

Paper II: Technical Subject

1. Principles of Biochemistry

- 1.1. Basics: Acid Base, Buffers, Hydrogen ion H^+ concentration, pH, Strong acid, Weak Acids and Strong Bases; Strong acids and Weak Bases; Buffers in living system (Physical Buffers), Henderson Hasselbach Equation, pH measurements, Buffer solutions for biological investigations, Equivalent Wt. Mol. Wt. Molar sol. Normal sol. Standard solution, pH meter, Ionization of Water, Structure, Composition and function of Biological membrane.
- 1.2. Biomolecules:
 - 1.2.1. Carbohydrates: Introduction, Biochemical and Medical Importance, Classification, Structure, Isomerism, Physical and Chemical Properties, Detection of Carbohydrates Oligosachharides: Classification, Structure and Properties, Medical Importance. Polysachharides: Classification, Biomedical Importance, Significance of antibacterial drug action related to cell wall disruption, Mucopolysachharides, Glycosaminoglycans, Glycoproteins, Carbohydrates as informational molecules, Lectins and Biological Importance.
 - 1.2.2. Fats: Fatty Acids, Lipoproteins and their physiochemical properties and structural aspects. Triglycerides, phospholipids, Cholesterol, glycolipids, saponification and iodine number, rancidity, antioxidants, complex lipids and steroids. Steroid hormones and bile acids. Prostaglandins and their biological significance
 - 1.2.3. Proteins: Amino acid classification, Structure and Physical / Chemical Properties. Protein Structure: Primary, Secondary, Tertiary, Quaternary forms, Complexes and Classification Methods of precipitation, extraction of protein, separation of protein. Structural and functional relationship in the Biological System
 - 1.2.4. Nucleic Acids: Definition, history, bases, nucleosides, structure and function of nucleosides, nucleotides, nucleoproteins and nucleic acids – DNA and RNA. Structure, properties, and functions of DNA & RNA. Types of DNA and RNA. Denaturation and hybridization. Biologically important nucleotides. Nucleotide coenzymes.
- 1.3. Enzymes: Definitions, classification, nomenclature, catalysis, mechanism of enzyme action, factors affecting the enzyme activity, extraction assays and purification of enzymes, units of activity, enzyme kinetics, different type of inhibitors, Coenzyme and cofactors, Diagnostic/Clinical enzymology - importance of determination of enzymes in disease states.
- 1.4. Micronutrients
 - 1.4.1. Vitamins: Biochemical Importance and roles in metabolism, deficiency and manifestations, effects of hypervitaminosis, toxicity of fat soluble vitamins and water soluble vitamins, antihistamines.

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- 1.4.2. Minerals: Biochemical Roles, Roles in Metabolism and Disease, bulk and trace elements, Mineral Deficiencies and Toxicity.
- 1.5. Body Fluids:
 - 1.5.1. Blood, pH regulation. Composition and function of interstitial fluid, CSF, lymph, urine.
 - 1.5.2. CSF: Normal Constituents, Markers of Inflammation, Biochemical Parameters
 - 1.5.3. Other Body Fluids (Pleural, Ascitic Fluids, pericardial fluid, Vitreous Humor, GI secretions) and their constituents
- 1.6. Metabolism
 - 1.6.1. Carbohydrates: Concept, Biochemical Roles, Importance and Disorders related to Glycolysis, Krebs's Cycle, Gluconeogenesis, Glycogen Metabolism, HMP Pathway, and Additional Pathways including Polyol Pathways, Uronic Acid pathways, and metabolism of fructose, galactose and amino sugars, lactose synthesis. Biological Oxidation and Bioenergetics including the Electron Transport Chain and Oxidative Phosphorylation.
 - 1.6.2. Fats: Concept, Biochemical Roles, Importance and Disorders related to Fatty Acids and Lipoproteins, Fatty Acid Oxidation and Regulation, Bile Salts and Cholesterol, Brown fats, Processes in starvation, atherosclerosis. Synthesis and degradation of complex lipids. Obesity and the mechanism of obesity, Fatty liver and Clinical Implications.
 - 1.6.3. Proteins: Concept, Biochemical Roles, Importance and Disorders related to Amino Acids, Transamination / Deamination, Ammonia and the Urea Cycle
 - 1.6.4. Nucleic Acids, Nucleotide Metabolism: Nucleic acid metabolism, Pyrimidine biosynthesis, Purine biosynthesis, Purine and Pyrimidine degradation, Salvage pathways and de-novo pathways and their regulation, Disorders of Purine and Pyrimidine Metabolism.
- 1.7. Inborn Errors of Metabolism: Diabetes Mellitus and Carbohydrate Disorders, Protein Metabolism Disorders, Lipids and Lipoprotein Metabolism Disorders. Other Inherited Disorders including hypothyroidism, tyrosinemia, phenylketonuria, galactosemia, cystic fibrosis, amino acidurias, organic acidurias, glycogen storage diseases, lipidoses, and porphyrias.
- 1.8. Integration of Metabolism: Co-ordination and integration of metabolic processes, and the metabolic and hormonal factors involved. Biosynthesis, functional significance and metabolic fate of specialized products obtained from amino acids, lipids and carbohydrates. Feed Fast Cycle, Metabolism and Energy Requirements in Starvation and Pregnancy.

