NORTHERN RAILWAY

Head Quarter Office
Baroda House,
New Delhi

No. 751-E/CadreofLabSudpt/EIIBII/2022 Dated:- 08/08/2025

The Divisional Railway Managers(P),
Northern Railway
UMB, DLI, FZR, LKO & MB

The Medical Director,
Northern Railway Central Hospital,
Basant Lane, New Delhi.

Sub:-Selection for promotion to the post of Lab Superintendent in GP-4200 (level-6) against 100%PQ.

1. In term of Railway Board's RBE no. 178/2019, the post of Lab Supdt GP-4200, Level-6 are to be filled by 100% PQ by selection of Lab Asstt, GP-2800, Level-5. It has been decided to hold a selection for filling up 03 vacancies for the post of Lab Superintendent in GP-4200 (level-6) against 100%PQ. Bifurcation of vacancies are as under:

UR	SC	ST	Total	PwBD (in terms of Railway Board's letter no. E(NG)II/2017/RC-2/1 Policy dt. 27.02.2019)
03	00	00	03	00

2. The following Lab Assistants, have been found eligible to appear in the written test as per seniority.

S. No.	Name (S/Sh.)	Place of Working
1.	Sh. Dharmesh Kumar(OBC)	NRCH
2.	Smt. Anju (OBC)	NRCH
3.	Smt. Hemlata (SC)	NRCH
4.	Sh. Deepu(SC)	NRCH
5.	Smt Kalpana Rawat (UR)	NRCH

3. **Eligibility and Service conditions**:

a) Serving staff in the medical Department fulfilling the qualification prescribed for direct recruitment i.e. "B.SC with Bio-Chemistry/Micro Biology/ Life Science or Equivalent plus Diploma in Medical Lab Tech (DMLT) or equivalent from recognized Institution" or B.SC in Medical Technology (Laboratory) from recognized university, with two year regular service in relevant grade are eligible for being considered for promotion as Lab Supdt. Level-06 by a duly constituted Selection Board in accordance with the prescribed procedure. {Rly. Board L. No. E(NG)II/2001/RR-I/20 dated 05.08.2013 (RBE 79/2013) & Para 165(4) (ii) (a) of IREM Vol-I}

b) The staff working as Lab. Technician/Assistant chemist in Level-05 and possessing the qualification of Matriculation with Science Plus Diploma in Medical Lab. Technology (DMLT) with five year regular service in grade will also be eligible for promotion by selection; the professional Competence being assessed by a trade test at the time of selection. {Authority Para 165(4) (ii) (b) of IREM Vol-I}

c) Person in service as on 01.08.98, with the then existing qualification of Matriculation with Science plus Diploma in Laboratory Technician's course and five year service as Lab Technician/ Asstt. Chemist in Level-5, will also continue to be eligible for promotion by selection as lab Supdt. Level-6. {Authority: Para 165 (4) (ii) of IREM Vol-I}

4. **Syllabus**: A syllabus for the above selection is attached as **Annexure-II**.

5. **Pre-Selection Training:**- It may be ensured that pre-selection coaching has been conducted by the concerned cadre controlling officers at their level itself and a certificate of the same may be sent to this office before the date of written test examination.

6. Procedure for written examination:

i) The written examination will be conducted by Railway Recruitment Cell (RRC), Northern Railway through an Examination Conducting Agency to be provided by Railway Recruitment Board (RRB).

ii) The written examination will be a Computer Based Test (CBT)/ Tablet Based Test (TBT) where there will be no physical question paper. All the questions will appear on the computer/ tablet and the employee will have to mark their responses/ answers to the questions on computer/tablet.

iii) RRC/NR will be issuing a formal admit card online (**through the website https://rrcnr.org)** to each and every eligible and willing employee for appearing in the CBT/TBT. Examination Venue and time of reporting for the written examination will be there in the admit card. As no physical communication will be made after issue of this vacancy notice, it will be the responsibility of the concerned employees to regularly visit RRC/NR's website as well as this Division's website for an update and to download the admit card as and when made available by RRC. Further, no supplementary/absentee examination shall be conducted on this ground.

iv) A link will also be made available on the above website (**https://rrcnr.org**) to the employees, explaining as to how the question will be appearing and how to mark the responses/ answers in the actual examination. Employees can practice through that link any number of times.

v) Both physical and biometric attendance will be marked at the examination venue.

vi) 100% questions will be objective type multiple choice questions.

vii) There will be no negative marking for incorrect answers. (as per RBE no. 194/2019)

viii) There shall be questions in Official Language Policy and Rules upto 10% of marks. However, it is not mandatory to attend the same.

ix) There will be 110 questions of objective multiple choice type with four answer options and the candidate has to answer a maximum of 100 questions. In case the candidate answers more than 100 questions, first 100 attempted questions are to be taken for evaluation.

x) The written examination will be of 02 (two) hours duration.

xi) There will be computerized evaluation.

