive
     Glomerulonephritis, IgA, ANCA related GN, Goodpasture syndrome)
   o 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
   o Causes
   o Clinical features
   o 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)
   o Acidosis
     ▪ Metabolic
     ▪ Respiratory
   o Alkalosis
     ▪ Metabolic
     ▪ Respiratory
8. CVS

i. Coronary artery disease
   o Stable angina
   o Unstable angina
   o 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
   o Causes
   o Acute pulmonary edema
   o Clinical features
   o Investigations
   o Treatment

iii. Valvular heart disease
   o Mitral Stenosis, mitral regurgitation
   o Atrial stenosis, atrial regurgitation
     ▪ Clinical features
     ▪ Investigations
     ▪ Treatment

iv. Congenital heart disease
   o Cyanotic
   o Non cyanotic

v. Arrhythmias
   o Paroxysmal supraventricular tachycardia
   o Atrial flutter and fibrillation
   o Heart blocks
   o V-tach and V-fibrillation
   o Cardiac arrest
     ▪ Basic life support, acute cardiac life support
   o Classification of antiarrhythmic drugs

vi. Infective endocarditis
vii. Cardiomyopathies
   o Dilated cardiomyopathy
   o Hypertrophic obstructive cardiomyopathy
   o Restrictive

viii. Diseases of Pericardium

ix. Hypertension
   o Classification
   o Definition
   o Clinical features
   o Classification and treatment with antihypertensive drugs

x. Peripheral vascular disease

9. PULMONOLOGY

i. Asthma
   o Clinical features
   o Complications
   o Grading
   o Emergency treatment
   o Long term management

ii. Chronic Obstructive Pulmonary Disease
   o Chronic bronchitis
   o Emphysema
     ▪ Differences
     ▪ Clinical features
     ▪ Investigations
     ▪ Treatment

iii. Pneumonia
   o Community acquired
     ▪ Etiology
     ▪ Clinical features
     ▪ Treatment
   o Hospital acquired

iv. Tuberculosis (TB)
   o Types
   o Causative agents
   o Clinical features
   o Investigations
   o Primary vs post primary
o Cultures
  o Treatment
    ▪ Non complicating cases
    ▪ Multi-drug resistant TB

v. Diffuse parenchymal lung disease
  o Interstitial pneumonias
  o Extrinsic allergic alveolitis
  o 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
    o Anterior and posterior pituitary hormones
    o Diabetes insipidus
    o Dwarfism
    o Gigantism, acromegaly
    o Sheehan syndrome

  ii. Diseases of Thyroid
    o Grave’s disease
      ▪ Lab Diagnosis, scans
      ▪ Treatment
        - Medical
        - Radioactive iodine
        - Treatment during pregnancy
    o Myxedema

  iii. Diseases of Adrenal
iv. Diseases of parathyroid

v. Diseases of reproduction and sex

vi. Diabetes mellitus
   o Types (1, 2 and Gestational Diabetes Mellitus)
   o 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
   o Treatment of diabetes
     - Oral drugs
       - Classification of various groups
       - Mechanisms, side effects and doses
     - Insulins
       - Human insulins
       - Analogs
   o Coma’s
     - Diabetic KetoAcidosis
       - Clinical features
       - Interpreting ABG’s
       - Treatment steps
         - Hyperglycaemic hyperosmolar non-ketotic coma (HONK)
         - Lactic acidosis
         - Hypoglycemia

vii. Disorders of Lipids
   o Hyperlipidemias

12. CNS

i. Unconsciousness and coma
   o 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
o Vertebral disorders
  ▪ Fracture
  ▪ Collapse / stress
o Disc disorder

ix. Neurodegenerative diseases
  o Alzheimer
  o Motor neuron diseases

x. Neuropathies
  o Autoimmune
  o Hereditary
    ▪ Hereditary motor sensory neuropathy I to IV
    ▪ Fredrick ataxia
  o Guillain-Barre Syndrome (GBS)
  o Systemic disease
  o Toxic

xi. Myopathies

xii. Myasthenia gravis

13. SKIN

  Diagnosis and management of:

  i. Itching and Pruritus:
     o Scabies, Pediculosis
     o Eczemas: Atopic, Seborrheic, Contact dermatitis
     o Urticaria

  ii. Acne Vulgaris

  iii. Psoriasis

  iv. Lichen Planus

  v. Erythema Multiforme, Steven Johnsons syndrome, toxic epidermal necrolysis

  vi. Infections:
     o Acute Bacterial: staphylococcal, streptococcal
     o Chronic Bacterial: tuberculosis, leprosy
     o Viral: Warts, M.Cs, herpes simplex, herpes zoster
     o Fungal: tinea, pityriasis versicolor
     o Protozoal: leishmaniasis
vii. Bullous Disorders:
   o Immune mediated: pemphigus, pemphigoid, dermatitis herpetiformis
   o Genetic: epidermolysis bullosa

viii. Pigmentary disorders
   o Vitiligo
   o Melasma

ix. Hair disorders
   o Alopecia Areata
   o Androgenic Alopecia

tax. Cutaneous tumors
   o Basal cell carcinoma
   o Squamous cell carcinoma
   o 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, arrythmias, 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)
xii. 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)
pii. Complications of regional anesthesia and their management
iii. 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. Paroesophageal 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. Hydrocele
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)
      o Varicella, influenza, hepatitis A
      o Meningococcal vaccine
      o Rabies
   vi. Health indicators (definitions and national statistics)
      o U5MR, IMR, neonatal mortality rate
      o Maternal mortality rate
      o Perinatal mortality rate
      o 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 stagging
   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 MALFORMATION

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 

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

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, 3\textsuperscript{rd}, 4\textsuperscript{th}, 6\textsuperscript{th} and 7\textsuperscript{th} 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
OTORHINOLARYNGOLOGY (ENT)

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. Presbyacusis.
   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 erythematosis
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 devises
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-scoppy 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