

पाटन स्वास्थ्य विज्ञान प्रतिष्ठान, सेवाआयोग
प्राज्ञिक सेवा, इन्टर्नल मेडिसिन समूह, **Interventional Cardiology** उपसमूह, सहायकप्राध्यापक पद, (नौ ख)
(९ख) तहको खुला र आन्तरिक प्रतियोगितात्मक परीक्षाको पाठ्यक्रम
Paper II: Technical Subject

Section (A) Internal Medicine - 45 Marks

1. Anatomy

1.1 Neuro-Anatomy

- 1.1.1 Neuron and its structure
- 1.1.2 Supportive cell type structure, cellular and myelin sheaths
- 1.1.3 Synapsis, neuro-effective junctions and receptors
- 1.1.4 Cerebrum: morphology, cerebral cortex, cortical neurons, cortical layers
- 1.1.5 Motorsystem: structure, corticospinal, rubrospinal, vestibulospinal and reticulospinal tracts
- 1.1.6 Basalganglia: structure
- 1.1.7 Cerebellum: morphology, cellular structure and organization
- 1.1.8 Brainstem: general organization
- 1.1.9 Spinal cord and ganglia: morphology, motor and sensory organization in the spinal cord

1.2 Anatomy of neuro-muscular system

- 1.2.1 LMN, structuring of voluntary muscles, motor units, types of muscle fibres
- 1.2.2 Muscle spindles and other muscles & tendon receptors
- 1.2.3 Sensory system
- 1.2.4 Reflex pathways: involving cranial nerves, and limb and trunk
- 1.2.5 Cranial nerves and special senses: pathways and structure of special sense organs
- 1.2.6 Anatomy of ventricular system and CSF production
- 1.2.7 Anatomy of meninges
- 1.2.8 Autonomic nervous system
- 1.2.9 Arterial and venous cerebral circulation
- 1.2.10 Blood brain barrier

1.3 Pulmonology

- 1.3.1 Gross anatomy of upper and lower respiratory tracts, lungs with lobes and fissures with surface marking
- 1.3.2 Concept of bronchopulmonary segments and lobule or acinus aerated by a terminal bronchiole

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- 1.3.3 Histology of alveolar lining cells
- 1.3.4 Pulmonary vascular bed
- 1.3.5 Pleura and pleural space, functions and histology
- 1.3.6 Media stinum and their structures
- 1.3.7 Thoracic cage and primary and secondary muscles of respiration
- 1.3.8 Thediaphragm its attachments, nerve supply and function
- 1.3.9 Lymphatic drainage of lungs and pleura
- 1.3.10 Innervation of the lungs
- 1.3.11 Thoracic receptors

1.4 **Gastrointestinal tract**

- 1.4.1 Gross anatomy of the gastrointestinal tract at different levels
- 1.4.2 Gross anatomy of the hepatobiliary system and pancreas
- 1.4.3 Histological aspects of GI tract at different levels
- 1.4.4 Blood supply and development aspects of GI tract and hepatobiliary system

1.5 **Kidney and urinary tract**

- 1.5.1 Gross anatomy of the kidney and urinary tract
- 1.5.2 Structure of nephron and function at different level
- 1.5.3 Development of kidney and urinary tract
- 1.5.4 Renal circulation

1.6 **Endocrinal organs**

- 1.6.1 Gross anatomy of different endocrinal organs and their development
- 1.6.2 Histology of different endocrinal organs

2. **Physiology**

- 2.1 Homeostatic behaviors of different fluid compartment in the body and implications during common clinical situations of burn, blood loss, diarrhea, vomiting, etc.
- 2.2 Role of pH in normal and in abnormal conditions e.g., diarrhea, vomiting, airway obstruction, medication, etc
- 2.3 Functions of micro/macro molecular, organelles and other structures of the cell
- 2.4 Nutritional requirements of normal people (different ages, male, female) and ill patients of all categories with their modality of

