

BHARATHIDASAN UNIVERSITY, TIRUCHIRAPPALLI - 620 023

Institute for Entrepreneurship and Career Development
Tiruchirappalli - 620023

DIPLOMA IN MEDICAL LABORATORY TECHNOLOGY

PAPER I- ANATOMY AND PHYSIOLOGY

UNIT-I

Introduction to anatomy : Scope of Anatomy and Physiology - Definitions and Terms in Anatomy and Physiology- Structure and function of human cell - Elementary tissues of human body- Brief account on Composition of Blood - functions of blood elements - Blood Group and coagulation of blood.

UNIT-II

Cardio Vascular System : Structure and functions of various parts of the heart, arterial and venous system, brief account on common cardiovascular disorders

Respiratory System : various parts of respiratory system and their functions, Physiology of Respiration

UNIT-III

Digestive System : names and various parts of digestive system-Liver, Spleen, Gall Bladder, Pancreas, Buccal Cavity, Pharynx, Oesophagus, Stomach, intestine etc.-physiology of digestion and absorption

Urinary System : various parts of urinary system and its function-structure and function of kidneys-physiology of urine formation - renal disease and oedema

UNIT-IV

Reproductive System : physiology and anatomy of Male & Female reproductive system-Prostate ,Uterus and Ovaries etc

Ear, Nose, Throat and Eye : Elementary knowledge of structure and functions of organs of taste, smell, hearing, vision

UNIT-V

Endocrine System : Endocrine glands ,their hormones and functions-Thyroid, Parathyroid, Suprarenal, Pituitary, pituitary and Thymus

REFERENCES

1. Solomon. E.A., (2008) Introduction to Human Anatomy and Physiology 3rd Ed, Saunders: St Louis.
2. Chaurasia, B.D., & Garg, K., (2012) *Human Anatomy Regional and Applied*. CBS Publications: New Delhi
3. T.S. Ranganathan – *A text book of Human Anatomy*
4. Fattana, Human anatomy (Description and applied) *Saunders's & C P Prism Publishers*, Bangalore – 1991
5. Chaterjee, H.H. Vol.-I & II, Human Physiology
6. Sembulingam, Human Physiology

PAPER II – ADVANCED BIOCHEMISTRY AND IMMUNOLOGY

UNIT I

Biomolecules : Carbohydrate, Proteins, Lipids and Nucleic Acids – classification, structure, properties and functions.

UNIT II

Vitamins and Minerals: Fat soluble vitamins(A,D,E,K) – Water soluble vitamins – B-complex vitamins- principal elements(Calcium, Phosphorus, Magnesium, Sodium, Potassium, Chlorine and sulphur)- Trace elements – Calorific value of foods – Basal metabolic rate(BMR) – respiratory quotient(RQ) Specific dynamic action(SDA) – Balanced diet – Marasmus – Kwashiorkar.

Unit III

Enzymes : Definition – Nomenclature – Classification – Factors affecting enzyme activity – Active site – Coenzyme – Enzyme Inhibition – Units of enzyme – Isoenzymes – Enzyme pattern in diseases.

Acids and bases: Definition, pH, Henderson – Hasselbalch equation, Buffers, Indicators, Normality, Molarity, Molality

UNIT IV

Metabolism: An overview of carbohydrate, protein and lipid metabolism. Carbohydrate – Glycolysis, TCA Cycle, glycogen metabolism Protein – Deamination and Transamination reactions, Urea Cycle. Lipid-Beta oxidation, Biosynthesis of fatty acids.

UNIT V

Immunology : Introduction -Non specific resistance to infection -Specific immunity. Antigens. Antibodies- Structure and function-Complement and antigen-antibody reaction. Hybridoma and Monoclonal antibodies.

Applied immunology : Hypersensitivity-Autoimmunity-Transplantation and Tumour immunity.

REFERENCES

1. Teitz, *Clinical Chemistry*. W.B. Saunders Company Harcourt (India) Private Limited New Delhi.
2. Vasudevan D. & Sree Kumari S., *Text Book of Bio Chemistry for Medical Students*, Jaypee Brothers, New Delhi.
3. Biochemistry, U. Satyanarayan, Books and Allied (P) Ltd. Kolkata-India
4. Das Debajyothi, *Biochemistry*, Academic Publishers Calcutta.
5. Biochemistry Voet and Voet
6. Biochemistry L.Stryer
7. Harper's Biochemistry Robert K.Murray, Daryl K.Garner, Peter A.Mayes, Victor W.Rodwell.
8. Principles of Biochemistry Cox and Lehninger
9. Fundamentals of Biochemistry J.L.Jain
10. Human Physiology Chaterjee. H.H. Vol I & Vol II
11. Immunology – Introduction to Text Book -Nandhini Shetty

PAPER III – CLINICAL BIOCHEMISTRY AND HISTOPATHOLOGY

UNIT I

Introduction to clinical biochemistry : Definition of bio-chemistry, use of biochemical tests- the application of biochemistry in hospital setting.