7. Other Terms and Conditions:

i) Applicants who fullfill the conditions mentioned above may submit their application of Willingness/Unwillingness through proper channel to their respective Dy. CPOs/Sr. DPOs/Personnel Officers in the enclosed Performa, marked as Annexure-I. Personnel Officers may ensure that applications received by their office after last date should not be considered under any circumstances.

ii) No Supplementary written examination is permissible, since the selection is conducted calling volunteers.

iii) Only the original application of Willingness/Unwillingness without (Cutting/overwriting) received in this office within stipulated time frame, will be considered for selection. Application received in duplicate/digitally and partially/wrongly filled will not be considered and summarily rejected.

8. Last Date:

i) Applications of willingness/Unwillingness candidates submit their application **upto 26.08.2025**. as per **Annexure-I.**

ii) Applications received in this office after 26.08.2025 will not be entertained and will be summarily rejected. Applications be forward in a lot by the concerned department and not in piecemeal.

9. **Notifying to the employees:**

The Senior Subordinate/ Supervisor concerned has to furnish a certificate that "the eligible employees have been duly notified of the holding of the written examination and asked to submit their willingness/ Unwillingness. They have also been informed about availability of any further information on RRC/NR's website (https://rrcnr.org) regarding availability of admit card and link for demo test." Such certificates should be forwarded to Personnel Deptt. addressed to Dy. CPO/HQ-II. It will be the personal responsibility of the Senior Subordinate/ Supervisor to complete the formality in this respect. It is further advised that any other communication received in respect to the selection should invariably be intimated to all the eligible employees. In case of non-receipt of any communication the same may be obtained from the Personnel Department or from the Controlling Officer.

Any matter which is not covered/mentioned above will be dealt as per Railway Board's provision.

Please ensure compliance and wide publicity amongst the concerned staff.

DA: As above.

8/8/2025

For General Manager/P

Copy to:-

1) PCMD/NR, Baroda House, New Delhi.

2) APO/RRC for advertising on RRC/NR's website (https://rrcnr.org)

3) IT Cell for uploading at https://nr.indianrailways.gov.in

Annexure-I

Date:-

Dy. CPO/HQ-II
Headquarter Office
Baroda House
New Delhi

Sub- For selection to the post of ....., Level-.....,
against.....Quota,..... Department.

I the undersigned hereby state that I am ..... (willing/unwilling) to appear for the selection for the post of ....., Level-..., Against ..... quota, ... Department which was notified vide ..... letter no. ..... Dated.....

Signature.....
Name.....
Designation.....
Division.....

Witness
Signature
Name

NORTHERN RAILWAY

Headquarters Office
Baroda House
New Delhi

P.S. No.15994/2025

No. 831-E/004/Policy/Pt.III/EIIBII

Dated: /07/2025

The General Manager(P)
Rail Coach Factory, Kapurthala
Diesel Locomotive Modernisation Workshop, Patiala

The Director General
Research Design & Standard Organization

The Medical Director, Northern Railway, Central Hospital, Basant Lane, New Delhi.

DRMs /P-DLI, FZR, LKO, MB & UMB.

Sub:- **Syllabus for Selection for the post of Lab Superintendent/Level-6.**

Ref:-1) PCPO/NR letter no. PCPO/Sel./2025 dated 15.05.2025.
2) Northern Railway's Medical Department No. 7-Med/E-3/QB-SY/Group-C dated 30.06.2025.

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In reference to above subject, the syllabus for selection for the post of Lab Superintendent Level-6, is enclosed herewith for your information and necessary action please.

The above PS No. is available on the website given as under:- https://nr.indianrailways.gov.in

Hindi Version will follow.
Please acknowledge the receipt.