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supplement

- 2.5 Mechanisms of metabolic response to trauma and infection
- 2.6 Function of hemopoietic /R.E.system
- 2.7 Blood groups, methods of transfusion of blood & blood products & their hazards
- 2.8 Mechanism of haemostasis, fibrinolysis & methods to control haemorrhage
- 2.9 Types of excitable tissues and methods of recording their activity e.g., EMG, EEG, ECG, etc
- 2.10 Cellular communication, chemical/neuronal/ electrical/synaptic transmission
- 2.11 Autonomic nervous system
- 2.12 Neuro transmitters, their synthesis and metabolism
- 2.13 Drugs affecting neurotransmitter activity
- 2.14 Cardiac and smooth muscles
- 2.15 Calcium metabolism
- 2.16 Pain and the mechanism of pain
- 2.17 Physiology of consciousness and sleep mechanism
- 2.18 Effect of injury to neurons
- 2.19 Different methods of monitoring of the heart functions
- 2.20 Drugs used for inotropic & chronotropic effects
- 2.21 Mechanism of blood pressure regulation
- 2.22 Physiology of circulation of different organ in the body
- 2.23 Pathophysiology of shock and principle of their management
- 2.24 Capillary exchange
- 2.25 Assess vascular functions
- 2.26 Respiration & cause of breathlessness
- 2.27 Measure blood flow
- 2.28 Measure/ assess blood gas
- 2.29 Mechanism of respiratory control
- 2.30 Mechanism of transport
- 2.31 Use of oxygen as therapy
- 2.32 Mechanism of absorption from gut and physiology of gastrointestinal motility
- 2.33 Composition of GI and hepatobiliary secretions and methods for their assessment
- 2.34 Normal functions of the liver

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- 2.35 Formation of urine
- 2.36 Mechanism of osmoregulation
- 2.37 Normal thermoregulation
- 2.38 Mechanism of hormone synthesis, secretion, metabolism

3. **Pathology**

- 3.1 Concept of cell injury, different types of degeneration & trauma
- 3.2 Principles of inflammation and the results of various types of inflammation
- 3.3 Acute and chronic inflammation
- 3.4 Tissue regeneration, wound healing and healing process
- 3.5 Various types of disorder of growth
- 3.6 Principles of neoplasia
- 3.7 Benign and malignant tumor
- 3.8 Mechanism of thrombosis, and embolism and their effects
- 3.9 Ischemia & infarction
- 3.10 Mechanism of blood clotting and different types of bleeding disorders
- 3.11 Principle of blood grouping system & complications of blood transfusion
- 3.12 Principle of shock
- 3.13 Principle of genetics and apply its concept in hereditary diseases
- 3.14 Principle of immune response
- 3.15 Humoral and cell mediated immunity
- 3.16 Principle of organ transplantation and causes of its rejection
- 3.17 Principle of Host Parasite relationship
- 3.18 Different types of micro-organism (Bacteria, Fungus, Parasite, and Virus)
- 3.19 Pathogenic and non-pathogenic micro-organisms
- 3.20 Principle of asepsis & antisepsis, sterilization and disinfection
- 3.21 Principle of antibiotic and chemotherapy
- 3.22 Microbes that cause wound infection
- 3.23 Principle of Hospital infection (Nosocomial infection)

4. **Clinical Pharmacology**

4.1 **General clinical pharmacology**

- 4.1.1 Pharmacokinetics, pharmacodynamics, adverse drug reactions, drug interactions, drug use in childhood, pregnancy, lactation, and old age

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4.1.2 Clinical trials

4.1.3 Rational drug use

4.2 **Neurosensory and musculoskeletal systems**

4.2.1 Parasympathomimetics and parasympatholytics, adrenergic and antiadrenergic drugs, narcotic and non-narcotic analgesics, non-steroidal anti-inflammatory drugs, alcohol, sedative/hypnotics, anti-parkinsonism drugs, anesthetics (general and local), appetite suppressants

