



All India Institute of Medical Sciences, Jodhpur

Indicative Syllabus for the Examination for the Post of LAB TECHNICIAN

(Syllabus is only indicative. The questions can assess any aspect of knowledge, aptitude, attitude and practical skills, which is expected from a trained person to work efficiently at the advertised post)

Section A

40% Questions to be based on General Aptitude from the following topics:-

General Intelligence & Reasoning: It would include questions of non-verbal type. The test will include questions on similarities and differences, space visualization, problem solving, analysis, judgment, decision making, visual memory, discriminating observation, relationship concepts, figure classification, arithmetical number series, non-verbal series etc. The test will also include questions designed to test the candidate's abilities to deal with abstract ideas and symbols and their relationship, arithmetical computation and other analytical functions.

Quantitative Aptitude: This paper will include questions on problems relating to Number Systems, Computation of Whole Numbers, Decimals and Fractions and relationship between Numbers, Fundamental arithmetical operations, Percentages, Ratio and Proportion, Averages, Interest, Profit and Loss, Discount, use of Tables and Graphs, Mensuration, Time and Distance, Ratio and Time, Time and Work, etc.

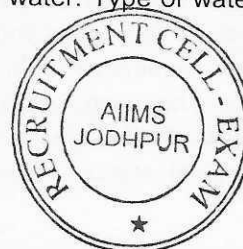
Computer Knowledge: Candidates' understanding of the Basics of Computer Knowledge, its parts, functions, emails, MS office, etc.

Section B

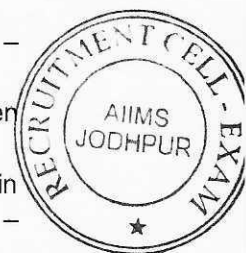
60% Questions to be based on Subject/Domain knowledge from the following topics:-

Biochemistry –

- Cleaning and care of general laboratory glass ware and equipment. Types of pipettes, calibration of pipettes.
- Distilled water. Method of preparation and storage of distilled water. Type of water distillation plants.



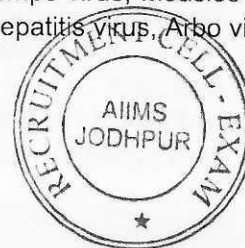
- Preparation of solutions – units of weights and volume, Calculation of concentration and methods of expressing concentration of solution.
- Units of Measurement - S.I unit and CGS units. Normality, Molarity, Molality
- Calibration of volumetric apparatus
- Principle, working and maintenance of Analytical balance
- Quality control and quality assurance in a clinical biochemistry laboratory
- Laboratory organization, management and maintenance of records
- Principles of assay procedures, Normal range in blood, Serum, Plasma and Urine and reference values.
- pH – Definition, Henderson Hasselbach equation, Pka value, pH indicator, Methods of measurement of pH, pH paper, pH meter, Principle, working, maintenance and calibration of pH meter
- Volumetric analysis- Normal and molar solutions, Standard solutions, Preparation of reagents, Storage of chemicals
- Working principles Types and applications of Electrophoresis – Paper, Agarose Gel, Cellulose Acetate and PAGE.
- Working principles, types and applications of Chromatography - Paper Chromatography, TLC, Ion Exchange, Affinity Gel, Filtration, Gas Chromatography and HPLC.
- Working principles, types and application of centrifugation
- Working Principles and application of photometry, and atomic absorption, Spectrophotometry and colorimetry.
- Definition, basic concepts of classification mechanism of action and properties of enzymes, factors influencing enzyme action
- Basic and elementary concepts of chemistry and properties of carbohydrates as applicable to the human body. (Classification, Digestion and Absorption, Metabolism, Disorders of metabolism)
- Overview of metabolism of carbohydrates – Methods for determining glucose, ketones, lactate, pyruvate reducing sugars and mucopolysaccharides and their clinical significance. Biochemistry, types, criteria parameters in diagnosis and prognosis of Diabetes mellitus.
- Basic and elementary concepts of chemistry and properties of lipids as applicable to the human body. (Classification, Digestion and Absorption, Metabolism, Disorders of metabolism)
- Overview of lipid. Importance of lipids in the body in body basic metabolic aspects and analytical importance. Disorders of lipid metabolism. Lipoproteins patterns in disease – analytical methods and procedures applicable to detecting and monitoring such disorders.
- Basic and elementary concepts of chemistry and properties of proteins & amino acids as applicable to the human body. (Classification, Digestion and Absorption, Metabolism, Disorders of metabolism)
- Overview of metabolism of amino acids and proteins – current methodologies for their determination and identification in biological specimens – disease associated with alteration in or deficiencies of amino acids and proteins.
- Basic and elementary concepts of chemistry and properties of nucleic Acids as applicable to the human body.
- Basic concepts of principles of nutrition and nutrients macro and micro nutrients. Vitamins & Minerals. Vitamins- Fat soluble vitamins , Water soluble vitamins sources, Biochemical role, RDA, deficiency manifestations Minerals – Calcium, Phosphorous, Iron, Copper, Zinc, Magnesium, Manganese, Iodine.
- Analytical methods and recommendations for testing and assessing nutritional deficiency – Methods for assessing concentration of vitamins in biological samples.
- General requirements for laboratory assessment of trace elements including specimen collection, handling, selection of analytical methodology and establishing quality.
- Overview of Biochemical roles of major electrolytes and blood gases and their changes in pathological states – relationship between major electrolytes and acid base balance –



