



ICMR-VCRC/Tech/01/2023-24

Date: 17.11.2023

**CORRIGENDUM**

With reference to the notification issued by ICMR-VCRC for filling up of technical posts under various disciplines vide notification No. ICMR-VCRC/Tech/01/2023-24, the Scheme of Test may be read as follows;

| Sl. No. | Subject                           | Marks     | Duration    |
|---------|-----------------------------------|-----------|-------------|
| 01      | General Knowledge                 | 50 Marks  | 120 Minutes |
|         | Test of Reasoning                 |           |             |
|         | General Aptitude                  |           |             |
|         | Basic English                     |           |             |
|         | Basic Mathematics /Basic Computer |           |             |
| 02      | ICMR                              | 10 Marks  |             |
| 03      | Subject specialization            | 40 Marks  |             |
| Total   |                                   | 100 Marks |             |

The syllabus (indicative) for the posts and the notice for scribe have been annexed herewith, separately.

All the other terms and conditions shall remain unchanged.

**DIRECTOR**

**SYLLABUS****TECHNICAL ASSISTANT: COMPUTER SCIENCE**

Relational Database Management System: Relational Algebra– Tuple and Domain Relational Calculus – SQL – Views – Triggers – Domain Constraints – Referential Integrity.

Normalization: Functional Dependencies – Inference rules – Decomposition – Properties – Normal Forms (NF) – First NF, Second NF, Third NF, Boyce-Codd NF, Fourth NF, and Fifth NF.

Sorting and Indexing:

Data Mining: Data Mining Functionalities – Data Preprocessing – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation. Association Rule Mining: - Efficient and Scalable Frequent Item Set Mining Methods – Mining Various Kinds of Association Rules – from Association Mining to Correlation Analysis – Constraint-Based Association Mining.

GIS: Definition -History of GIS -Basic Components of GIS – Hardware, Software, Spatial Data, Non-spatial data, Scaling, Open-Source software.

Functions in C++: Function Prototype - Arguments passing - Return type - Default arguments - Inline functions– Function overloading - Operator function - Operator overloading - Template functions.

Inheritance in C++: Derived class - Single Inheritance - Multiple Inheritance - Hierarchical Inheritance - Hybrid Inheritance - Virtual Functions - Virtual Base class - Nesting of classes.

Markup and Scripting Languages: Introduction to HTML – Attributes, Events, Web forms, SVG, Audio and Video – DHTML – Client-Side Scripting –JavaScript – Cascading style sheets –XML – DTD – XML Schema – DOM – SAX –XSL–AJAX–JSON.

Web Application Development: HTML, PHP, Java, JavaScript, Perl, Python

Android: Overview – Features - activities - services - content providers - broadcast receivers.

Information Security: Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel.

Testing Automation Tools: Building and testing.

R language

Machine learning process

AI tools

Internet of Things

**TECHNICAL ASSISTANT: ELECTRICAL / ELECTRICAL ENGINEERING**

- DC Circuits
- AC Circuits
- Transformers
- Electrical Machines
- Electromagnetic Fields
- Electronic Devices and Circuits
- Power Electronics
- Measurements and Instrumentation
- Transmission and Distribution
- Control Systems
- Electrical Machine Design
- Power System Engineering
- Power System Protection and Switch Gear
- High Voltage Engineering
- FACTS

- HVDC and AC Transmission
- Power Quality
- Energy Engineering
- Renewable Energy Systems
- Electric and Hybrid Vehicles

### **TECHNICAL ASSISTANT: SOCIAL WORK/ SOCIOLOGY**

#### **Sociology**

Introduction to Sociology, Fundamentals of Sociology, Elements of Sociology, Principles of Sociology, General Sociology, Sociological Concepts, Study of Society, Social structure of Indian Society, Indian Social System, Indian Social Institutions, History of Sociological Thought, Social Thinkers, Early Sociological Theory, Introduction to Classical Social Thinking, Founding Fathers of Sociology, Social Problems and Social Welfare, Social Concerns, Social Pathology, Social Disorganisation, Social Policy, Social Demography, Population Education, Rural Sociology, Social Change, Urban Sociology, Social Stratification and Mobility, Socialisation and Social Control, Social Conflicts/Social Movements, Sociology of Women and Society, Public Health And Hygiene, Sociology of Family, Sociology of Mass Communication, Sociology of Health, Study of Weaker sections, Applied Sociology, Participatory Sociology, Personnel Management, Social Statistics