4.2.2 Drugs for psychiatric disorder, gout and rheumatoid arthritis, vertigo, and eye, ENT, and skin diseases

4.3 **Gastrointestinal system**

4.3.1 Drugs for peptic ulcer, diarrhoea, constipation

4.3.2 Antispasmodics, antiemetics

4.4 **Respiratory system**

4.4.1 Drugs for bronchial asthma

4.4.2 Antihistamines and other antiallergic agents

4.4.3 Cough preparation, nasal decongestants, and respiratory stimulants

4.5 **Reproductive/Endocrine systems**

4.5.1 Anti-diabetics, thyroid and anti-thyroid drugs, corticosteroids, sex hormones and antagonists, hypothalamic and pituitary hormones

4.5.2 Drugs used in labor and puerperium

4.6 **Renal/Electrolyte system**

4.6.1 Drugs for edema, and fluid/electrolyte and acid/base disturbances

4.7 **Infections**

4.7.1 General principle of chemotherapy

4.7.2 Antibacterial, antiprotozoal, anthelmintic, antifungal, and antiviral drugs

4.8 **Miscellaneous drugs**

4.8.1 Drugs for malignant diseases and immunosuppression

4.8.2 Vaccines

4.8.3 Vitamins and minerals

4.8.4 Antidotes

5. **Recent Advances in Internal Medicine and Emergencies**

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- 5.1 Recent advances in all disciplines of Internal Medicine
- 5.2 Respiratory emergencies: Hemoptysis, Acute respiratory failure, Pneumothorax, Statusasthmaticus, ARDS
- 5.3 Gastrointestinal emergencies: G.I. bleeding, Acute gastroenteritis and food poisoning, Acute pancreatitis, Hepatic failure, Acute abdomen
- 5.4 Neurological emergencies: CVA including SAH, Hypertensive encephalopathy, Meningitis, Encephalitis, Unconscious patient, Status epilepticus, Myastheniagravis
- 5.5 Endocrine and metabolic emergencies: DKA and coma, Hypoglycemia, Hyperosmolar non ketotic diabetic coma, Thyroid crisis, Myxoedema coma, Pheochromocytoma, Acuteadrenocorticalcrisis, Hypopituitarism
- 5.6 Hematological emergencies: Aplastic anaemia, Agranulocytosis, Acutethromocythpenicpurpur, Leukemia, Hemophiliaandallieddisorders
- 5.7 Renal emergencies: Renalcolic, Renalfailure, Hematuria
- 5.8 Miscellaneous emergencies:
 - 5.8.1 Emergencies in fluid and electrolyte balance
 - 5.8.2 Acute emergencies in infectious and tropicaldisease
 - 5.8.3 Malaria
 - 5.8.4 Septicemia
 - 5.8.5 Tetanus
 - 5.8.6 Snakebite
 - 5.8.7 Dog bite & rabies
 - 5.8.8 Poisonings
 - 5.8.9 Drowning
 - 5.8.10 Electrocutation
 - 5.8.11 High altitude sickness

6. Principles and Practice of Internal Medicine

6.1 Gastroenterology

- 6.1.1 Acid peptic diseases
- 6.1.2 Gastrointestinal bleeding: upper (nonvariceal/variceal) and lower
- 6.1.3 Gastroesophageal reflux disease (GERD)
- 6.1.4 Dysphagia in relation to malignancy and achalasia
- 6.1.5 Malabsorption syndrome
- 6.1.6 IBD: ulcerative colitis and Crohn's disease
- 6.1.7 Diverticular diseases

