DETAILED SYLLABUS FOR THE POST OF LABORATORY TECHNICIAN IN MEAT PRODUCTS OF INDIA LTD
(Category Nos: 596/2024)

(Total Marks ±100)

PART I : PATHOLOGY (15 Marks)

Module 1 Hematology (3 Marks)

1.1 Composition of blood, anticoagulants, blood cell count, Hematopoiesis, blood cell, morphology - normal and abnormal, functions of blood, thin and thick smear, staining of blood films, different stains used, demonstration of blood cells, bone marrow smear, sickle cell preparation, LE cell preparation, leukemia, demonstration of blood parasites.

1.2 Hemoglobin – Functions, normal and abnormal hemoglobin, estimation methods, anemia.

1.3 PCV, ESR, blood cell indices, osmotic fragility

1.4 Blood coagulation and homeostasis, disorders of coagulation, coagulation tests, factor analysis

Module 2 Clinical pathology - Basic techniques (2 Marks)

2.1 Urine analysis – Physical, chemical, microscopy, examination of faeces, sputum, cerebrospinal fluid, other body fluids, semen analysis.

Module 3 Histotechnology (3 Marks)

3.1 Brief introduction to histology, design of a histology laboratory, reception and recording of specimens, basic knowledge about the various types of tissues and characteristics that influence their processing.

3.2 Fixatives – Purpose, ideal fixatives, common and important fixatives, removal of formalin pigment and deposits from sections, decalcification – method, preparation of reagents used.

3.3 Microtome – Principle and maintenance of different types of microtomes, microtome knives and types, sharpening of knives and their care.

3.4 Preparation of paraffin sections – Tissue processing, different steps, embedding, principles and uses of vacuum and paraffin embedding, treatment of blocks before cutting, automatic tissue processors, recognition and correction of faults occurring in blocks and sections, storage of blocks, defects of processing

and rectification of defects.

3.5 Staining and mounting – Principles of staining, common and special stains-preparation and procedure, Immunohistochemistry – basic principles, methods, storage of sections.

3.6 Frozen sections – Freezing microtomes – Principles, use, preparation of frozen sections and staining, advantage of frozen sections, cryostat.

Module 4 Cytology (3 Marks)

4.1 Important applications of cytology, collection of specimens -gynaecological and non-gynaecological, preparation of smears, fixation, Papanicolaou staining method, Shorr's stain, other stains used in cytology, preparation of stains, buccal smear- Barr body demonstration.

4.2 Fine needle aspiration cytology, concentration techniques in cytology-centrifugation, cyto-centrifugation, membrane filters, cell blocks

4.3 Liquid based cytology-monolayer preparation

Module 5 Cytogenetics (2 Marks)

5.1 Karyotyping-methods of chromosome analysis with blood and bone marrow, banding techniques, general aspects of chromosomes, chromosome defects, advanced methods in cytogenetics.

Module 6 Blood banking (2 Marks)

Theoretical aspects of blood grouping and blood banking, nature of blood cell antigens, mode of inheritance, general characteristics, antigen- antibody concept.

6.1 ABO and Rh blood group system, other blood group systems ABO grouping and Rh typing technique, direct and indirect Coomb's test, compatibility testing.

6.2 Donor selection, Screening of donors, collection and storage of blood, anticoagulants used in blood transfusion, preservation and storge of blood, preparation of blood components and their storage

6.3 Transfusion reactions, transmission of diseases through blood transfusion, apheresis, plasma pheresis, automation and recent developments in blood bank.

PART II : MICROBIOLOGY (15 Marks)

Module 1 General Microbiology (3 Marks)

1.1 History and scope of microbiology, laboratory safety and personal protection

1.2 Sterilization and disinfection- different methods and their applications,

biomedical waste management

1.3 Guidelines on laboratory procedures- reception, recording and handling of specimens, cultures and laboratory wastes

1.4 Microscopes- Compound Microscope, Darkfield, Phase contrast, Fluorescent & Electron Microscopy.

Module 2 Bacteriology (3 Marks)

2.1 Morphology of bacteria, growth requirements, culture media, pH adjustment, sterilization and storage of media, culture methods
2.2 Staining- simple, differential, special- principle, methods and application
2.3 Methods of study of bacteria- scheme of identification, study of medically important bacteria- role in infection, important diseases, laboratory diagnosis, microbial flora in health and diseases.
2.4 Antimicrobial susceptibility testing- antimicrobials in common use, preparation and storage of antimicrobial discs for susceptibility testing, different methods of testing, use of antimicrobials in the identification of bacteria.
2.5 Clinical bacteriology- sample collection, containers, collection of different types of specimens, transportation, storage, use of transport media and preservatives in transportation
2.6 Processing of specimens- microscopy, culture, biochemical identification, serological identification, pathogenicity tests and antibiotic susceptibility tests.
2.7 Serological tests and rapid techniques for the diagnosis of bacterial infections.