#### **Social Work**

Foundations of Social Work, Social Science Concepts and Social Work, Communicative English, Social Casework, Social Group Work, Social Work Practice, Community Organization and Social Action, Contemporary Social Problems and Concerns, Programme Media and Its Application, Social Work Research, Human Rights and Social Justice, Social Legislation in India, Skill Development and Entrepreneurship, Social Policy, Planning and Development, Health: Issues and Concerns, Disaster Management, Environmental Social Work, Social Deviance, Project Formulation, Counselling and Guidance, Social Welfare Administration

### **TECHNICAL ASSISTANT: LIFE SCIENCES**

#### **ZOOLOGY**

- General characteristics of invertebrate, Chordata and vertebrata; Parasites: Morphology, pathogenesis, laboratory diagnosis, prevention and control of the following parasites. *Leishmania donovani*, *Leishmania tropica*, *Plasmodium falciparum*, *Balantidium coli*, *Taenia saginata*, *Taenia solium*, *Ascaris lumbricoides*.
- Vector borne human diseases: pathogens and mechanisms of transmission;
- Structure and functions of cell and cell organelles; cell division and cell cycle; basics of cancer cells
- Genetics: Mendelian concepts; linkage and crossing over; karyotype; chromosomal anomalies and syndromes.
- Physiology: Nutrition and digestion, respiration, circulation, locomotion; neural and chemical coordination, excretion and reproduction.
- Environmental Biology: ecosystem, food chain and food web, population and community ecology; pollution-water, soil, air, thermal and sound.
- Embryology: gametogenesis, fertilization, cleavage, blastulation and gastrulation, extra embryonic membranes and placentation
- Evolution: Origin of life, theories and types of evolution, isolation and speciation mechanisms, Hardy-Weinberg equilibrium.

## **MICROBIOLOGY & MOLECULAR BIOLOGY**

- Ultrastructure of micro-organisms-bacteria, fungus and virus; Principles and methods of sterilization; Types of culture media; Pure culture techniques.
- Prokaryotic DNA replication: semi-conservative method, Meselson and Stahl Experiment, enzymes and mechanism involved; inhibitors of replication. Prokaryotic Transcription: mechanism and enzymes involved. Genetic code; inhibitors of transcription. Prokaryotic Translation: steps involved and inhibitors of translation; Lac operon;
- Bacteria: pathogenicity, laboratory diagnosis and prevention of infections caused by the following organisms: Staphylococcus aureus, Streptococcus pyogenes, Streptococcus pneumoniae, Neisseria meningitidis, Neisseria gonorrhoeae, Corynebacterium diphtheriae, Clostridium tetani, Escherichia coli, Shigella, Salmonella, Vibrio cholerae, Pseudomonas, Mycobacterium tuberculosis, Mycobacterium leprae.
- Viruses: General properties and structure; classification: Human viruses, animal viruses, plant viruses, bacterial viruses and retroviruses.
- Physical and chemical properties, types and functions of carbohydrates, proteins, lipids and nucleic acids; Metabolic pathways: Glycolysis, TCA cycle and its energetics, electron transport chain and oxidative phosphorylation: Gluconeogenesis, Glycogenesis, Glycogenolysis, Gluconeogenesis, Pentose phosphate pathway,  $\beta$  - oxidation of fatty acids, Urea cycle.
- Nucleic acids: DNA and RNA- structure and types; as genetic materials, experiments of Griffith, Avery, Macleod and McCarty, Hershey and Chase, Lederberg and Tatum; Chargaff's principles
- Mutation: spontaneous and induced mutations, mutation rate; carcinogens; repair of damaged DNA.