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- 6.1.8 Irritable bowel syndrome
- 6.1.9 Acute abdomen
- 6.1.10 Ascites
- 6.1.11 Liver disorders
- 6.1.12 Hepatitis: acute and chronic
- 6.1.13 Cirrhosis with special reference
- 6.1.14 Hepatic cellular cancer
- 6.1.15 Jaundice: obstructive and non-obstructive
- 6.1.16 Liver failure: acute and chronic
- 6.1.17 Pancreas
- 6.1.18 Acute, recurrent & chronic pancreatitis
- 6.1.19 Pancreatic tumor (exocrine & endocrine)
- 6.1.20 Cystic fibrosis & other childhood disorder of the pancreas
- 6.1.21 Hereditary pancreatitis
- 6.1.22 Pancreatic transplantation

6.2 Respiratory Medicine

- 6.2.1 Anatomy and applied physiology of the respiratory system
- 6.2.2 Understanding of basic pathophysiology and be able to manage the disease processes mentioned below considering the relevant differential diagnosis:
 - 6.2.2.1 Pneumonias
 - 6.2.2.2 Lung abscess
 - 6.2.2.3 Tuberculosis
 - 6.2.2.4 Fungal infections
 - 6.2.2.5 Bronchial asthma
 - 6.2.2.6 Chronic bronchitis, emphysema and cor-pulmonale
 - 6.2.2.7 Cystic fibrosis
 - 6.2.2.8 Pulmonary eosinophilia
 - 6.2.2.9 Bronchiectasis (including its postural drainage management)
 - 6.2.2.10 Pulmonary oedema (cardiogenic and non-cardiogenic including ARDS)
 - 6.2.2.11 Interstitial lung disease (including fibrosingalveolitis, extrinsic alveolitis, lung fibrosis, sarcoidosis and pneumoconiosis)
 - 6.2.2.12 Carcinoma lung and other neoplasms
 - 6.2.2.13 Mediastinal masses

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6.2.2.14 Pleural diseases(e.g.,drypleurisy, pleural effusion,empyema)

6.2.2.15 Pneumothorax

6.2.2.16 Sleepapnoea syndrome

6.2.2.17 Acute and chronic respiratory failure

6.3 Hematology

6.3.1 Physiology and pathophysiology of bloodcell formation and haemostasis

6.3.2 Pathophysiology, causes and management of:

6.3.2.1 Anaemia: iron deficiency (with iron metabolism), megaloblastic, haemolyticanaemia and aplastic anaemia

6.3.2.2 Haemoglobinopathy and Polycythemia

6.3.2.3 Leukaemia: myeloid (acute and chronic) and lymphoid (acute and chronic)

6.3.2.4 Myeloproliferative diseases

6.3.2.5 PV(Polycythemia Vera)

6.3.2.6 Myelofibrosis

6.3.2.7 Essential thrombocytosis

6.3.2.8 Bleeding Disorders

6.3.2.9 Plateletes Disorders

6.3.2.10 Lymphomas: Hodgkin's and NonHodgkin's

6.3.3 Explain the underlying principles and complications of:

6.3.3.1 Blood Transfusion, Blood group and Rh factor, Principles of cross match, Hazards of transfusion, Blood–platelets component, Bone MarrowTransplantation

6.3.3.2 Infectious and Tropicaldiseases

6.3.4 Understanding of the following procedures:

6.3.4.1 Peripheral blood smear

6.3.4.2 Splenic aspiration

6.3.4.3 Z– N staining

6.3.4.4 Gram's staining

6.3.4.5 Bone marrow examination

6.3.4.6 Stool examination

6.3.4.7 Aldehyde test

6.3.4.8 Liver biopsy

6.3.5 Microbiological aspects of various infectious disease

6.3.6 Underlying pathogenesis of various infectious/tropical disorders

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6.3.7 Basic pharmacokinetics of drugs used for treatment of tropical and infectious diseases