2. Cell Biology

- 2.1. An overview of cellular structure and function
- 2.2. Prokaryotic and eukaryotic cells
- 2.3. Structure of eukaryotic cells-sub cellular organelles, cytosol, endoplasmic reticulum, nucleus, nucleolus, mitochondria, lysosomes, ribosomes, Golgi apparatus, peroxisomes, plasma membranes and their functions
- 2.4. Receptor-mediated endocytosis
- 2.5. Properties of biological membranes -motility, permeability, concept of semi permeable membranes, electrochemical gradient and pumps, cortical membranes and liposomes
- 2.6. Transport across membranes- active, facilitated and passive. Transport mechanisms-ion channels including gated channels, carrier proteins, glucose transporters (GLUT), active transporter, symporters and antiporters
- 2.7. Non-membrane organelles-cytoskeleton, microfilaments, microtubules and microvilli
- 2.8. Cell interactions and adhesion- types of junctions: tight junctions and gap junctions
- 2.9. Adhesion molecules-cadherins, selectins, integrins (beta 1 and beta 2 integrins)
- 2.10. Cell cycle, regulation of cell cycle, apoptosis, biochemistry of aging Cell division and cell cycle: Mitotic and meiotic cell division, Phases of cell cycle, cell cycle check points, Regulation of cell cycle.
- 2.11. Stem cells and their differentiation
- 2.12. Cell as experimental models- E. coli, yeast, Drosophila melanogaster, viruses

3. Molecular Biology

- 3.1. DNA Replication: Replication process, DNA Repair, Recombination between homologous DNA sequences, DNA Rearrangements
- 3.2. Transcription: Prokaryotic and Eukaryotic transcription, Regulation of transcription in Eukaryotes, RNA processing and turnover
- 3.3. Translation: Prokaryotic and Eukaryotic Protein synthesis, Regulation of translation, Protein folding, Post-translational modification, Protein degradation.
- 3.4. Regulation of gene expression, Mutation, Stem Cell and differentiation, Apoptosis
- 3.5. Cancer genetics: Carcinogenic Agent- Radiation, chemicals and viruses, Oncogenes, Tumor suppressor genes, Genetic cancer syndromes- familial breast cancer, familial adenomatous polyposis coli and retinoblastoma Inherited conditions and predispose to development of cancer (e.g., ataxia, telangiectasia, xerodermapigmentosum, Fanconi syndrome), Mechanisms of action of cytotoxic drugs, application of molecular biology to cancer prevention and treatment.
- 3.6. Recombinant DNA technology: A knowledge of Recombinant DNA, vector, cloning, restriction enzyme, blot techniques and their application in medicine.
- 3.7. Polymerase Chain Reaction: Introduction, Primer and its designing, Phases of reactions (denaturation, annealing and annexing), Open array, digital PCR and their application.
- 3.8. Genetic mapping and Physical mapping, DNA Sequencing, Human genome project, cDNA Library and Gene Bank, Gene Therapy.

3.9. Genetic Testing: Restriction fragment length polymorphism (RFLPs), Its application in mutation detection and DNA fingerprinting, Analysis of Gene Expression: Microarray, Western blot

4. Medical Genetics

- 4.1. Introduction to Medical Genetics and its brief history, Mendelian Inheritance, Non-Mendelian Inheritance, Single gene diseases and Multifactorial Inheritance, Autosomal, Sex linked and Mitochondrial Inheritance, Chromosome and Cytogenetics, Biochemical disorders of carbohydrate, lipid, amino and purine and pyrimidine metabolism seen in the local hospital, Population genetics, Genetic Counselling, Medical ethics.
- 4.2. Inherited Disorders and their evaluation from a biochemical perspective: A comprehensive overview of Autosomal and Sex Linked genetic disorders and the biochemical tests used in diagnosis and monitoring of these conditions (? Removed from clin chem and added in this section)