## **BIOTECHNOLOGY**

- BIO-ANALYTICAL TOOLS: Electron microscopy (TEM and SEM), Spectrophotometry (visible, UV, infrared), centrifugation, Chromatography. Electrophoresis. Blotting (Southern, Northern and Western).
- RECOMBINANT DNA TECHNOLOGY: Restriction enzymes, ligases, polymerases, alkaline phosphatase. Gene recombination and gene transfer: Transformation, Episomes, Plasmids and other cloning vectors (Bacteriophage-derived vectors, artificial chromosomes), Microinjection, Electroporation, Ultrasonication, Principle and applications of Polymerase chain reaction (PCR), primer-design, and RT- (Reverse transcription), PCR.
- IMMUNOLOGY AND IMMUNODIAGNOSTICS: Components of mammalian immune system, Genetic basis of antibody diversity, Major Histocompatibility complexes; Autoimmune diseases, Immunodeficiency-AIDS: Vaccines & Vaccination; immunodiagnosics - RIA, ELISA.
- PLANT AND ANIMAL BIOTECHNOLOGY: Transgenesis and Molecular markers, Bioethics, Biosafety, Plant tissue culture techniques & secondary metabolites production, Transgenic animals and Animal propagation, Gene Therapy; Embryo transfer techniques and Stem Cell Technology.
- ENVIRONMENTAL & INDUSTRIAL BIOTECHNOLOGY: Pollution Types, Biodegradation and Bioremediation, Biofuels, Basic principles of Microbial Technology, Commercial Production of Microbial products.

## **TECHNICAL ASSISTANT: PHYSIOTHERAPY**

### **A: Anatomy**

Musculo Skeletal Anatomy

### **B: Physiology**

Nerve Muscle Physiology, Cardiovascular System, Respiratory System

### **C: Nutrition, Microbiology and Pathology**

Nutrition in diseases, General Microbiology, Sterilization & disinfection. Aetiology, pathogenesis, laboratory diagnosis, and prevention of General Pathology. Inflammation & Repair, Infectious diseases

### **A: General Medicine:**

Infection, Geriatrics

### **B: General and Plastic Surgery:**

Reasons for Surgery, Plastic Surgery

### **C: Paediatrics - Growth and development**

Assessments, Cerebral Palsy, Spinal Cord Disorders, Muscular Dystrophy

### **A: Soft tissue manipulation**

Essential requirements for soft tissue manipulation, Classification, definitions & descriptions of the basic massage techniques.

### **B: Exercise therapy**

Muscle testing, Goniometric measurement, Posture, Hydrotherapy, Crutch walking, Endurance Training  
Functional Re-education.

### **C: Electrotherapy:**

Galvanic current, Transcutaneous Electrical Nerve Stimulation (TENS), Interferential Therapy (IFT), Functional electrical stimulation, Infra red radiation, Wax bath / hydrocollator, Cryotherapy, Soft L.A.S.E.R.

### **D: Biomechanics and Kinesiology**

Basic Concepts in Biomechanics: Kinematics and Kinetics, Joint structure and function, Gait, Movement Analysis

### **E: Physiotherapy in orthopaedics conditions:**

Orthopedic Physical Assessment, Fractures, Treatment guidelines for soft tissue injuries- Spinal conditions, Shoulder joint, Wrist and Hand, Hip, Knee, Ankle

### **F: Physiotherapy in neurological conditions:**

Parkinsonism, Spinal cord lesions, Peripheral nerve lesions

### **G: Physiotherapy in cardiorespiratory conditions:**

General Overview Assessment, Investigations and tests , General overview of Physical Treatment  
Physiotherapy techniques to increase lung volume , Physiotherapy techniques to decrease the work of breathing, Physiotherapy techniques to clear secretions, Physiotherapy in Obstructive Lung Diseases, Physiotherapy in Restrictive Lung Disorders, Physiotherapy after Pulmonary Surgery, Physiotherapy after Cardiac Surgery and ICCU.

## **TECHNICAL ASSISTANT: CHEMISTRY**

### **INORGANIC CHEMISTRY**

#### **1. Atomic Structure**

Bohr's theory, Dual behavior of matter and radiation, de Broglie's relation, Heisenberg Uncertainty principle. Shapes of s, p and d atomic orbitals, Spin quantum number (s) and magnetic spin quantum number (ms).