DA. As above.

(Udot Jha)
For General Manager (P)

Copy to for information:

1. All PHODs and All Officers of Personnel Deptt., HQ Office,Baroda House, New Delhi.
2. Genl. Secy./NRMU, 12 Chelmsford Road, New Delhi.
3. Genl. Secy./ URMU, 166/2, P.K.Road, New Delhi.
4. Genl. Secy./AIOBC Rly Emp. Asso. 171/A3, Basant Lane, New Delhi.
5. Zonal. Secy. All India SC/ST Rly Emp. Asso. North Zone Office, Baroda House, New Delhi.
6. Genl. Secy. NRPOA Room No.301, HQ Office, Baroda House, New Delhi.
7. Dy.CPO/IT, HQs Office, Baroda House, NDLS for uploading on the website.

ANNEXURE-II

SYLLABUS FOR LABORATORY SUPERINTENDENT

A. SUBJECT- RELATED TOPICS

PART A: FOUNDATION SUBJECTs

1. GENERAL PATHOLOGY

Basic Sciences Foundation:

- Cellular structure and function
- Tissue types and characteristics
- Organ systems overview
- Homeostatic mechanisms
- Systems Overview: Cardiovascular, Respiratory, Digestive, Urogenital, Nervous, Lymphatic & Immune Systems

Basic Pathological Processes:

- Cell injury and death mechanisms
- Inflammation: acute and chronic responses
- Healing and repair processes
- Thrombosis, embolism, and infarction

Disease Categories:

- Infectious diseases: bacterial, viral, fungal, parasitic
- Immune system disorders
- Neoplasia: benign and malignant characteristics
- Metabolic and nutritional disorders

2. LABORATORY FUNDAMENTALS & SAFETY

Core Concepts:

- Laboratory services and types of laboratories
- Infrastructure requirements and layout design
- Laboratory organization and medical laboratory technician roles
- Code of conduct for medical laboratory personnel

Safety & Quality Management:

- Universal precautions and laboratory safety protocols
- Bio-safety levels and hazard management (biological, chemical, fire)
- Laboratory accidents: prevention, emergency procedures, and first aid
- Biomedical waste management and disposal methods
- Standard Operating Procedures (SOPs)
- Internal quality control and external quality assessment

- Total Quality Management (TQM), Quality Assurance (QA), and Quality Control (QC)

Laboratory Materials & Techniques:

- Water purification, chemical storage, and reagent preparation
- Units of measurement and SI units
- Buffer systems and pH management
- Solution preparation (normal, molar, percentage w/v, v/v)
- Cleaning and maintenance of laboratory glassware and equipment
- Sterilization methods: autoclaves, hot air ovens, and other techniques

3. SPECIMEN MANAGEMENT & PHLEBOTOMY

Collection & Handling:

- Specimen collection, storage, and transportation protocols
- Blood collection techniques (venous and capillary puncture)
- Order of blood draw
- Preservation of blood sample; Changes during blood storage
- Materials required for blood collection
- Home collection procedures and preservation methods
- Anticoagulants: types, uses, and mechanisms of action
- Sample processing and analysis workflows

Sample Types:

- Blood specimens and components
- Urine collection and preservation
- Stool, semen, and sputum samples
- Body fluids (CSF, synovial, serous fluids)
- Tissue specimens for histopathology

4. LABORATORY APPARATUS & INSTRUMENTATION

Basic Equipment:

- Layout and organization of medical laboratories
- Glassware: beakers, flasks, pipettes, burettes, test tubes
- Specialized containers: reagent bottles, specimen bottles, cuvettes
- Flasks - different types (Volumetric, round bottom, Erlenmeyer conical)
- Funnels – different types (Conical, Buchner)
- Bottles – Reagent bottles – graduated and common, Wash bottles – different type
- Specimen bottles
- Measuring cylinders, Test tubes, centrifuge tubes, test tube, Wire gauze, Bunsen burner.
- Cuvette – Bottle, Test tube, Pipette Desiccator
- Measuring devices and calibration
- Reagent Preparation & Storage

Advanced Instrumentation:

- Microscopy: principles, types, and applications
- Analytical balances: operation and maintenance
- Centrifugation: principles, types, and applications
- Colorimetry and spectrophotometry
- Electrochemistry principles
- pH meters: calibration and maintenance
- Point of Care Testing (POCT) platforms
- Laboratory automation systems