6.3.8 Diagnose and manage following emergencies:

6.3.8.1 Septicemia, septic shock

6.3.8.2 Cerebral malaria/black water fever

6.3.8.3 Tetanus/gasgangrene

6.3.8.4 Acute viral encephalitis

6.3.8.5 Hepatic Encephalopathy

6.3.8.6 Enteric Encephalopathy

6.3.8.7 HIV&AIDS

6.4 Rheumatology

6.4.1 Common clinical presentations of rheumatic disease

6.4.2 Systemic perspective of rheumatic diseases in different systems

6.4.3 Genetics and rheumatic diseases

6.4.4 Inflammatory arthritides (RA, SpA, crystal arthritis and others)

6.4.5 Infection and joints (Septic arthritis and others)

6.4.6 Connective tissue diseases (SLE, systemic sclerosis and others)

6.4.7 Vasculitides

6.4.8 Diseases of bones and cartilages (osteoarthritis, osteoporosis and others)

6.4.9 Regional musculoskeletal pain syndromes

6.4.10 Miscellaneous conditions (autoinflammatory diseases, sarcoidosis & others)

6.4.11 Bone marrow aspiration

6.4.12 Bone marrow biopsy

6.4.13 Z-N staining

6.4.14 Muscle biopsy

6.4.15 Skin biopsy

6.4.16 Arthrocentesis

6.4.17 Intra-articular injections

6.4.18 Anatomical and physiological aspects of joints muscle and blood vessels in relation to rheumatologic conditions

6.4.19 Basis of cellular and humoral immune response, autoimmunity and gene therapy in rheumatological disorders

6.4.20 Interpret the results of various tests such as LE cell, ANF, anti-dsDNA, electrophoresis, complement system

6.4.21 Analysis of synovial fluid

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6.4.22 Interpret the X-ray findings of bones and joints

6.4.23 Interpretation of the results of:

6.4.23.1 Muscle biopsy

6.4.23.2 Skin biopsy

6.4.23.3 Kidney biopsy

6.4.24 To diagnose and manage rheumatologic emergencies

6.5 **Endocrinology and metabolic diseases**

6.5.1 Understanding of the following procedures:

6.5.1.1 Arterial puncture for blood gas analysis

6.5.1.2 Use of glucometer and stripes for blood sugar

6.5.1.3 Urine examination for sugar, Ketones, Specific gravity

6.5.2 Interpret the findings of the following procedures/tests:

6.5.2.1 Arterial blood gas analysis

6.5.2.2 Pulse oximetry

6.5.2.3 Thyroid function tests

6.5.2.4 Pituitary function tests

6.5.2.5 Parathyroid function tests

6.5.2.6 Adrenal gland function tests

6.5.2.7 G.T.T

6.5.2.8 Sex hormone analysis

6.5.2.9 Plain X-ray of various parts concerned

6.5.3 Interpret the finding of:

6.5.3.1 FNAC report of thyroid gland

6.5.3.2 CT scan reports of various endocrine organs

6.5.4 Diagnose and manage following emergencies:

6.5.4.1 D.K.A. and coma and hyperosmolar nonketotic coma

6.5.4.2 Hypoglycaemia

6.5.4.3 Thyroid crisis

6.5.4.4 Myxoedema coma

6.5.4.5 Pheochromocytoma

6.5.4.6 Hypopituitarism

6.5.4.7 Hypocalcaemia

6.5.4.8 Acute adrenocortical crisis

6.5.4.9 Hypopituitarism

6.5.5 Explain the structural and functional basis:

6.5.5.1 Various endocrine glands, homeostatic control mechanism of hormone regulation, and the genetic basis

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of various endocrine disorders