#### **2. Chemical Bonding and Molecular Structure**

Ionic Bonding - Lattice energy. Born-Haber cycle and its applications, polarizing power and polarizability. VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with the following examples – BeCl<sub>2</sub>, BF<sub>3</sub>, NH<sub>3</sub>, SF<sub>4</sub>, PCl<sub>5</sub>, SF<sub>6</sub>

#### **3. S-block elements: preparation, properties and comparative study of Alkali metals and Alkaline Earth**

metals

**4. P-block elements:** preparation, properties and comparative study of group 13, 14, 15, 16, 17 & 18 elements

**5. d-block & f-Block elements:** preparation, properties and comparative study of 3d, 4d, 5d transition elements and f-Block elements

### **6. Co-ordination compounds**

Classification of ligands - Chelation - Co- ordination number and stereo chemistry of complexes – Werner’s theory - EAN rule. Valence Bond Theory - Spectrochemical series

### **7. NUCLEAR CHEMISTRY**

Nuclear forces- Atomic Mass Unit- Packing Fraction – Mass Defect and Binding Energy of the nucleus. Stability of nuclei. Nuclear models. Nuclear reactions- Nuclear Fission- Fission of Uranium- Nuclear fusion. Radio activity

## **ORGANIC CHEMISTRY**

### **1. FUNDMENTALS OF ORGANIC CHEMISTRY**

Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Homolysis and Heterolysis. Nucleophiles and electrophiles. Carbocations, Carbanions and free radicals. Aromaticity: Benzenoids and Hückel’s rule

### **2. STEREOCHEMISTRY**

Conformations –Ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality. Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds

### **3. ALKANES: ALKENES & ALKYNES**

Wurtz reaction, Kolbe’s Synthesis from Grignard reagent reactions. Birch reduction. Aromatic Hydrocarbons: Preparation and properties of aromatic hydrocarbons, benzene, benzoic acid, aniline, phenol and benzamide

### **4. ALCOHOLS:**

Preparation of primary, secondary and tertiary alcohols using Grignard reagent, ester hydrolysis, reduction of aldehydes, ketones, carboxylic acids and esters. Reactions with sodium, HX (Lucas Test), Esterification, Oxidation (with PCC, alk.  $\text{KMnO}_4$ , acidic dichromate, Con.  $\text{HNO}_3$ ). Oxidation of diols - Pinacol-Pinacolone rearrangement

### **5. PHENOLS:**

Preparation and Chemical Reactions - Electrophilic substitution - nitration, halogenations and sulphonation. Reier-Tiemann reaction, Gattermann-Koch reaction, Houben- Hoesch condensation, Schotten Baumann reaction.

### **6. CARBONYL COMPOUNDS**

Aldehydes and ketones: Formaldehyde, Acetaldehyde, Acetone and Benzaldehyde - Reaction with HCN, ROH,  $\text{NaHSO}_3$ , amino derivatives. Iodoform test, aldol condensation, Cannizzaro’s reaction, Wittig reaction, Benzoin condensation, Clemmensen Reduction and Wolff Kishner reduction. Meerwein-Pondorff-Verley reduction Carboxylic acids & their derivatives: Hell- Volhardt-Zelinsky reaction, Synthetic applications of diethyl malonate Williamson’s synthesis

### **7. ARYL HALIDES**

Preparation of halo-benzenes from phenol, Sandmeyer and Gattermann reactions. Reformatsky Reaction, Perkin condensation.

### **8. AMINES**

Preparation from alkyl halides, Gabriel- Phthalimide synthesis, Hofmann bromamide reaction. Hofmann and Saytzeff elimination, Carbylamine test, Hinsberg test, Schotten-Baumann reaction

### **9. HETEROCYCLICS**

Molecular Orbital picture of pyrrole, furan, thiophene and pyridine. Methods of synthesis and chemical reactions Comparison of basicity of pyridine, piperidine and pyrrole

## 10. Natural Products:

Classification, nomenclature, occurrence of Alkaloids & Terpenoids: Carbohydrates- Configuration, Reactions of monosaccharides (glucose, fructose), inter-conversion of glucose to fructose

## **PHYSICAL CHEMISTRY**

### **1. GASEOUS STATE**

Kinetic molecular model of a gas: Postulates and derivation of the kinetic gas equation - collision frequency - collision diameter - mean free path

### **2. LAW OF THERMODYNAMICS:**

Statement of first, second and third law of thermodynamics; concept of residual entropy; Nernst heat theorem

### **3. CHEMICAL EQUILIBRIA**

Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between  $\Delta G$  and  $\Delta G^\circ$ , Le Chatelier's principle. Relationships between  $K_p$ ,  $K_c$  for reactions involving ideal gases.