PART B: CLINICAL DISCIPLINES

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1. CLINICAL PATHOLOGY & BODY FLUID ANALYSIS

Urine Analysis:

- Collection methods (random, 24-hour, midstream)
- Physical examination: colour, clarity, specific gravity
- Chemical analysis: proteins, sugars, ketones, blood, bile
- Microscopic examination: cells, casts, crystals, parasites
- Clinical significance and interpretation

Other Body Fluids:

- **Cerebrospinal Fluid (CSF):** collection, processing, physical, and chemical analysis
- **Semen Analysis:** physical, chemical, and microscopic examination
- **Sputum Examination:** collection and analysis techniques
- **Synovial Fluid:** collection and clinical significance
- **Serous Fluids:** pleural, pericardial, peritoneal fluid analysis

Cytology:

- Specimen collection and processing techniques
- Exfoliative cytology and Fine Needle Aspiration Cytology (FNAC)
- Pap smear and cervical cytology
- Cytological stains: Giemsa, PAS, H&E, Ziehl-Nielsen
- Liquid-based cytology techniques

2. HEMATOLOGY

Basic Concepts:

- Haematopoiesis and bone marrow function
- Blood composition and cellular components
- Haemoglobin: structure, synthesis, and degradation
- Normal ranges for haematological parameters

Laboratory Procedures:

- Blood film preparation and staining
- Bleeding Time & Clotting Time
- Complete Blood Count (CBC) components
- Haemoglobin estimation methods (Sahli's, cyanmethemoglobin)
- Cell counts: RBC, WBC, platelet, reticulocyte
- Erythrocyte Sedimentation Rate (ESR)
- Packed Cell Volume (PCV) and haematocrit

Specialized Tests:

- Red cell indices and clinical significance
- Differential leucocyte count (DLC), AEC, ANC, IT Ratio
- Blood grouping and cross-matching
- Platelet Function Tests
- Coagulation studies: PT, APTT, bleeding time, clotting time
- Haemoglobin electrophoresis and variant detection
- Bone marrow slide preparation
- LE Cell Test
- Alkali Denaturation Test
- Sickle Cell Preparation
- Supravital Stains
- Heinz Body, Pappenheimer Body

Investigation & Workup of Pathological Conditions:

- RBC, WBC, Platelet Disorders
- **Anaemia:** iron deficiency, megaloblastic, aplastic, haemolytic
- **Benign Lymphocyte Reactions:** Leucocytosis, Leukopenia, Neutrophilia, Lymphocytosis, Eosinophilia, Monocytosis
- **Leukemoid Reactions:** Myeloid, Lymphoid
- **Leukaemia:** AML, CML, ALL, CLL classification and diagnosis
- **Multiple Myeloma**
- **Bleeding Disorders:** platelet function tests, coagulation disorders
- **Hemoglobinopathies:** thalassemia, sickle cell disease
- **Parasitic Infections:** malaria, microfilaria identification, LD bodies

Instrumentation:

- Automated cell counters: principles and troubleshooting
- Hemacytometer usage and maintenance
- Haemoglobinometry: Methods, principle, procedure, application, and error analysis.
- Anticoagulants and preservatives: Mode of action, composition, merits and demerits of EDTA, citrate, oxalate, heparin. and sodium fluoride.
- Quality control in haematology

3. HISTOPATHOLOGY

Tissue Processing:

- Knowledge of material and equipment used
- Specimen collection, fixation, and labelling
- Grossing Methods
- Fixatives: types, composition, advantages/disadvantages
- Decalcification procedures for processing of bone tissue for histopathological studies
- Tissue processing: dehydration, clearing, embedding
- Microtomy: sectioning techniques, knife maintenance
- Mounting
- Processing of eyeball for histology

Staining Techniques:

- **Staining Procedures:** Theory & Types of Staining agents
- **Mordants & Differentiation**
- **Routine Stains:** Haematoxylin and Eosin (H&E) – Types & Preparation
- **Eosin Stock & Other Counterstains**
- **Metachromatic Dyes**
- **Special Stains:**
    - Connective tissue: collagen, reticulin, elastin
    - Carbohydrates: PAS, glycogen demonstration
    - Lipids and pigments: fat, iron, bile, melanin, lipofuscin
    - Amyloid, Mucin, Calcium, Iron, Copper
    - Microorganisms: Gram, acid-fast, silver stains
    - Demonstration of neuron, neuroglia, myelin, and axon

