



PBC No. 45 /2025

दक्षिण रेलवे Southern Railway
प्रधान मुख्य कार्मिक अधिकारी कार्यालय
Office of the Principal Chief Personnel Officer
प्रधान कार्यालय, कार्मिक विभाग, चेन्नै-600003
Headquarters, Personnel Department, Chennai-600003

सं/No.SR-HQ0HR(MEDL)/102/2021(C.No 177979)

दिनांक/Dated:14.02.2025

All PHODs/ DRMs/ CMS/ Dy.CPOs/ Sr.DPOs/Secy to GM,
Chairman/RRB/MAS,TVC, Addl.Registrar/RCT/MAS, ,
Principal MDZTI/TPJ, DPOs/SPOs/WPOs/APOs of HQ/Divisions /Workshops/Units.

**विषय/Sub: Syllabus for the post of Lab Superintendent in Level- 6 of
VIIth CPC against 100% (General Selection) quota- Medical
Department- reg.**

The Syllabus for the post of Lab Superintendent in PML-6 against 100%
(General Selection) is uploaded for information, guidance and necessary
action.

This has the approval of competent authority.

संलग्नक/Encl.05 page

Digitally Signed by M Syed
Sirajuddin

Date: 14-02-2025 18:51:30

Reason: Approved

(M.Syed Sirajuddin)

सहायक कर्मचारी संबंधी अधिकारी/Asst. Personnel Officer /SMO.

कृते प्रमुकाधि/for Principal Chief Personnel

Officer

प्रतिलिपि/Copy to: The General Secretary/SRMU
The General Secretary/DREU
The General Secretary/AISCTREA
The General Secretary/AIOBCREA
The General Secretary/NFIR
IT Section/PB/HQ - to upload in the SR website.

DRAFTED SYLLABUS FOR LAB TECHNICIAN/ LAB SUPERINTENDENT EXAM (UPDATED)

GENERAL TOPICS

- Laboratory Services
- Infrastructure in the laboratories.
- Specimen collection, storage & Transportation
- Universal precautions
- Water, chemicals, solutions and reagents
- Units of measurement
- Principle, working and maintenance of Analytical balance
- Colorimetry
- Electrochemistry
- Accidents and Emergencies & first-aid in the laboratory.
- Biowaste Management.
- Cleaning and care of general laboratory glass ware and equipment.
- Working principles, types and application of centrifugation
- Microscopy: Principle, types and uses of microscope
- Automation
- Reagent preparation and storage
- Ethical considerations
- Computers
- Quality assurance: Standard Operating Procedures (SOPs)
- Internal quality control procedures and external quality assessment.

CLINICAL PATHOLOGY

- Urine collection, physical & chemical examination
- Sugars, proteins, ketone bodies, Bence-Jones proteins, bile, blood in urine
- Microscopic examination – formed elements
- Casts, crystals, parasites, abnormal cells
- Other body fluids- types, names, physical & chemical examination
- Semen analysis- physical, chemical and microscopic examination.

HAEMATOLOGY

- Knowledge about Haematopoiesis and Bone marrow
- RBC, WBC and platelet disorders
- Haemoglobin estimation, red cell indices, haematocrit, ESR
- Total cell counts- WBC, RBC, platelets, AEC
- LE cell test
- Investigations of bleeding and Coagulation disorders.
- Haemolytic anaemia workup
- HB electrophoresis, Alkali denaturation Test, Sick cell preparation, Supravital stain, Reticulocyte count, Heinz body.

- Hemoparasites (Malaria, LD bodies, microfilaria and methods of demonstration)
- Bone marrow slide preparation
- Cell Coulter operation, principles and troubleshooting.
- Various benign leucocyte reaction – Leucocytosis, Neutrophilia, Eosinophilia, Lymphocytosis, leukopenia.
- Leukaemia – definition, causes, classification, detection of leukaemia.
- Multiple myeloma workup.
- Platelet function tests.