### **4. SOLID STATE**

Definition of Space lattice, Unit cell, Laws of crystallography, Law of constancy of interfacial angles, Law of rationality of indices, Law of symmetry, Derivation of Bragg's equation

### **5. CHEMICAL KINETICS**

Order and Molecularity of reactions, Half- life period; Pseudo order reactions, Arrhenius equation; Activation energy and its significance

### **6. CATALYSIS, PHOTOCHEMISTRY AND PHASE RULE**

Homogeneous, Heterogeneous catalysis, Acid-base catalysis, Enzyme catalysis, Auto catalysis. Laws of photochemistry- Grothus- Drapper and Stark-Einstein laws; Jablonski diagram; Fluorescence and phosphorescence; Quantum yield.

### **7. ELECTROCHEMISTRY**

Specific conductance, Equivalent conductance, Variation of equivalent conductance with dilution, Kohlrausch law and Transport number

### **8. SPECTROSCOPY**

UV & Infrared spectrum- Selection rules, Energy levels, Vibrational spectroscopy, Selection rules, Frank-Condon principle.

## **ANALYTICAL AND CLINICAL BIOCHEMISTRY**

### **1. BIOLOGICAL CHEMISTRY**

Carbohydrates: Biological importance of carbohydrates, Metabolism, Cellular currency of energy (ATP), Glycolysis, Krebs cycle.

Proteins: Aminoacids, peptides and proteins

classification of proteins: Digestion and absorption of proteins.

Enzymes: Elementary treatment of enzymes, cofactors.

Hormones: Physiological functions of adrenaline, thyroxin, oxytocin, insulin and sex hormones.

Micronutrients and their biological role in human systems. Iron Metabolism - Definition of Health, WHO standard - Balanced diet.

### **2. Biochemical Analysis:**

Blood: Composition, grouping and Rh factor - collection and preservation of samples. Anaemia, Urine: Collection and preservation of samples.

## **CHEMOINFORMATICS**

History and evolution of chemoinformatics, Use of chemoinformatics, Prospects of chemoinformatics, Model Building; Modeling Toxicity; Structure-Spectra correlations Design of Combinatorial Libraries; Ligand-Based and Structure Based Drug design; Application of Chemoinformatics in Drug Design.

## **APPLICATIONS OF COMPUTERS IN CHEMISTRY**

1. Elements of the BASIC language. BASIC keywords and commands. Logical and relative operators. Strings and graphics. C language – introduction, C compiler, operating systems and preprocessor

directives - variables, constants, operators, input and output functions.

2. Applications OF Computers in Chemistry: Calculation of the radius of the first Bohr orbit for an electron, Calculation of electronegativity of an element using Pauling's relation. Calculation of empirical formulae of hydro carbon, calculation of reduced mass of a few diatomic molecules, determination of the wave numbers of spectral lines of hydrogen atom.

### **GREEN METHODS IN CHEMISTRY**

1. INTRODUCTION - Definitions of Green Chemistry. Brief introduction of twelve principles of Green Chemistry with examples, special emphasis on atom economy, reducing toxicity. Waste Production, problems and prevention: Sources, Cost of waste, Waste minimization techniques, Design for degradation and polymer recycling.

2. DESIGNING GREEN PROCESSES: Conventional reactors, Inherently safer design, Process intensification, In-Process monitoring.