Requirement of Blood Collection : Blood collection - Phlebotomy - Sampling errors - Collection and preservation of biological fluids - Anticoagulants - Preservation of samples - Chemical preservatives - Process of analysing the specimens - The laboratory report.

UNIT-II

Evaluation of organ function test : Function of liver in health and disease: Jaundice, Hepatitis; liver function test. Assessment and clinical manifestation of renal, hepatic, pancreatic, gastric & intestinal function, enzyme of pancreatic origin and biliary tract, test of myocardial infarction.

UNIT-III

Enzymes as clinical diagnostic tools. : Endocrinal disturbance: protein hormones and hormones of hypothalamus, pituitary, thyroid and steroid hormones.

In born errors in metabolism: Introduction, Metabolic disorders of carbohydrates- galactosemia, glycogen storage disease, deficiency of glucose-6-phosphate dehydrogenase, Hypoglycemia, Diabetes mellitus. Metabolic disorder of lipid: Tay-Sachs disease, Nieman Pick disease. Metabolic disorder of amino acid: phenylketonuria, alkaptonuria, Maple syrup urine disease. Metabolic disorder of nucleotides: gout, Lesch-Nyhan Syndrome

UNIT-IV

Examination of Urine : Special type of collection of urine - Biohazard management - Components of routine urine analysis - Colour - Clarity - Odour - Volume - Chemical Examination - Sugar in Urine - Tests for Sugar, Protein, Ketone Bodies, Ketones, Bile and Bile salts, Blood in Urine - Test for Hematuria.

Microscopic Examination of Urine: Crystals Found In Urine - Crystals Found In Acid Urine and Alkaline Urine, Cells in Urine:- Red Blood cells, Pus cells, Epithelial cells, Spermatozoa, Bacteria, Tumour cells, Examination of stool- physical, chemical and microscopic examination

UNIT V

Histopathology : Introduction, fixation, tissue processing and embedding, section cutting and problem encountered, staining, Decalcification, frozen section, cytology, Fine needle aspiration cytology.

References:

1. Practical Biochemistry Varley
2. Medical Biochemistry M.N.Chatterjee
3. Teitz, *Clinical Chemistry*. W.B. Saunders Company Harcourt (India) Private Limited New Delhi.
4. KAPLAN, *Clinical Chemistry*, Mosby Company, St. Louis Washington, D.C. Toronto.
3. Biochemistry, U. Satyanarayan, Books and Allied (P) Ltd. Kolkata-India
5. Ramanic Sood, Laboratory Technology (Methods and interpretation) 4th Ed. J.P. Bros, New Delhi
6. Mukharji, Medical Laboratory Techniques, Vol - I, II & III, 5th Edn. Tata McGrawHill, Delhi.

PAPER IV-FUNDAMENTALS OF MEDICAL LABORATORY TECHNOLOGY AND MICROBIOLOGY

UNIT-I

Introduction to Clinical laboratory : Basic laboratory principles - Code of conduct of medical laboratory personnel, The use of the laboratory - Organization of clinical laboratory and role of medical laboratory technician - Safety measures - clinic borne infection and personnel hygiene.

UNIT-II

Common Laboratory Equipment's Incubator, Hot Air Oven, Water Bath - Anaerobic Jar, Centrifuge, Autoclave -Types of Microscope, Glassware – Description of Glassware, its use, handling and care, **Sterilization :** Definition -Classification and General Principle of Sterilization, **Antiseptics and Disinfectants :** Definition -Types - Mode of Action – Uses

UNIT-III

Growth and cultivation of Microorganisms : Nutritional requirement of microorganisms-Types of media-Microbial growth and growth curve-Collection, Transportation and processing of clinical samples for Microbiological investigations.

Bacteriology : Definition - Bacteria – General characteristics of Bacteria -Classification and morphology of Bacteria - Staphylococcus, Streptococcus, Pneumococcus, Neisseria gonorrhoea, Neisseria meningitis, Corynebacterium diphtheriae, Mycobacterium, Clostridium, E.coli, Klebsiella, Salmonella, Proteus, Pseudomonas, Vibrio and Spirochaetes with reference to their Morphology, cultural characteristics, biochemical reaction, pathogenesis/disease caused & lab diagnosis.

UNIT-IV

Virology : Definition - General Introduction of Virus - Physicochemical characteristic of Viruses -Isolation of Viruses in Laboratory by tissue culture -Cell and tissue culture technology -Embryonated Egg - Principles of animal cell culture and their use in Virology - Retro viruses - HIV, Hepatitis virus , Pox virus , Picorna virus - Polio - Orthomyxo virus - Influenza - Arbo virus - Chikungunya, Dengue - Herpes and Adeno virus with reference to their mode of infection, pathogenesis and diagnosis-Bacteriophages.