5. Immunology:

- 5.1. Concept, mechanisms and role of innate and acquired immunity, humoral and cell mediated immunity, antigen and antibodies, antibody diversity, class switching, MHC.
- 5.2. Recognition of antigens: Primary interaction, antigen processing and presentation
Immune response: Lymphocyte maturation, activation of T and B lymphocytes, cytokines, regulation of immune response, immunodeficiency, tumor immunity
- 5.3. Transplantation, immunosuppression and immunopotentiality including vaccination

6. **Bioinformatics and computational Biology:** Genomics, proteomics and bioinformatics, computer aided drug design and discovery, genome guided personalized medicine, Basic Local Alignment Search Tool (BLAST) for protein and nucleic acid, protein data base.

7. Instrumentation:

- 7.1. Basic Laboratory Principles
 - 7.1.1. Sample Collection, Preservation, Transport and Storage
 - 7.1.2. Supportive Laboratory Equipments (Centrifuge, Water Bath, Waste Management, Electronic Balance, pH Meters, Pippettes, Volumetric and Measuring Glassware, Dispensers, Hot Air Oven)
- 7.2. Instruments: Principles, Operation Protocols and Applications of photometry. Concepts of colorimeter, visible and ultraviolet spectrophotometer, turbidimetry, nephelometry, fluorimetry, flame Photometer, ion selective electrodes, atomic adsorption and mass spectrometry, Autoanalyzer (Liquid and Dry chemistry).
- 7.3. Separation Techniques:
 - 7.3.1. Chromatography: Principles, Types, and applications in biochemistry, Relative Front, Discrimination Factor and Technical Considerations. GLC-HPLC.

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- 7.3.2. Electrophoresis: Principles, types, working techniques and application in biologic systems. Rocket and Capillary electrophoresis, Gel Electrophoresis for Nucleic Acids, Isoelectric Focusing
- 7.4. Immunoassays:
- 7.4.1. Enzyme based Assays: Principle and applications of ELISA and EIA, modified enzyme based investigative techniques and Chemiluminescent Immunoassay (CLIA) and Enhanced Chemiluminescent Immunoassays (ECI)
- 7.4.2. Radioactivity and RIA: Application of radioactive substances in medicine and hazards of radioactivity and prevention. Principle and applications of Radioimmuno assay (RIA)
- 7.5. Other Techniques: Principle and applications of osmometry, viscometry and measurements of surface tension, Flow Cytometry, Nuclear Magnetic Resonance Techniques
- 7.6. Automation Techniques in Clinical Chemistry (Autoanalyzers, Automated Immunoassays)
- 8. Quality Control:** Preanalytical errors, analytical errors and post analytical errors, Precision, accuracy, Precision, accuracy, Errors of laboratory instruments; use of standardization units: SI and conventional; Process of internal quality control, external quality control; Use of statutory proficiency testing programs: primary and secondary standards; Use of Reference materials: international reference materials and reference methods; Course of action of evaluation and comparison of methods and instruments.
- 9. Application of Biochemistry in Medicine:**
- 9.1. Role of the Biochemist in laboratory management:
- 9.1.1. Laboratory reporting systems: Ensuring that the information reaches the attending physician within a time frame, Critical values, directing attention to abnormal results when necessary, Providing clinical interpretation when appropriate, Laboratory information system, Electronic data transfer, Instrument interfacing.
- 9.1.2. Laboratory Records: Retention polices, workload measurement system, preparation and maintenance of proper laboratory manuals, accreditation requirements.
- 9.1.3. Laboratory Reagents: Assessing the quality, stability, cost of reagents, commercial "kits"
- 9.1.4. Instruments: Laboratory instruments and analyzers, and their technical implications.
- 9.1.5. Test Interpretation: Effect of biological/physiological variation in biochemical tests results in terms of diurnal and individual variation, rest,

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exercise, age, sex, fasting and the effect of a drug. Normal or reference ranges and clinically significant limits and the therapeutic and toxic level of drugs. Chemical interferences like the effects of interference by drugs, hemoglobin, lipemia, icterus and other substances in the plasma.