Advanced Techniques:

- Histochemistry principles and applications
- Immunohistochemistry principles
- Frozen section techniques

Record Keeping

- Preservation of specimens, blocks, reports
- Museum preparation and specimen preservation

4. CYTOPATHOLOGY

- Different types of techniques & equipment used to obtain materials, including various guided procedures.
- **Methods:** FNAC, imprint smear, pap smear, nipple discharge smear, vaginal smear, buccal smear, cytospin cytosmears
- Collection, preservation, transportation, and processing of cytological specimens (Sputum, Bronchial brush, Oesophageal and gastric brush, oral scraping, Breast aspiration)
- Cytological Stains: Introduction, Composition of Cytological Stains; Giemsa stain, Periodic Acid-Schiff (PAS) stain, Haematoxylin and eosin stain, Ziehl-Nielsen stain.
- Preparation of fluids for cytological examination
- Neubauer's Chamber

- Liquid based Cytology
- Synovial Fluid Analysis

5. BIOCHEMISTRY

Basic Biochemistry:

- **Principles of assay procedures**
- **Normal ranges in blood, serum, plasma, urine, and reference values**
- **pH:** Definition, Henderson Hasselbach equation, Pka value, pH indicator, methods of measurement of pH, pH paper, pH meter.
- **Volumetric Analysis:** Normal & molar solutions, standard solutions
- **Preparation of reagents and storage of chemicals**
- **Electrophoresis:** working principles, applications, types – paper, agarose gel, cellulose acetate, PAGE
- **Chromatography:** working principles, applications, types – paper, TLC, ion exchange, affinity gel, filtration, gas chromatography & HPLC
- **Working principles & applications of photometry, spectrophotometry, and colorimetry**
- **Carbohydrates:** structure, classification, metabolism disorders
- **Lipids:** classification, lipoproteins, dyslipidemia
- **Proteins:** structure, plasma proteins, clinical significance
- **Non-Protein Nitrogen Substances (NPN)**
- **Enzymes:** classification, clinical enzymology, organ-specific markers
- **Nucleic Acids:** DNA/RNA structure and clinical applications
- **Macro- & Micro- Nutrients:** Vitamins & Minerals

Clinical Chemistry:

- **Glucose Metabolism:** diabetes diagnosis, glucose tolerance tests, HbA1c
- **Lipid Profile:** cholesterol, triglycerides, HDL, LDL, VLDL
- **Liver Function Tests:** bilirubin, aminotransferases, alkaline phosphatase
- **Kidney Function:** urea, creatinine, electrolytes
- **Pancreatic Function:** Amylase, Lipase
- **Cardiac Markers:** troponins, CK-MB, myoglobin
- **Tumour Markers:** PSA, CEA, AFP, CA 125
- **Electrolytes & Blood Gases**

Endocrinology:

- **Current Concepts:** RIA, ELISA, CLIA, ECLIA
- Physiological effects produced by normal and abnormal levels of various hormones
- **Thyroid Function:** T3, T4, TSH
- **Reproductive Hormones:** Testosterone, Oestrogen, Progesterone, LH, FSH
- **Diabetes Markers:** Insulin, C-Peptide, Glucagon
- **Stress Hormones:** Cortisol, ACTH

Specialized Areas:

- Therapeutic drug monitoring
- Toxicology and drug analysis

- Trace elements and vitamins
- Inborn errors of metabolism
- Study/ Estimation of sugar, protein, and chloride from Cerebro Spinal Fluid (CSF), pleural fluid, peritoneal fluid, amniotic fluid - foam test.
- Estimation of Ketone bodies in blood/ urine.
- Estimation of Vitamin A, C, E/ & Metabolites of Vitamins in serum /Urine (B complex)
- Methods for electrolyte estimation -Na/ K/ Cl/ Ca in serum/urine
- Porphyrins – Including appropriate specimen collection & preservation techniques
- Acid-base balance and blood gases
- Radio isotope techniques
- Calculi formation and analysis

6. MICROBIOLOGY

General Microbiology:

- Sample: Types and Procedures for collection
- General characteristics and classification & nomenclature systems of microbes
- Immunity, antigen, and antibody reactions
- Vaccines
- Serology & culture techniques
- Bacterial morphology and physiology
- Growth requirements and culture conditions
- Sterilization and disinfection methods
    - Physical agents: Dry heat (flaming, incineration, and hot air oven),
    - Moist heat (pasteurization, boiling, autoclaving and Tyndallisation), filtration and UV radiation.
    - Chemical agents: ethanol, phenol, and ethylene oxide.
- Disposal of used media and specimens
- Normal flora and pathogenicity
- Nosocomial Infections

Culture Techniques:

- **Media Preparation:** types and compositions
    - Basic: nutrient agar, nutrient broth
    - Enriched: blood agar, chocolate agar
    - Selective: MacConkey, DCA
    - Differential: specialized media for organism identification
    - Dorsett's egg media, Mac Conkey's media, Lowenstein-Jensen's media
- Pure culture techniques and preservation methods
- Anaerobic culture systems

Identification Methods:

- **Staining Techniques:** Gram, acid-fast, capsule, spore stains, India ink
- **Biochemical Tests:** catalase, coagulase, oxidase, IMViC
- **Antimicrobial Susceptibility:** disk diffusion, MIC determination

- . **Rapid Identification:** automated systems, molecular methods

Systematic Bacteriology:

- Characterization of aerobic and anaerobic bacteria, including fastidious organisms
- Gram's staining method, Albert stain, AFB Stain, Capsular stain – reagents preparation & staining
- Principles, procedure, and interpretation of biochemical tests for identification of bacteria
- Antimicrobial agents and antimicrobial susceptibility test
- **Gram-positive:** Staphylococcus, Streptococcus, Bacillus, Clostridium
- Catalase Test, Coagulase Test
- **Gram-negative:** Enterobacteriaceae, Pseudomonas, Haemophilus
- Oxidase Test, IMViC Test, Sugar Fermentation Test
- **Acid-fast:** Mycobacterium species
- **Anaerobes:** identification and clinical significance

Mycology:

- Fungal morphology and classification
- Culture media and identification techniques
- Types of Media for fungus (Sabouraud's Dextrose Agar (SDA), Brain Heart Infusion (BHI),
- Potato Dextrose Agar (PDA)
- Sample collection and processing
- Techniques used for isolation of medically important fungi
- **Common Infections:** dermatophytosis, candidiasis, systemic mycoses
- Laboratory diagnostic methods
- Identification of yeast and moulds

Virology:

- Viral classification and characteristics – DNA/ RNA Viruses
- Sample collection and processing
- **Diagnostic Methods:** serology, ELISA, antigen detection, PCR
- **Important Viruses:** hepatitis, HIV, influenza, dengue
- Tests based on immunochromatography
- Maintenance of virology laboratory

Parasitology:

- Classification of parasites and vectors
- Collection, transportation, preservation of stool specimen for parasite examination
- **Stool Examination**: Ova & Cyst – Normal Saline and Lugol Iodine mounts
- **Protozoa:** Plasmodium, Entamoeba, Giardia, Leishmania
- **Helminths:** Ascaris, Taenia, Schistosoma, Ancylostoma
- **Arthropods:** mosquitoes, flies, ticks, mites
- Diagnostic techniques and life cycle studies (Pictorial Representation)

Applied Microbiology:

- Clinical specimen processing

- Infection control and nosocomial infections
- Food and water microbiology
- Biomedical waste management

Automation in Microbial Identification:

- Automation in Bacteriology – Blood Culture Systems
- 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 Resistance (MDR) Bacteria – ESBL, MRSA, VRE, Mycobacterium
- Serological tests for antigen and antibody detection

7. IMMUNOHEMATOLOGY (BLOOD BANKING)

Blood Group Systems:

- ABO system: genetics, serology, variants
- Rh system: antigens, antibodies, clinical significance
- Other systems: Kell, Duffy, Kidd, MNS
- Antibody screening and identification

Blood Collection & Processing:

- Donor selection criteria and screening
- Blood collection procedures and equipment
- Component preparation and storage
- Quality control testing and labelling of Blood Bags
- Testing for Transfusion Transmitted Infections

Transfusion Medicine:

- Pre-transfusion testing: crossmatching, compatibility
- **Specialized Tests:** direct/indirect Coombs, antibody titration
- Transfusion reactions: recognition and investigation
- Problems & troubleshooting in Blood Grouping & Crossmatching
- Haemolytic disease of the newborn
- Therapeutic apheresis procedures
- Cryoprecipitate

Additional Aspects:

- Organization and operation of blood donation camp
- Quality control in blood banking
- Advances in transfusion medicine: Cord blood bank, Automation
- Obstetric and Paediatric Transfusion

8. MOLECULAR DIAGNOSTICS & ADVANCED TECHNIQUES

Sample: Collection, Transportation, Handling, Processing

Molecular Biology Techniques:

- DNA/RNA extraction and purification
- Polymerase Chain Reaction (PCR) and RT-PCR
- Gel electrophoresis and analysis
- Sequencing and genotyping methods
- NAAT

Immunological Techniques:

- ELISA: principles and applications
- Immunofluorescence assays
- Immunodiffusion
- Western blotting
- Flow cytometry concepts
- Radioimmunoassay (RIA)
- Chemiluminescence immunoassays (CLIA)

Fundamental Genetics:

- DNA structure and replication
- Mendelian inheritance patterns
- Chromosomal abnormalities
- Sex-linked inheritance

Applied Genomics:

- Human Genome Project implications
- Molecular diagnostics applications
- Genetic counseling basics
- Population genetics principles

Point-of-Care Testing:

1. Rapid diagnostic tests
2. Portable analyzers
3. Quality assurance for POCT

PART C: SUPPORT SUBJECTS

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1. MEDICAL RECORDS & ETHICS

Documentation:

- Medical record forms and content requirements
- Utility & functions of Medical Records in Laboratories
- Laboratory information systems (LIMS, Apex LIS, eLAB)
- Report writing and data management
- Record maintenance and retrieval systems

Ethical Considerations:

- Basic principles of medical ethics
- Patient confidentiality and informed consent
- Patient rights and autonomy
- Professional conduct and malpractice prevention

2. BIOMEDICAL INSTRUMENTATION

Instrument Categories:

- **Optical Instruments:** microscopes, spectrophotometers, colorimeters
- **Separation Techniques:** centrifuges, electrophoresis, chromatography
- **Measurement Devices:** pH meters, analytical balances, thermometers
- **Specialized Equipment:** autoclaves, incubators, laminar flow hoods

Maintenance & Troubleshooting:

- Preventive maintenance protocols
- Calibration procedures
- Common problems and solutions
- Safety protocols for instrument operation

3. COMPUTER APPLICATIONS & INFORMATION SYSTEMS

Basic Computer Skills:

- Hardware and software concepts
- Operating systems and file management
- Internet applications and email

Laboratory Informatics:

- Laboratory Information Management Systems (LIMS)
- Electronic health records integration
- Data analysis and statistical software
- Report generation and transmission

Microsoft Office Applications:

- Word processing for documentation
- Excel for data analysis and calculations
- PowerPoint for presentations
- Database management basics

4. LABORATORY ACCREDITATION & QUALITY MANAGEMENT

Accreditation Standards:

- NABL (National Accreditation Board) requirements
- ISO 15189 medical laboratory standards
- CAP (College of American Pathologists) guidelines
- Good Laboratory Practices (GLP)

Quality Systems:

- Document control and management
- Internal audit procedures
- Corrective and preventive actions
- Management review processes
- Continuous improvement strategies

5. COMMUNICATION SKILLS

Professional Communication:

- Verbal and non-verbal communication
- Patient interaction skills
- Telephone etiquette and email protocols
- Medical terminology usage

Presentation Skills:

- Public speaking and confidence building
- Visual aid preparation and use
- Group discussion participation
- Interview skills and resume writing

Healthcare Communication:

- Patient education techniques
- Interdisciplinary team communication
- Conflict resolution strategies
- Cultural sensitivity in healthcare settings

6. RESEARCH METHODOLOGY & BIOSTATISTICS

Research Fundamentals:

- Research design and methodology
- Literature review techniques
- Hypothesis formulation and testing
- Data collection methods

Statistical Analysis:

- Descriptive & Inferential Statistics
- Data presentation and interpretation
- Statistical software applications

PART D: RAJBHASHA

Rajbhasha