UNIT-V

Parasitology : Introduction of parasitology and classification - Protozoa - Rhizopoda - Mastigophora (Haemoflagellates, Intestinal and genital flagellates)- Sprozoa (Malarial parasite, Toxoplasma)- Helminthes -Nematodes (Ascaris, Hookworm, Whipworm, pinworm, strongyloides trichinella, Filaria,Dracunculus medinensis) - Cestodes (Taenia Saginata, T. Sclium, Echinococcus, D. atum, Hymenolepis nana)Trematodes.

Mycology : Definition - Structure – Classification-Cutaneous and Sub cutaneous and Systemic Mycosis - Opportunistic fungal infections -Diagnosis of fungal infections.

REFERENCE BOOKS:

1. Fischbach, 2005. Manual of lab and diagnostic tests, Lippincott Williams Wilkins, New York.
2. Gradwohls, 2000. Clinical laboratory methods and diagnosis. (ed) Ales C. Sonnenwirth and leonard jarret, M.D.B.I., New Delhi.
3. J Ochei and Kolhatkar, 2002. Medical laboratory science theory and practice, Tata McGraw- Hill, New Delhi.
4. Kanai L. Mukherjee, 2007, Medical laboratory technology Vol.1.Tata McGraw Hill.

PAPER V-FUNDAMENTALS OF MEDICAL LABORATORY TECHNOLOGY AND MICROBIOLOGY PRACTICAL

1. Handling common laboratory equipment's
2. Preparation of various reagents.
3. Responsibilities of a technician in the maintenance of the analyzers.
4. Use and care of microscopes.
5. Simple staining methods and gram stains
6. Tests for motility in bacteria.
7. Preparation of media.
8. Using of autoclave hot air oven, other common laboratory equipment etc.
9. Disinfection practices in laboratory and wards.
10. Assay for disinfection.
11. Techniques of cultivation of bacteria.
12. Isolation of bacteria from clinical specimens.
13. Biochemical testing – Catalase, oxidase, citrate, urease, TSI, Carbohydrate fermentation, MR VP, Indole
14. Purification of microbial cultures.
15. Standard Plate Count.
16. Antibiotic sensitivity test
17. PCR -Demonstration
18. Study of antibiotic sensitivity of common pathogens
19. Examination of stool for parasites.
20. Culture techniques for parasites

REFERENCE BOOKS:

1. Fischbach, 2005. Manual of lab and diagnostic tests, Lippincott Williams Wilkins, New York.
2. Gradwohls, 2000. Clinical laboratory methods and diagnosis. (ed) Ales C. Sonnenwirth and Leonard Jarret, M.D.B.I., New Delhi.
3. J Ochei and Kolhatkar, 2002. Medical laboratory science theory and practice, Tata McGraw- Hill, New Delhi.
4. Kanai L. Mukherjee, 2007, Medical laboratory technology Vol.1. Tata McGraw Hill.

PAPER VI – CLINICAL BIOCHEMISTRY PRACTICAL WITH INTERNSHIP

1. Collection of biological samples – Blood, Urine, Faeces, CSF, Sputum, Intestinal fluid, Semen.
2. Basic units and conventional units in hospital laboratories.
3. Estimation of blood Glucose
4. Estimation of Blood cholesterol
5. Estimation of Blood Urea
6. Estimation of Blood Uric acid
7. Estimation of Total and free creatinine in blood
8. Estimation of Bilirubin
9. Estimation of Protein – A : G ratio
10. Estimation of Calcium
11. Estimation of electrolytes – Na⁺ , K⁺.
12. Blood Grouping, compatibility tests, tissue typing.
13. Enumeration of RBC and platelet
14. Estimation of Haemoglobin
15. WBC-TC, DC.
16. ESR
17. Bleeding time and Clotting time
18. Qualitative analysis of Urine (Normal and Abnormal)
19. Microscopic analysis of urine.
20. Pregnancy tests
21. Montoux test
22. Hormone assay in urine – VMA.
23. AFA – in urine and amniotic fluid
24. Ketone bodies – urine
25. PAP smear.
26. Visit to Diagnostic Laboratory (Internship: 10-15 Days)

REFERENCES

1. Teitz, *Clinical Chemistry*. W.B. Saunders Company Harcourt (India) Private Limited New Delhi.
2. KAPLAN, *Clinical Chemistry*, Mosby Company, St. Louis Washington, D.C. Toronto.
3. Biochemistry, U. Satyanarayan, Books and Allied (P) Ltd. Kolkata-India
4. Ramanic Sood, Laboratory Technology (Methods and interpretation) 4th Ed. J.P. Bros, New Delhi
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