Module 3 Parasitology (3 Marks)

3.1 Morphology and classification- Protozoa, helminths, common and important diseases caused by them, details of morphology, life cycle and laboratory diagnosis.
3.2 Clinical parasitology- collection of specimens, transportation and storage
3.3 Processing of specimens- blood smear- thin and thick for protozoan parasites, microfilaria, stool examination for parasitic ova, larvae, their identification, concentration methods, staining techniques.
3.4 Serological diagnosis and other rapid tests for diagnosis.

Module 4 Mycology (3 Marks)

4.1 Introduction- classification of fungi, dimorphic fungi, common contaminant fungi- morphology, culture characteristics and identification of fungi
4.2 common fungal diseases- cutaneous, sub-cutaneous/mucous, systemic and opportunistic
4.3 Clinical mycology- collection of specimens and transportation
4.4 Processing of specimens- microscopy, culture media and techniques

Module 5 Virology (3 Marks)

5.1 Introduction to virology- structure, classification-DNA viruses, RNA viruses, morphology, cultivation and identification of viruses, medically important viral diseases.
5.2 Clinical virology- collection, transportation and storage of specimens, special care in handling specimens.
5.3 Processing of specimens- staining, fluorescent antibody techniques, viral isolation methods and identification of viruses, viral inclusion bodies in diagnosis.
5.4 Serological techniques in diagnosis of viral infections

PART III : BIOCHEMISTRY (20 Marks)

Module 1.1 Composition of glass, Varieties, Grades of glassware, Cleaning of glassware.
1.2 Calibration of pipettes and other volumetric apparatus.

Module 2. Laboratory safety- Laboratory hazards and safety, Universal safety precautions. First aid in the laboratory.

Module 3. Grades of chemicals, Secondary standard chemicals, Storage of chemicals.

Module 4. Preparation and storage of distilled water, Deionized water, pyrogen free distilled water. Evaluation of water purity.

Module 5. Units of measurement -SI units and Non SI units.

Module 6.1 Preparation of normal, molar and percentage solutions.
6.2 Dilution of solution, Interconversion of concentration- Normal, Molar, Molal and Percentage solutions.
Module 7.1 Collection, Preparation, Transportation, Processing and Disposal of biological specimens in a Clinical Biochemistry Laboratory.
7.2 Preparation and use of anticoagulants.
7.3 Urine preservation.

Module 8.1 Laboratory Instruments – Principle, Use and Maintenance of Colorimeter, Spectrophotometer, Fluorimeter, Nephelometer, Flame photometer, Atomic Absorption Spectrophotometer, Luminometers, Centrifuges, Magnetic stirrer, Vortex mixer, pH meter.

Module 9.1 Radioisotopes, Basic principles of radioactivity , Detection and Measurement of Radioactivity ,Application of Radioactivity.

Module 10.1 Buffer solution , Henderson Hasselbach equation
10.2 pH indicators.
10.3 Body buffer system, Respiratory and renal disturbances in acid base

balance, Anion gap, Metabolic acidosis and alkalosis, Respiratory acidosis and alkalosis, Fluid and electrolyte balance, Osmolality, Methodology of measuring Blood pH, PCO2 and PO2.

10.4 Physical chemistry- Osmosis, Dialysis, Donnan Membrane Equilibrium, Viscosity, Surface tension, Properties of colloids, Emulsion,, Adsorption, Partition coefficient,

Module 11.1 Digestion and Absorption of Carbohydrates, Proteins and Lipids.

Module 12.1 Chemistry of Carbohydrates, Proteins, Lipids and Nucleic acids.

12.2 Metabolism of Carbohydrates, Proteins, Lipids, Nucleic Acids, Minerals. Common Inborn errors and disorders of metabolism.

12.3 Vitamins and coenzymes of vitamins, Estimation of vitamins.

12.4 Nutrition-Nutritional importance and calorific values of food.

12.5 Hemoglobin-Function, Synthesis and degradation of heme, Hemoglobin derivatives, hemoglobin Variants, Jaundice, Congenital disorders of heme metabolism.

12.6 Porphyria, Disorders of porphyrin metabolism, Laboratory diagnosis of porphyriasis

Module 13.1 Enzymes-Classification, Co-enzymes, Co factor, Mechanism of enzyme action, Enzyme kinetics, MM constant, Enzyme inhibition, Regulatory enzymes.

13.2 Clinical Enzymology-Enzyme Activity Determination, End point and Kinetic Assay. Principle and methods for the activity determination of Acid phosphatase, Alkaline phosphatase, Aspartate transaminase, Alanine transaminase, Amylase, Lipase, Lactate dehydrogenase, Creatinine Kinase, Glucose 6- Phosphate Dehydrogenase, 5’ Nucleotidase, Gamma Glutamyl Transpeptidase, Choline esterase.