- 9.1.6. Laboratory Hazards: Laboratory safety measures in relation to fire, chemicals, radiation and infection. Waste disposal regulation; Workplace Hazardous Materials Information System [WHIMIS]; Potential for waste reduction and/or recycling
- 9.2. Analytical Biochemistry and Data Interpretation
 - 9.2.1. General Tests: Knowledge, Principle, Application and Predictive Values for Routine Biochemical Tests along with their evolution over time
 - 9.2.2. Drugs: Knowledge, Principle and Application of drug levels in the diagnosis, treatment and monitoring of disease states and immunomodulation.
 - 9.2.3. Diagnostic Tests: Knowledge of diagnostic tests in endocrinology including Dexamethasone Suppression Test, Synacthen Test, Ham's Test, Water Deprivation Test, Schumm's Test, Schilling Test
 - 9.2.4. Special Tests: Testing principles and applications of hormone tests, lipids, special proteins and other emerging biomarkers.
 - 9.2.5. Other Tests and Tumor Markers: Principle, application and techniques for tests used for collagen disorders, tumor markers in diagnosis and monitoring of cancers, hormone profiles, metals, vitamins and enzymes in clinical syndromes.
 - 9.3. Organ System Function:
 - 9.3.1. Cardiovascular System: Characteristics features of heart muscles and its metabolism. Mechanism of atherosclerosis, Ischemic heart disease, pre-disposing factors leading to ischemia and myocardial infarction. Cardiac markers (enzymatic and non-enzymatic) used in the diagnosis of heart disease.
 - 9.3.2. Haemopoietic system : Iron metabolism- absorption, regulation, function (haem and non-haem protein) and iron deficiency anemia. Diagnostic tests for iron deranged states and its interpretation (Serum Iron, Ferritin and total iron binding capacity), Haem biosynthesis and degradation. Classification of porphyria, causes, diagnosis and management of porphyria.
 - 9.3.3. Respiratory System and Acid Base Balance: Clinical features and laboratory findings in [metabolic and respiratory acidosis and alkalosis, pH, pCO₂, pO₂, HCO₃⁻, oxygen saturation, Hydrogen ion homeostasis, Effect of body temperature, Assessment of H⁺ ion, base excess, keto-acidosis, lactic acidosis, anion gap, Simple lung function tests, Principle of respirators, hypothermia, Heart lung bypass surgery. Role of hemoglobin

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in oxygen and carbon dioxide transport, carbon monoxide, control of respiration, acute and chronic respiratory failure, Biochemical Basis of Mountain Sickness.

- 9.3.4. Gastrointestinal and Hepatobiliary System: Clinical features and laboratory findings in diseases of the stomach, pancreas, duodenum, jejunum, ileum, and colon. Assessment of Gastric Function: H⁺ production, secretin stimulation test and calcium loading test, Secretory levels of HCl in pernicious anemia, peptic ulcer, neoplastic disease and Zollinger -Ellision syndrome
- 9.3.5. Assessment of Pancreatic Function; acute and chronic pancreatitis; amylase and lipase in serum and urine; immunoreactive trypsin, Pancreatic enzymes; secretin and CCK -Pz tests; cerulean, Gastrointestinal hormones, Celiac antibody testing endomysial antibodies, Assessment of intestinal function, small bowel malabsorption tests; xylose, lactose, and other dissacharides, Bile acids, carcinoid syndrome [5HIAA]. Malabsorption syndrome, gluten intolerance [anti gliadin A], Electrolytes, including analysis of ileostomy fluid, Alpha 1 Antitrypsin test, fecal fat analysis, carcinoembryonic antigen, Fe²⁺, Fecal analysis for nitrogen, sugars, Balance studies [with food and urine analysis].
- 9.3.6. Clinical features and laboratory findings in neonatal jaundice, acute and chronic liver disease, intra and extra hepatic cholestasis, hepatic and biliary malignancies, Metabolic functions of the liver, monitoring liver disease, Bilirubin, conjugated bilirubin, delta -bilirubin, urobilinogen, Alkaline phosphatase, the aminotransferases, gamma glutamyl transferase, Differential diagnosis of diseases causing jaundice, Alcohol and liver disease, Viruses in acute and chronic liver disease, Hepatitis A,B,C,D,E, Complications of chronic liver disease, bleeding, ascites, gall stones, Serum proteins, alpha-fetoprotein, Immunoglobulins in liver disease, prothrombin and vitamin K, bile acids and liver, disease, 5' nucleotidase, lactate dehydrogenase, Blood ammonia, hepatic coma, hepatotoxic drugs, Lecithin cholesterol acyl transferase, lipoprotein X.
- 9.3.7. Renal System and Electrolyte Balance: Clinical features and laboratory findings in dehydration and over hydration, Clinical Features including effect of hormones and drugs and their biochemical basis for electrolyte imbalance and Diabetes Insipidus. Distribution of water and electrolytes; Osmolality; Measurement of plasma volume; Diagnosis and quantitative assessment of fluid and electrolyte loss; Principles of intravenous fluid therapy, inappropriate ADH syndrome (SIADH), shock, metabolic effects of trauma, measurement of Total Body Water, sodium and potassium spaces, Measurement of intracellular electrolytes. Clinical features and laboratory findings in Renal Disorders, normal and abnormal urine

