

MEDICAL DIAGNOSTICS

CLASS–XII

CLINICAL BIOCHEMISTRY & MICROBIOLOGY–II (742)

CLINICAL BIOCHEMISTRY & MICROBIOLOGY–II (742)

THEORY

Time: 3 Hours

Marks: 60

Unit–1: Concepts Instruments & Procedures

10

- Introduction - scope of biochemistry and clinical biochemistry objectives and scheme of clinical biochemistry teaching.
- Basic Biochemistry - over view of biomolecules, biochemical transformations. Biochemical organization of cell, tissues, organs and human organism.
- Ethics and Discipline - Laboratory ethics and discipline. Patient management, Reception, Registration, Biochemical parameters investigations, protocols, documentation.
- Hazards and safety - physical, chemical and biological hazards, self & patient & equipment safety. Disposal of laboratory waste and the hazardous material.
- First Aid Measures.
- Instruments, Principles & Procedures: Basis, uses, parts, installation, glass ware & plastic ware – colorimeters, balances, centrifuges, refrigerators, hot air ovens, water baths, thermometers, vortex, mixers, magnetic stirrers, UV lamp.
- Cleaning & Maintenance of Equipment.
- Assessment.

Unit–2: Investigations Separation Procedures & Analysis

10

- Separation techniques: basic principles, different types, general techniques and clinical applications of different types of electrophoresis and chromatography.
- Automation: Basic Principles, different components and general principles of usage and applications.
- Calcium and Phosphorus: Outlines of mineral metabolism. Principles of estimation of serum calcium and inorganic phosphate and their clinical importance.
- Urine Proteins: requirements of quantisation of proteins in the urine. Different samples used Principles of samples collection, preservation and analysis.
- Lipoproteins: Principles of estimation of different lipo protein fractions of lipase, & LDH.
- Acid–Base balance.
- Immuno assays.
- Sample identification and labeling.
- Types and mechanisms of actions of various anti coagulants and preservatives used Principles of Spectrophotometry and Turbidoemetry.
- Quantitative analysis.
- Calorimetry- applications in clinical biochemistry.
- Units of measurement.
- Assessment.

Unit–3: Functional Test & Profile

10

- Glucose tolerance test: Concept of tolerance tests. Definition, patient preparation, performance, reporting and interpretation of GTT.
- Liver functions tests: bilirubin, total proteins, albumin and prothrombin time, turbidity tests and serum enzyme estimations (SGPT, ALPA and GT).

- Kidney functions tests: Concept of clearance tests, Use of serum NPN substances creatinine clearance, concentration and dilution tests and urine examination.
- Gastric function tests: Principles of analysis of gastric juice, Concept of basal and maximal acid outputs, Principles of stimulation tests & tubeless gastric analysis.
- Thyroid function tests: Principles underlying estimations of various thyroid hormones and their interpretations.
- Profiles: Concepts of Profile testing.
- Cardiac Profiles.
- Lipid Profile.
- Assessment.

Unit-4: Fundamentals of Microbiology **10**

- Personal Care.
- Infection Control.
- Sterilization Techniques - Autoclave, Hot air oven, Tyndallization & Pasteurization.
- Equipment – Handling & Maintenance.
- Assessment.

Unit-5: Bacteriology **10**

- Bacteriology.
- Applied Anatomy and Physiology of the Bacterial Cell.
- Pathogenic organisms.
- Identification & Isolation of Staphylococcus, Streptococcus, Pneumococcus, Gonococcus, meningococcus, C. diphtheria, Mycobacterium tuberculae and M. Leprae, Clostridia, E. Coli, Klebsiella, Salmonella, Shigella, Proteus, Vibrio, Pseudomonas.
- Anthrax, Plague, Dengue, Japanese encephalitis.
- Assessment.

Unit-6: Mycology Immunology & Serology Parasitology Virology **10**

- Introduction & Classification.
- Enumeration of pathogenic & opportunistic fungi.
- Introduction.
- Antigens, Antibodies & Reactions.
- Hypersensitivity.
- Introduction.
- Pathogenic parasites in blood, stool and urine.
- Viruses – Classification, Cultivation & Enumeration.
- Study of the laboratory animals – Sheep, Rabbit, Mice & Guinea Pig.
- Assessment.