13.3 Isoenzymes and its diagnostic importance in cases of MI, Liver disease, Muscular disease.

Module 14 Hormones- General properties and functions of hormones. Mechanism of hormone action, Hypothalamic hormones, Pituitary hormones, Hormones of Pancreas, Thyroid, Parathyroid, Adrenal cortex, Adrenal medulla and Gonad. Different methods of estimation of hormones and hormone metabolites.

Module 15.1 Molecular Biology- DNA replication and repair mechanism. Transcription and Genetic code, Translation, Post translational modification, Protein folding and protein targeting.

15.2 Molecular Biology Techniques-Recombinant DNA Technology, Blotting techniques, PCR, FISH.

15.3 Cloning, Genomic library.

Module 16.1 Urine – Composition of normal urine, Abnormal constituents -Qualitative and Quantitative tests.

16.2 Urinary screening test for metabolic inherited disorders.

16.3 Estimation of VMA, 17 ketosteroid, 5HIAA, Oestriol from urine.

16.4 Clearance test- creatinine, urea and inulin.

16.5 CSF and other body fluids- Composition and chemical analysis of CSF, Synovial fluid, Peritoneal, Pericardial and Amniotic fluid.

Module 17. Gastric juice- Stomach tubes, Fractional test meal, Chemical examination for bile pigments, blood, starch and gastric juice. Estimation of free and total acid from gastric juice. Tubeless gastric function test.

Module 18. Analysis of calculi- Urinary and Biliary Calculi.

Module 19. Electrophoresis- Different methods for electrophoresis, Advantages and disadvantages of various methods. Electrophoresis of serum protein, hemoglobin and lipoproteins and its interpretation.

Module 20.1 Chromatography- Different forms of chromatographic technique, Applications, advantages and disadvantages of these methods.

20.2 Urine Aminogram and chromatographic separations of amino acids, sugar, lipids, drugs and toxins.

Module 21.1. Infection, Immunity, Antigens, antibodies, Immunoglobulins, Complement system, Structure and functions of Immune systems, Immune response, Immune deficiency diseases, Hypersensitivity, Autoimmunity, Immunology of Transplantation and malignancies.

Module 21.2 Immunological methods and related techniques-Various antigen antibody reactions, Immunodiffusion, Immunoelectrophoresis , ELISA, Fluorescent Immunoassay and Radioimmunoassay.

Module 22. Biochemistry Laboratory tests- Liver function test, Kidney function test, Gastro intestinal function test, Malabsorption studies, Pancreatic function tests, Thyroid function tests, Gonadal function tests, Foeto placental function tests, Lipid profile, Cardiac Markers, Tumor markers, GTT, GCT, Glycated hemoglobin.

Module 23. Toxicology – General methods of analysis and screening tests for common drugs used in therapy.

Module 24. Organization and management of Clinical Biochemistry Laboratory.

Module 25.1 Automation- Semi auto analyzer and Auto analyzers-Different types, Advantages and Recent trends.

25.2 Laboratory Informatics.

Module 26. Quality Control- Accuracy, Precision, Sensitivity, Specificity, Standard deviation, Preanalytical variables and analytical variables. QC charts, QC sera, Internal and External Quality Control Programme.

PART : IV - NUTRITION AND DIETING – (50 MARKS)

Module I: Fundamentals of Human Nutrition (10 Marks)

• Introduction to Nutrition: Definitions, scope, and functions of food
• Classification and functions of nutrients: Macronutrients and Micronutrients
• Dietary Guidelines and Recommended Dietary Allowances (RDA)
• Balanced Diet: Planning and composition for different age groups
• Nutritional Assessment: Anthropometric, Biochemical, Clinical, and Dietary methods

Module II: Human Physiology and Biochemistry (as related to Nutrition) (10 Marks)

• Digestive System: Process of digestion, absorption, and assimilation
• Metabolism of carbohydrates, proteins, and fats
• Role of vitamins and minerals in metabolic pathways
• Enzymes and hormones in nutrition: Functions and regulation
• Fluid and electrolyte balance

Module III: Dietetics and Therapeutic Nutrition (10 Marks)

• Introduction to Dietetics: Principles and role of dietitian
• Nutrition in disease conditions:
- Diabetes Mellitus
- Cardiovascular diseases
- Renal disorders
- Gastrointestinal disorders
• Nutrition in critical care and surgical conditions
• Planning and modification of therapeutic diets
• Nutrition counselling and dietary management

Module IV: Food Science, Safety and Quality Control (10 Marks)

• Principles of Food Science: Food composition and properties
• Food preservation methods and processing
• Food additives and contaminants

- Food safety regulations and standards (FSSAI, Codex)
- Food adulteration: Detection and prevention
- HACCP and Good Manufacturing Practices (GMP)

Module V: Public Health Nutrition and Recent Trends (10Marks)

- Role of Nutrition in public health
- National nutrition programs and policies (ICDS, Mid-Day Meal, NNAPP)
- Malnutrition: PEM, Micronutrient deficiencies, and overnutrition
- Nutrition education and communication strategies
- Recent trends: Functional foods, Nutraceuticals, Personalized nutrition

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.