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composition, including abnormal pigments, Urinalysis, dipstick tests, microscopic analysis,

- 9.3.8. Urine osmolality, anion gap, proteinuria, differential protein clearance, Plasma creatinine, urea [blood urea nitrogen], urea kinetics, complements and antistreptolysin-O, Measurement of glomerular filtration rate, Creatinine clearance, Inulin clearance. Measurement of renal plasma flow, Tubular function tests, Concentration test, Ammonium chloride loading test, Bicarbonate loading test, Amino acid chromatography, Renal calculi, Beta 2 microglobulin, Urinary enzymes, Hemodialysis, peritoneal dialysis [CAPD], Transplant biochemistry. Endocrine function of the kidney and Nephrotoxic drugs.
- 9.3.9. Endocrine and Metabolic System: Clinical features, laboratory findings and pathophysiology of the principle disorders of the hypothalamus, pituitary, thyroid, adrenals and gonads; Control mechanisms - hypothalamic hormone, anterior and posterior pituitary hormones, Thyroid hormones, iodine metabolism, Adrenal cortical and medullary hormones, pineal glands, Testicular, ovarian and placental hormones, Endocrine rhythms, responses to diet, exercise, glucose, Insulin, pregnancy, posture, and drugs. Radionuclide in uptake studies, Endocrine organ scanning, Secretion rate measurements and differential diagnosis. Thyroid hormone change in various age group such as Neonate, childhood, adulthood and old age. Acute and chronic lesions of the hypothalamus and pituitary, Hypo and hyper thyroidism, goitre, thyroiditis - pheochromocytoma, Addison's disease and Cushing's syndrome, adrenogenital syndromes, Renin /angiotensin /aldosterone disorders. Biochemical basis, related investigations in case of primary and secondary endocrine hypertension and edema, ectopic endocrine tumors, Neonatal thyroid screening, Prostaglandin, Neurotransmitters; MHPG [methoxy hydroxyphenylglycol]. Endocrine changes, role of leptin in obesity and concept of adipose tissue as an endocrine gland. Clinical features and laboratory findings in type I, type II and gestational diabetes mellitus; diagnostic criteria for diabetes; investigation of hypoglycemic syndromes, Glucose tolerance test procedures and interpretation; in pregnancy, Ketosis and lactic acidosis, Differential diagnosis of coma; hypermolar coma, Hemoglobin A1c, fructosamine; C-peptide, insulin tolerance test, glucagons and somatostatin, Use and dangers of provocative tests, eg tolbutamide and glucagon, Assay of insulin, proinsulin, and insulin antibodies.
- 9.3.10. Reproductive System and infertility: Gonadal hypo-and hyper function, infertility, amenorrhea, hirsutism, fetoplacental disorders, genetic defects, hyperprolactinoma. congenital adrenal hyperplasia.