- application of physical and chemical principles to biological system – laboratory measurements of electrolytes and blood gases. Acid base balance disorders
- Overview of current concepts in endocrinology RIA, ELISA, chemiluminescence assay procedure for hormones – physiological effects produced by normal and abnormal levels of various hormones. Thyroid function test and Adrenal function test.
 - Introduction to molecular Biology. Recombinant DNA technology, Role of recombinant DNA technology as diagnostic tool. Polymerase chain reaction.
 - Overview of porphyrins, their precursors, primary and secondary disorders of porphyrin metabolism – diagnostic laboratory methodologies including appropriate specimen collection and preservation techniques related to porphyrins
 - Laboratory tests and analytical methods used in identification and evaluation of hepatobiliary disorders, renal disorders and disorders of Stomach, pancreas and intestinal tract
 - Overview of calcium and inorganic phosphate metabolism current laboratory analytical

Microbiology –

- History of Medical Microbiology - Host-Microbe relationship.
- Safety Measures in clinical microbiology
- Cleaning, care and handling of glassware
- Care and maintenance of Equipment in Microbiology.
- Microscopy: Principle, types and uses of microscope
- Sterilization and Disinfection - Definition, Types, principles, mode of action and methods. Qualities of a good disinfectant. Assay for various disinfectants .
- Biomedical waste management in a lab
- General characteristics & classification of Microbes : Classification of microbes. Morphological classification of bacteria, Bacterial anatomy (Bacterial cell structures)
- Growth and nutrition of bacteria, Culture media and culture methods-aerobic and anaerobic
- Quality control and safety in microbiology.
- Handling and care of laboratory animals.
- Antimicrobial agents, Antimicrobial susceptibility tests.
- Stains used in bacteriology Principle, procedures, significance and interpretation - Simple staining, Gram stain, Ziehl –Neelsen staining, Albert's stain, Capsule staining.
- Principle, procedures and interpretation of the biochemical tests for identification of different bacteria.
- Immunity – innate and acquired immunity, humoral and cell mediated.
- Antigen antibody reactions and their applications
- Complement
- Hypersensitivity
- Vaccines
- Gram positive & Gram negative cocci – Staphylococci, Streptococci, Enterococci, Pneumococci, Neisseria
- Gram positive bacilli – Corynebacterium, Mycobacterium, Actinomyces, Listeria, Bacillus, Clostridia
- Gram negative bacilli – Enterobacteriaceae, Pseudomonas, Vibrio, Aeromonas, Plesiomonas, Campylobacter, Bacteroides, Fusobacterium, Brucella, Haemophilus, Bordetella, Pasteurella, Francisella
- Spirochaetes, Chlamydia, Rickettsia, Mycoplasma, L forms
- General properties of viruses – Structure, classification and replication.
- Laboratory diagnosis of virus
- DNA virus –Adenovirus, Papova virus, Herpes virus, Varicella zoster virus, Cytomegalo virus, Hepatitis B virus
- RNA virus – Polio virus, Influenza virus, Para influenza virus, Mumps virus, Measles virus, Rubella virus, Respiratory syncytial virus, Rhinovirus, Rotavirus, Hepatitis virus, Arbo viruses

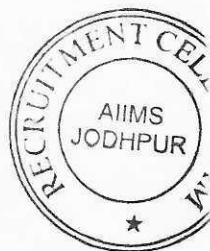


prevalent in India (Dengue, West Nile, Japanese Encephalitis, KFD), HIV, Rabies virus, SARS virus.

- Bacteriophage
- Introduction to Parasitology –Common definitions, Types and Classification of parasites.
- Collection transport and preservation of specimens for parasitological examination
- Protozoa: Entamoeba Trichomonas, Trypanosomes, Leishmania, Giardia, Plasmodium, Isospora, Balantidium, and Toxoplasma.
- Cestodes - Diphyllbothrium, Taenia, Echinococcus, Hymenolepis.
- Trematodes - Schistosoma, Fasciola, Fasciolopsis, Clonorchis, Paragonimus
- Intestinal Nematodes - Ascaris, Ancylostoma, Necator, Strongyloides, Trichinella Enterobius, Trichuris
- Tissue Nematodes - Wuchereia, Brugia, Loa loa, Onchocerca, Dracunculus
- Collection and preservation of specimens for parasitological examination, preservation of specimens of parasitic eggs and embryos, Preserving Fluids, Transport of specimens.
- Morphology and classification of fungus
- Laboratory diagnosis of fungus- Culture media used in mycology, Direct microscopy in Medical mycology laboratory, Processing of clinical samples for diagnosis of fungal infections i.e. Skin, nail, hair, pus, sputum, CSF and other body fluids.
- Superficial fungal infections
- Subcutaneous fungal infections
- Deep fungal infections
- Opportunistic fungal infections
- Techniques used for isolation and identification of medically important fungi
- Methods for identification of yeasts and moulds
- Preservation of fungal cultures