7. **Nephrology**

8.1 Diagnose, investigate and treatment of following renal emergencies:

8.1.1 Acute renal failure

8.1.2 Renal colic

8.1.3 Haematuria

8.1.4 Fluid, electrolyte and acid-basic imbalance

8.2 Diagnose, investigate and treatment of following common renal diseases:

8.2.1 Acute glomerulonephritis

8.2.2 Nephrotic syndrome

8.2.3 Urinary tract infection

8.2.4 Chronicrenal failure

8.2.5 Adult polycystic kidney disease, Alports syndrome

8.2.6 Diabetic Nephropathy

8.2.7 Renal tubular acidosis (RTA)

8.2.8 Interstitial Nephropathy

8.2.9 Toxic Nephropathy

8.2.10 Lupus Nephritis

8.2.11 Nephrocalcinosis and Nephrolithiasis

8.2.12 Renal arterystenosis (RAS)

8.3 Interpret investigations of:

8.3.1 Renal function test(RFT)

8.3.2 Blood gas analysis

8.3.3 Renal biopsy report

8.4 Basic principles of haemodialysis and peritoneal dialysis and their specific indications

8. **Neurology**

9.1 Perform following procedures independently:

9.1.1 Lumbar puncture

9.1.2 Intrathecal injection

9.1.3 Administration of IV contrastagent

9.2 Understanding of the following procedures

9.2.1 EEG, EMG, Nerve conduction studies

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9.3 Interpretation of the findings of:

9.3.1 CT scan / MRI scan of:

9.3.1.1 Subdural haematoma

9.3.1.2 Intracranial haemorrhage including
subarachnoid haemorrhage

9.3.1.3 Infarction

9.3.1.4 Obstructive hydrocephalus

9.3.2 Myelogram:

9.3.2.1 Complete obstruction

9.3.2.2 Intramedullary compression

9.3.2.3 Extramedullary compression

9.3.3 Interpretation of the results of:

9.3.3.1 Muscle biopsy

9.3.3.2 Nerve biopsy

9.3.3.3 EEG

9.3.3.4 EMG

9.3.3.5 Nerve conduction study

9.3.3.6 Carotid and vertebral angiogram

9.3.3.7 CT myelography

9.4 Diagnose and management the following neurological emergency:

9.4.1 CVA including subarachnoid haemorrhage

9.4.2 Meningitis

9.4.3 Encephalitis

9.4.4 Unconscious patient

9.4.5 Status epilepticus

9.4.6 Myastheniagravis

9.4.7 Increased Intracranial pressure

9.4.8 Guillain–Barre syndrome

9.4.9 Hypoxicencephalopathy

9. **Oncology**

9.1 Etiopathogenesis of cancer

9.2 Epidemiology of cancer

9.3 Cancer prevention & screening

9.4 Diagnosis & diagnostic tools in cancer

9.5 Principles of cancer management

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- 9.6 Common cancers: Oesophagus, stomach, colorectum, hepatocellular cancer, cancers of the biliary tree, pancreas, breast, lung, renal cell carcinoma, prostate, testicular, GIST, ovarian, endometrial, hematological & lymphoid malignancies, cancers of the endocrine system, HIV-associated cancers, tumors of the mediastinum etc
- 9.7 Oncological emergencies & paraneoplastic syndromes
- 9.8 Anticancer therapeutics

10. **Dermatology**

- 10.1 Scabies
- 10.2 Superficial mycoses
- 10.3 Superficial bacterial infections
- 10.4 Diagnosis and management of drug induced cutaneous eruptions

11. **Psychiatry**

- 11.1 Diagnose anxiety neurosis, depression and schizophrenia
- 11.2 Differentiate between functional and organic psychoses (simple and uncomplicated)
- 11.3 Treat cases of anxiety neurosis and depression
- 11.4 **Diagnose and manage substance abuse**

Section (B) Interventional Cardiology - 55 Marks

I. BASIC SCIENCE

a. **Anatomy and physiology:** Cardiac, vascular and coronary artery anatomy, including anatomical variants and frequent congenital abnormalities; basic circulatory physiology, myocardial blood flow regulation, myocardial physiology and metabolism.

b. **Vascular biology:** Processes of vasoreactivity, plaque formation, vascular injury and healing, restenosis, SVG atherosclerosis, cardiac allograft vasculopathy.