### **PHARMACEUTICAL CHEMISTRY**

#### **1. DRUGS – Classification and Action**

Classification of drugs– Definition and action of Antipyretics, anti- inflammatory, analgesics (Aspirin, paracetamol, Ibuprofen), antibiotics (Penicillin, Streptomycin, chloramphenicol, ampicillin), Antivirals (Acyclovir), antimetabolites, antibacterial and antifungal agents (Sulphonamides), Central Nervous System agents (Phenobarbital, Diazepam), Cardiovascular (Glyceryl trinitrate)

#### **2. HEALTH PROMOTING DRUGS & HIV**

Vitamins A,B, C, D, E and K - Micronutrients -Medicinally important inorganic compounds of Al, P, As, Hg and Fe, Agents for kidney function (Aminohippuric acid).HIV – Symptoms, Prevention, Treatment – AIDS related drugs (AZT- Zidovudine)

### **TECHNICAL ASSISTANT: CIVIL ENGINEERING**

Basic Electrical Engineering Programming for Problem Solving

Engineering Graphics and Computer Aided Drawing

Environmental Science

Basic Electrical Engineering Laboratory

Programming Laboratory

Mathematics

Physics

Chemistry

Workshop and Manufacturing Practice

Physics Laboratory

Chemistry Laboratory

Biology for Engineers

Engineering Mechanics

Engineering Geology

Fluid Mechanics

Building Technology

Surveying and Geomatics

Computer-Aided Civil Engineering Drawing

Surveying Laboratory

Eco-friendly Building Materials and Construction

Materials and Technologies of Building

Construction

Numerical Methods and Statistics

Disaster Management

Hydraulics Engineering



Instrumentation and Sensor Technologies for Civil  
Engineering Applications  
Concrete Technology  
Basics of Solid Mechanics  
Materials Testing and Evaluation Laboratory  
Fluid mechanics Laboratory  
Mechanics of Materials  
Environmental Engineering  
Transportation Engineering  
Hydrology Water Resources and Irrigation  
Engineering  
Material Testing and Evaluation Laboratory-II  
(Highway and Concrete Laboratory)  
Environmental Engineering Laboratory  
Entrepreneurship  
Design of Pre-stressed Concrete Structures  
Mechanics of Solids and Fluids  
Structural Analysis  
Structural Concrete Design  
Geotechnical Engineering  
Estimation costing and Valuation  
Geotechnical Engg. Laboratory  
Structural Mechanics Laboratory  
Essence of Indian Traditional Knowledge  
Environmental Impact Assessment and Audit  
Pavement Materials and Ground Improvement  
Techniques  
Industrial Economics & Management  
Computer Aided Analysis and Design of Structures  
Professional Practice, Law & Ethics  
Design of Steel Structural Elements  
Basics of Structural Design  
Structures  
Safety Practices in Construction  
Construction Methods and Equipments Planning  
Construction Management  
Utilization of Waste Materials  
Airport Harbour and Tunnel Engineering  
Finite Element Analysis  
Advanced Structural Analysis  
Advanced Reinforced Concrete Structures  
Advanced Steel Design  
Earthquake Resistant Structures  
Bridge Engineering  
Geotechnical Processes and Application  
Highway and Airport Pavement Design VII  
Industrial Waste Disposal and Treatment  
Foundation Engineering  
Design and Construction of Prefabricated  
Structures  
Environmental Geo-technology  
Formwork for Concrete Structures  
Non Destructive Testing

Building Lighting and Ventilation Engineering  
 Air, Water and Noise Pollution  
 Airport and Harbour Engineering  
 Fluid Mechanics and Strength of Materials  
 Numerical Methods and Statistics  
 Basic Electrical Engineering  
 Programming for Problem Solving  
 Engineering Graphics & Computer Aided Drawing  
 Electrical Engineering Laboratory  
 Programming Laboratory  
 Workshop and Manufacturing Practice  
 Engineering Mechanics  
 Computer-Aided Civil Engineering Drawing  
 Instrumentation and Sensor Technologies for Civil Engineering Applications  
 Engineering Geology  
 Introduction to Fluid Mechanics  
 Building Technology  
 Surveying and Geomatics  
 Surveying Laboratory  
 Disaster Management  
 Hydraulics Engineering  
 Concrete Technology  
 Introduction to Solid Mechanics  
 Materials Testing and Evaluation Laboratory-I  
 Fluid mechanics Laboratory  
 Mechanics of Materials  
 Environmental Engineering  
 Transportation Engineering  
 Hydrology water Resources and Irrigation  
 Material Testing and Evaluation  
 Laboratory-II (Highway and Concrete Laboratory)  
 Environmental Engineering Laboratory  
 Structural Analysis  
 Structural Concrete Design  
 Geotechnical Engineering  
 Estimation costing and Valuation  
 Geotechnical Engg. Laboratory