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- 9.3.11. Neurological System: Clinical features, laboratory diagnosis of disorders of the nervous system, disturbances of neuro-anatomic systems, inherited disorders with neurological systems e.g. acute intermittent porphyria, metachromatic leucodystrophy [shilder's disease], mucopolysaccharide storage diseases, disorders of neurotransmission : cholinergic systems, alzheimer's disease, myasthenia gravis, dopaminergic systems, parkinson's disease, schizophrenia, depression, mania, action myoclonus, epilepsy, huntington's disease, Multiple sclerosis, Biochemical changes in cerebrospinal fluid: glucose, protein, oligoclonal banding, specific immunoglobulins, enzymes, IgG/albumin ratio, Biochemical causes of convulsions.
- 9.3.12. Musculoskeletal System: General knowledge of pathophysiology of broad spectrum of disorders affecting the joints, primarily the musculoskeletal system [e.g. rheumatoid arthritis], Systemic diseases with pain in muscles and joints, diffuse connective tissue disease, Malignant hyperthermia. Laboratory tests, mainly hematological, microbiological or serological, serum calcium, phosphorus serum enzymes, uric acid, antinuclear and related antibodies, immune complexes and examination of synovial fluid.
- 9.3.13. Pregnancy and Related Disorders :Prenatal Diagnosis: Prenatal diagnosis of inborn errors of metabolism, neural tube defects and down syndrome, Maternal serum screen [alpha-fetoprotein, hCG, unconjugated estriol]; amniotic fluid and fetal blood examination, Acetylcholinesterase and other tests on amniotic fluid, Chromosomal abnormalities, Hemophilia, Hemoglobinopathies, Chromosome analysis laboratory assessment of fetal lung maturity, Ectopic pregnancy. Rh isoimmunization, intrauterine growth retardation, Diabetes, pre-eclampsia.
- 9.4. Biomolecules in evaluation of cancers: Cancers as examples of defective cellular differentiation, strategy of cancer detection by biochemical means, cancer markers, cancer screening, Oncogenes, Use and limitations of tumor products and enzymes in the diagnosis and monitoring of cancer, carcinoembryonic antigen, alpha feto protein, human chorionic gonadotrophin, total and free prostate specific antigen, CA 19-9, CA 125, other antigens, oncogenic enzymology - acid phosphatase, alkaline phosphatase, lactate dehydrogenase, other enzymes other fluid constituents of use in oncology, hormone receptors and response to therapy, primary neoplastic endocrinopathies, paraneoplastic syndromes, multiple endocrine adenopathy [MEA] syndromes type I and type II; syndrome due to ectopic hormone synthesis, Cancer associated with familial and congenital disorders.
- 9.5. Pediatric and Geriatric Chemistry: Problems of specimen collection, capillary specimens, Reference range differences in infants and children: those that vary significantly with age and sex[inorganic phosphorous, creatinine, alkaline phosphatase, aspartate aminotransferase, creatine kinase, Special problems in pediatrics, Respiratory distress syndrome, Neonatal hyperbilirubinemia, Cystic

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- fibrosis, Neuroblastoma [VMA,HVA], Gastrointestinal disease [fat absorption, disaccharide intolerance, protein losing enteropathy, Heavy metal poisoning].
- 9.6. Mechanisms and theories of aging and reference range differences that occur in elderly patients, Decline in organ system and metabolic functions, Drug metabolism in the elderly as per the following:
- 9.6.1. Aging and the nervous system (Concepts of normal aging, age related biochemical changes, and age related disease in the nervous system)
- 9.6.2. Aging and the Musculoskeletal system (Aging effects the presentation of gout, myopathies, Rheumatoid Arthritis and SLE)
- 9.6.3. Aging and the endocrine System (Age related changes that occur in Glucose Metabolism, Thyroid Function, Gonadal Function, Adrenal Function, Growth Hormone Secretion)
- 9.6.4. Aging and the Renal System (Structural and Biochemical Changes in the Kidney which accompany aging, Acute and Chronic Kidney Disease in the elderly, Secondary complications of reduced GFR in elderly patients)
- 9.6.5. Aging and the immune system (Define differences in the immune responses of old Vs young adults)
- 9.6.6. Aging and the reproductive system
- 9.7. Nutritional Value of Food:
- 9.7.1. Energy metabolism – BMR, Mechanism of calculation of BMR. Respiratory Quotient and its significance.
- 9.7.2. Calculate Energy requirements of different stages of man [childhood, adolescent, adult, old age, pregnancy, lactation]
- 9.7.3. Balanced diet, Plan diet in health and disease
- 9.7.4. Role of Protein, carbohydrate and fat in man, principles of calculating their requirements, their daily allowance, Biological value of proteins, Glycemic Index of Carbohydrates.
- 9.7.5. Protein energy malnutrition, Malabsorption, Parental nutrition. Assessment of nutritional status.
- 9.8. Therapeutic Drug Monitoring and Toxicology:
Drug absorption, metabolism, excretion, hepatic enzyme induction, Pharmacokinetics, pharmacodynamics, and pharmacogenetics, Monitoring therapeutic levels of drugs, concepts of half life, volume of distribution, peak and trough concentration, dosing intervals, toxicity levels, Symptoms and signs of overdose, use of antidotes, Detecting and quantifying poisons, e.g. methanol, ethylene glycol, lead, carbon monoxide, Organophosphorus compounds [cholinesterase], Drugs of abuse and modalities of DAU testing.