HISTOPATHOLOGY

- Knowledge of material and equipment used.
- Collection, preservation and labelling of samples
- Tissue processing, dehydration, clearing, Embedding, sectioning, Mounting.
- Technique of processing bone for histological studies.
- Grossing methods, fixatives used and processing of tissue including bone tissue from collection to slide making
- Special stains- Demonstration of collagen, reticulin, elastin, fat, amyloid, glycogen, mucin, pigments and minerals (malarial, mercury, bile, lipofuscin, calcium, iron, copper)
- Demonstration of neuron, neuroglia, myelin and axon.
- Demonstration of fat, iron, amyloid, bile in large sections of tissue.
- Processing of eye ball for histology.
- Principles of histochemistry and its application
- Immunohistochemistry
- Staining procedures- theory, types of staining agent.
- Mordants and differentiation.
- H & E staining. Types of haematoxylins and its preparation. Eosin stock stain and other counter stain used.
- Preservation of specimens, blocks, reports
- Museum technique. Preparation, setting up of and arrangement of museum.

CYTOLOGY AND GENERAL PATHOLOGY

- Different types of techniques and equipment used to obtain materials including various guided procedures
- Methods- FNAC, imprint smear, Vaginal smear, buccal smear, cytospin cytosmeears
- Various staining methods
- Different reagents used in Pathology
- Preparation of fluids for cytological examination
- Liquid based cytology

IMMUNO HAEMOTOLOGY

- Material and methods used in Blood banking
- Blood grouping techniques, ABO system and Rh system
- Donor's selection

- Storage and processing of blood bags
- Blood bags- grouping, quality control test and labelling
- Direct and indirect coombs test, antibody titres
- Problems in blood grouping and cross matching.
- Automation in blood bank.

BIOCHEMISTRY

- Metabolism and disorders of carbohydrates, lipids, amino acids and proteins.
- Basic concepts of principles of nutrition and nutrients- macro and micro nutrients, Vitamins & Minerals.
- Structure of DNA, RNA, ATP, GTP, UTP
- Non protein nitrogen substances (NPN)
- 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 and application of photometry, Spectrophotometry and colorimetry.
- Definition, basic concepts of classification mechanism of action and properties of enzymes, factors influencing enzyme action
- 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 porphyrins and diagnostic laboratory methodologies including appropriate specimen collection and preservation techniques related to porphyrins.
- Acids, bases & salts
- Plasma proteins
- Bilirubin
- Urine
- Creatinine, BUN
- Body fluids
- Glucose tolerance test
- Blood coagulation
- Liver function tests
- Gastric analysis
- Renal function tests

- Radio-isotopic techniques
- Calculi formation and analysis
- Thyroid function tests
- Current concepts in endocrinology- RIA, ELISA, CLIA, ECLIA
- Physiological effects produced by normal and abnormal levels of various hormones.

GENERAL MICROBIOLOGY

- Knowledge of various samples and procedures of sample collection.
- General characteristics and classification of microbes.
- Immunity, antigen and antibody reactions.
- Vaccines
- Serology & culture techniques
- Procedure of handling various infectious agents
- Biomedical waste management.
- Culture media preparation and culture methods.
- Preservation of bacterial and fungal cultures.
- Disposal of used media & specimens
- Sterilization & Disinfection

BACTERIOLOGY

- Characterization of aerobic and anaerobic bacteria, including fastidious organisms.
- Gram's staining method, Albert stain, AFB staining and capsular stain -Reagents preparation and staining.
- Principles, procedure and interpretation of biochemical test for identification of bacteria.
- Antimicrobial agents and anti-microbial susceptibility test.
- Mycobacteria, spirochetes

MYCOLOGY

- Knowledge of common pathogenic fungi
- Morphology and classification of fungus
- Fungal culture media preparation
- Sample processing for fungal examination.
- Techniques used for isolation of medically important fungi.
- Identification of yeast and moulds.

VIROLOGY

- Knowledge of medically important viruses- DNA and RNA virus.
- General laboratory tests for viral detection
- Viral serology & ELISA

- Tests based on Immunochromatography
- Maintenance of virology laboratory

PARASITOLOGY

- Knowledge of various parasites and diseases caused by them
- Classification of parasites
- Collection, transportation, preservation of specimen for parasite examination
- Stool examination of ova and cyst- Normal Saline & Lugol iodine mounts

AUTOMATION IN MICROBIAL IDENTIFICATION

- Automation in bacteriology-Blood culture systems
- Methods of antimicrobial sensitivity tests- Disk Diffusion Test (Kirby Bauer) – MIC- E test
- Automation in bacterial identification.
- Principle of action of antibiotic agents
- Detection of multi drug resistant (MDR) bacteria- ESBL, MRSA, VRE, Mycobacterium
- Serological tests for antigen & antibody detection.

MOLECULAR DIAGNOSTICS

- Techniques- sample collection, transportation, specimen handling and sample processing.
- PCR, NAAT