PRACTICAL

Time: 2 Hours

Marks: 40

Unit-1: Instruments & Procedures

7

- Lab Equipment – Identification, Use & Cleaning of Glass & Plastic ware.
- Pipettes: Use of Pipettes/automated.
- Sample collection – Blood, urine and body fluids, Containers - Appropriate usage for different samples.
- Centrifuge – Preparation and separation of plasma, serum protein.
- Storage of sample.
- Filters - Filter Papers & Filtration.
- Drying of chemicals.
- Weighing – Appropriate Balances.
- Solutions – Preparation, Reagents - Preparation.
- Usage-Thermometer, Vortex Mixers & Magnetic Stirrers.
- Buffers.
- Colorimeters – Beer – Lambert's Law Experiment.
- Assessment.

Unit-2: Investigations

7

- Glucose: Orthotoluidine and glucose oxidase methods.
- Urea: DAM method and urease Berthelot reaction.
- Serum Creatinine: Jaff's method end point and kinetic analyses modes.
- Serum total proteins: Biuret method.
- Serum Albumin: Dyebinding (BCG) method.
- Serum Bilirubin.
- Malloy Evelyn method, Vandenberg reaction.
- Total and conjugated bilirubin estimation.
- Amino transferases: AST and ALT – Reitman Frankel method.

Unit-3: Separative Procedures & Analysis

7

- Estimation of serum: sodium, potassium and Lithium by Flame.
- Photometer.
- Estimation of serum bicarbonate by titration method.
- Acid base parameters using blood gas analyzers.
- Estimation & Standardization of Glucose, Urea, Creatinine, Chloride, Proteins & Transaminases.
- Standardization of pipettes and photo metric instruments – Demo and Analysis of Gastric juice, Demonstration of stimulations tests.
- Separation Techniques.
- Electrophoresis – serum proteins, hemoglobin – Demo.

- Paper chromatographic – aminoacids and carbohydrates – Demo.
- Oral glucose tolerance test.
- Estimation of 24 Marks urine proteins by turbid metric method.
- Assessment.

Unit-4: Personal Care, Sterilization & Equipment 7

- Personal Care, Sterilization & Equipment cleaning the equipment and glass ware Universal precautions.
- Methods of Sterilization – Autoclave, Hotair oven.
- Tyndallization & Pasteurization, Filtration, Disinfection & Antiseptics.
- Sterilization of Syringes, Needles & Slides.
- Sterilization of Cultureroom & Work Benches.
- Maintenance of the Equipment – Indications & Contra – Indications for Sterilization in a equipment.
- Uses of equipment.
- Refrigerators.
- Deep Freezers.
- Incubators & Water baths Different microscopes Preparation of wire loops Preparation of Pasture pipettes Preparation of smears.
- Assessment.

Unit-5: Bacteriology 6

- Staining procedures.
- Simple, Grams, Acid fast Albert, Fontana's Negative.
- India Ink & Negrosin.
- Hanging drop preparation.
- Preparation of media, pH adjustment, Sterilization, storage and disposal after use of Solid, liquid and special media.
- Disposal of specimens and contaminated material.
- Sample collection, labeling, registering and maintenance of records and statistics.
- Processing Techniques – Sputum, Blood, Urine & Stool, Pus, CSF. Swab – Wounds, Skin, Throat, Clippings, Spore, Strips.
- Assessment.

Unit-6: Mycology Immunology & Serology Parasitology 6

- Fungi – Identification, Collection & Labeling.
- Microscopy.
- KOH preparation.
- Staining methods & Culture methods.
- Lactophenol blue.
- Negative – Indian Ink Negrosin.
- Culture, Slide Culture.

- Collection of specimen.
- Labeling, separation of Sera and Storage.
- Inactivation of serum.
- VDRL Test – qualitative and semi-qualitative & quantitative.
- Widedest – principle and procedure.
- Latex tests – R.A. factor.
- Stool examination – saline, iodine staining & Concentration.
- Preservation of samples.
- Disposal of infected material.
- Peripheral blood smear preparation and staining techniques.
- Leishman, Giemsa's & JSB stain.
- Assessment.