Pathology –

- General-Haematology: Origin, development, morphology, maturation, function and fate of blood cells, nomenclature of blood cells.
- Various methods of blood collection, anticoagulants-mechanism and uses.
- Basic concepts of automation in haematology
- Counting chamber- hemocytometry. Enumeration of RBC including various counting chambers, diluting fluids for RBC count.
- Haemoglobinometry. Principles and methods of quantitating Hb. Concentration of blood including knowledge of errors and quality control in various method. Abnormal hemoglobin and its investigation.
- ESR: introduction, factors affecting ESR, principles and methods of determining ESR, increasing and decreasing conditions of ESR.
- WBC: introduction, development of WBC, diluting fluids. Absolute eosinophil count, errors in sampling, mixing, diluting and counting.
- Cell counting, advantages and disadvantages, uses and mechanism of cell counting, quality control in cell counts.
- Preparation of peripheral smear and bone marrow smear. Thin smear, thick smear. Buffy coat smear, wet preparation. Romanowsky stain. Preparation advantages and disadvantages.
- Principle and methods of staining of Blood smears and bone marrow smears. Supravital stain. Reticulocyte count. Heinz bodies.
- Description of morphology of normal and abnormal red cells. Blood differential WBC counting. Recognition of abnormal cell. Anaemia – definition etiology classification and laboratory diagnosis.
- Methods of identification and estimation of abnormal hemoglobin including spectroscopy. HB electrophoresis. Alkali denaturation Test. Sickle cell preparation.



- Various benign leucocyte reaction – Leukocytosis. Neutrophilia, Eosinophilia, Lymphocytosis. Infectious mononucleosis. leucopenias.
- Leukemias – definition, causes, classification, detection of leukemia. Total leucocyte count in leukemias. Multiple myeloma.
- Blood Coagulation and disorders of hemostasis. Classification of coagulation factors, Principles and methods of assessment of coagulation. BT, CT, Prothrombin time, partial thromboplastin time, thromboplastin regeneration time
- Thrombocytopenia, thrombocythemias, platelet function test, platelet count. Clot retraction test. Platelet factor III Test.
- LE cell – definition, morphology causative agents. Various methods of demonstrating LE cells. Blood parasites. Malaria, LD bodies, microfilaria and methods of demonstration.
- Preparation of donor and collection of blood. Solution and apparatus used. Storage of blood. Preparation and storage of plasma. Preparation of packed red cells.
- Principles involved in Blood grouping. ABO system and the methods used. Factors influencing the results of blood grouping, Rh system. Rh antigen. Principles and methods used.
- Cross matching. Compatibility test, direct and indirect Coomb's test – Principle involved and the methods used. Blood transfusion and its Hazards.
- Definition, sources and types histological specimens, kinds of histological presentations
- Labelling, fixation, properties of fixing fluids, classification and composition of fixing fluids. Advantages and disadvantages of secondary fixatives. Post chroming.
- Tissue processing, dehydration and cleaning.
- Embedding. Water soluble substances, embedding in paraffin nitrocellulose
- Equipment for sectioning microtome, knife, honing and stropping. Types, care and use of microtome.
- Technique for sectioning – frozen section. Technique for sectioning – Paraffin embedded tissue. Errors in sectioning and remedies. Attaching blocks to carriers.
- Technique of processing bone for histological studies. Mounting and covering. Mounting media.
- Staining – theory, types of staining agent. Mordents and differentiation. H & E staining. Types of hematoxylin and its preparation. Eosin stock stain and other counter stain used.
- Demonstration of collagen, reticulin, elastin, fat, amyloid, glycogen, mucin, pigments and minerals (malarial, mercury, bile, lipofuscin, calcium, iron, copper).
- Principles of histochemistry and its application
- Demonstration of neuron, neuroglia, myelin and axon. Processing of eye ball for histology.
- Demonstration of fat, iron, amyloid, bile in large sections of tissue.
- Cytology – introduction, definition, types of cytological specimen, preparation of slide for microscopic studies, stains used.
- Museum technique. Preparation, setting up of and arrangement of museum.
- Preparation of cell blocks, mailing of slides.
- FNAC, definition, techniques involved in preparation of smear and staining. PAP smear.
- Calibration and Validation of Clinical Laboratory instruments