### **TECHNICAL ASSISTANT: BIO-INFORMATICS**

- Database development and management systems, Data abstraction, Data models, Instances and schemes, E-R model- Basic concepts and applications -Network data model, Hierarchical data model and Multimedia databases.
- Biological Databases; Sequence databases; Structural databases and Motif databases: Genbank- NCBI, DDBJ, and EMBL. Bioinformatics tools: FASTA, BLAST, BLAT, RASMOL: Introduction to XML, UMLS, CORBA, PYTHON and OMG/LIFESCIENCE.
- Cheminformatics; Chemical Structure Representation (SMILE & SMART}. Chemical databases: CSD, ACD, WDI, ChemBank, hazardous chemical database, PUBCHEM; Tools for drug discovery.
- Sequence Alignments and Visualization, Local and Global alignment and Dynamic Programming, Pairwise and multiple sequence alignment (Clustal W algorithm) Building and interpreting multiple Sequence alignment: Phylogenetic tree - Tree interpretation.
- Genomics: Genome Annotation, Genome Assembly, Structural and Functional Genomics.

Comparative Genomics; Metagenomics, Concept of metabolome and metabolomics. Proteomics, Computer aided Drug design.

- Artificial Neural Networks, Genetic algorithm, Bayesian modelling, Perl basic: Variables, Perl operations, program to simulate DNA Mutation, generating random DNA, analyzing DNA, Hashes, data structures and algorithms for biology- genetic code.

## **TECHNICIAN-I: MEDICAL LAB TECHNOLOGY**

### **MICROBIOLOGY**

#### **GENERAL MICROBIOLOGY:**

History of Microbiology, Working principle, construction, operation and maintenance of microscopes. Principles and methods of sterilization by physical and chemical agents. Morphology of Bacteria and staining methods. Growth and nutrition of bacteria, culture media and culture methods. Antimicrobial susceptibility tests.

#### **BACTERIOLOGY:**

Classification: Occurrence, host pathogen relationship, pathogenic and laboratory diagnosis of Staphylococcus, Streptococcus, Pneumococcus, Neisseria, Corynebacterium, Mycobacterium, Enterobacteria, salmonella, Shigella, E.coli, Klebsiella, Pseudomonas, Proteus, vibrio, Spirochetes.

#### **VIROLOGY:**

Classification: General properties of viruses mode of infection, spread and lab diagnosis of common human viral diseases - Polio, Influenza, Para influenza, Dengue, Japanese encephalitis, Chicken pox, Herpes, HIV, Hepatitis.

#### **PARASITOLOGY:**

Nomenclature, morphology, life cycle, pathogenicity and lab diagnosis and mode of infection of plasmodium, Entamoeba, Giardia, Trichomonas, Hookworm, Roundworm, Tapeworm and Whipworm.

#### **MYCOLOGY:**

Morphology, pathogenesis and lab diagnosis of fungi

#### **IMMUNOLOGY:**

Immunity classification, Antigen- Ab reactions and their application in the diagnosis of the diseases.

### **PATHOLOGY:-**

#### **HAEMATOLOGY**

##### **Composition of Blood:**

Components of the blood (Plasma and Cellular elements) and their functions - Haemopoietic system of the body (Leucopoiesis, erythropoiesis and thrombopoiesis).

Haemostasis - disorders and regulation - Types of Anaemia ( deficiency of iron, B12 and folic acid, haemolytic, aplastic and genetic disorders), Bleeding disorders of man.

##### **Coagulation of blood:**

Coagulation system- recalcification time activated partial thromboplastin time and thrombin time, Clotting time, bleeding time, Prothrombin time, Partial Prothrombin time, Mechanism of coagulation of blood.

##### **Haemogram**

Haemogram - Haemoglobin, PCV, ESR, RBC count, WBC count, Platelet count, Calculations of Anaemia using MCH, MCV & MCHC, Reticulocyte count, Absolute Eosinophil count, Differential count.

**Special Haematological tests:** Osmotic fragility - Heinz body preparation, Blood parasites – Lupus Erythematosus (LE) Cell preparation - Cytochemical tests, Quality control and quality assessment.