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c. **Progenitor cells:** Function of progenitor cells and their possible role in angiogenesis and myogenesis.

d. **Haematology:** Platelet function and aggregation, clotting cascade, and fibrinolysis.

e. **Coronary anatomy and physiology:**

- Classification of coronary segments and lesion characteristics;
- Assessment of lesion severity, intracoronary pressure and flow velocity measurement, fractional flow reserve (FFR);
- Assessment of collateral circulation.

II. PHARMACOLOGY

a. Biologic effects and appropriate use of vasoactive drugs, antiplatelet agents, thrombolytics, anticoagulants, antiarrhythmics, inotropic agents, and sedatives.

b. Biologic effects and appropriate use of angiographic contrast agents, including prevention of renal dysfunction and allergic reactions.

c. Atherosclerosis prevention in PCI candidates focusing on optimal care of hypertension, dyslipidemia, diabetes and smoking cessation.

III. IMAGING

a. Radiation physics, radiation risks and injury, and radiation safety, including glossary of radiological terms, methods to control radiation exposure for patients, physicians, and technicians.

b. Specific imaging techniques in interventional cardiology, such as quantitative angiography and intravascular ultrasonography.

c. Principles of cardiac computed tomography, potential role for noninvasive coronary imaging.

d. Digital archiving and tele-communication of angiographic images.

IV. INDICATIONS FOR TREATMENT AND PATIENT SELECTION

- a. Indications for elective cardiac catheterisation and related catheter-based interventions in management of ischaemic and valvular heart disease, in accordance with the recent guidelines and evidence based medicine.
- b. Indications for urgent catheterisation and management of acute myocardial infarction, including differentiation between patients who require primary or rescue angioplasty, coronary bypass surgery or conservative treatment.
- c. Indications for mechanical support devices in the management of haemodynamically compromised patients (intra-aortic balloon pump etc.)
- d. Present indications for surgical re-vascularisation in coronary artery disease

V. PROCEDURAL TECHNIQUES

- a. Vascular access including principles of femoral, radial, and brachial procedures, closure techniques, detection and treatment of complications.
- b. Appropriate catheter selection to achieve optimal opacification and support.
- c. Selection of optimal projections for lesion visualisation and treatment.
- d. Knowledge of angioplasty material and proper selection of guidewires, balloon catheters, and stents. e. Knowledge of types and characteristics of bare metal and drug-eluting stents including post-implantation pharmacological treatment and their risk of thrombosis and restenosis.
- f. Classification, mechanisms, and therapy of in-stent restenosis.
- g. Knowledge of ancillary interventional techniques:
 - Therapeutic: anti-embolic protection with filters and occlusive balloons, rotablator, laser, atherectomy and thrombectomy devices.

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- Diagnostic: intravascular ultrasound, Doppler and intracoronary pressure measurement

h. Indications for mitral, aortic, and pulmonary valvuloplasty in management of valvular disorders, including factors that differentiate patients who require surgical commissurotomy or valve repair or replacement.

i. Indication for catheter-based interventions in management of congenital heart disease in adults, such as closure of intracardiac defects (ASD, PFO, VSD, PDA).

j. Indications for septal alcoholisation in obstructive hypertrophic cardiomyopathy

VI. MANAGEMENT OF COMPLICATIONS OF PERCUTANEOUS INTERVENTION

a. Mechanical complications, such as coronary dissection, spasm, perforation, “slow/no reflow”, cardiogenic shock, left main trunk dissection, cardiac tamponade including pericardiocentesis, peripheral vessel occlusion, and retained components.

b. Thrombotic and haemorrhagic complications associated with percutaneous intervention or drugs.

VII. MISCELLANEOUS

a. Peripheral angiography and angioplasty including essential radiological anatomy, indications and principles of carotid, subclavian, renal and iliac stenting.

b. Ethical issues and risks associated with diagnostic and therapeutic techniques.

c. Statistics, epidemiologic data, and economic issues related to interventional procedures.

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