## **BLOOD BANKING**

### **Blood Bank:-**

Basic principle involved in Immuno haematology as prior to blood transfusion, Blood collection procedure, Blood grouping (Slide method, tube method ), Rh typing, Forward and Reverse grouping techniques, Cross matching(Major and Minor types), Separation of Blood components, Coombs test

### **Screening Test:-**

HbsAg, HCV, HIV (ELISA, Western Blot tests), TPHA (Treponemapallidum haemagglutination), Malarial parasites.

## **HISTOPATHOLOGY AND CYTOLOGY**

**General introduction of histopathology** Reception, recording, handling and labelling of histology specimens, fixation and various fixatives and their preparation.

**Tissue processing**-processing of histological tissues, dehydration, clearing, wax preparation, paraffin embedding and embedding media, decalcification and block preparation.

**Microtomes**- various types, their working principle and maintenance.

Microtomes knives and knife sharpening procedure, practical section cutting, cutting fault and remedies

**Staining preparation**-preparation of slide, deparaffinization and routine staining procedures, Identification and Demonstration of different metabolic compounds, mounting and mounting media.

Exfoliate Cytology - Preparations of Pap smear, stain, cell blocks.

## **CLINICAL BIOCHEMISTRY**

### **Basic principles and practices of clinical chemistry**

Patient management, prognosis and diagnosis. Laboratory safety – toxic chemicals and biohazards - computers in the clinical chemistry lab for a reliable report.

### **Instrumentation**

Description of certain important instruments e.g. balance, centrifuge colorimeter, spectrophotometer, flame photometer etc., principle & instrument.

### **Blood Chemistry**

Methods of collection and preservation of blood; Use of selective anticoagulants; Separation of serum and plasma, different protein precipitation agents, preparation of pff and its preservation.

### **Blood sugar and G.T.T**

Normal levels, abnormal levels associated with various pathological conditions; different methods of sugar estimation- principle reagents, procedure precautions to be observed. Renal threshold importance of G.T.T, Methods of G. T. T.

### **Urea:-**

Normal level, pathological conditions associated with abnormal levels. Principles and procedure of different methods of urea estimated.

### **Plasma and serum proteins:-**

Separation of different proteins. Normal and abnormal levels. Clinical significance of plasma and serum protein estimation. Different methods of protein estimation including principle and procedure.

### **Fibrinogen and prothrombin time:-**

Significance of fibrinogen and prothrombin time determinations, principle and procedure of the method applied.

### **Liver functions test**

Liver and its functions. Detoxication of bile pigments. Normal and abnormal estimation of conjugated and unconjugated bilirubin in relation to differential diagnosis of jaundice. Principles and procedures for different L.F tests index.

### **Cholesterol**

Significance of cholesterol estimation. Normal and abnormal values. Principles and procedures of cholesterol estimation.

### **Renal function test**

Kidneys and their physiological role laboratory test to assess detect and monitor renal diseases.

### **Urine Chemistry**

Physical characteristics of urine, chemical composition. Clinical importance of Urine analysis. Presence of abnormal constituents like protein, sugar, bile salts and pile pigments occult blood etc. qualitative estimation of protein and sugar. Identification of sugar, glycosuria and albuminuria, ketone bodies.

### **Stool Chemistry**

Physical characteristics and chemical composition of stool. Formation of stercobilinogen. Significance of presence of blood and excess fat in stool. Principle of stercobilinogen and fat estimation.

### **Cerebro spinal fluid**

Composition and function of C.S.F. normal levels of chloride sugar and protein in C.S.F. Abnormal levels in relating to different pathological conditions. Methods determination of chlorides, sugar and protein in C.S.F.

### **Enzymes**

Importance of acid and alkaline phosphates, amylase, SGOT, LDH & CPK, their normal levels. Abnormal levels in relation to pathological conditions. Iso-enzymes. Principle and procedure of different methods of assaying the above mentioned enzymes.

### **Electrolytes**

Function of electrolytes like Na<sup>+</sup> K<sup>+</sup> and Cl<sup>-</sup>. other essential trace elements like P, Ca<sup>++</sup> iron etc. Normal levels. Abnormal levels associated with different pathological conditions. Principle and procedure for determining their concentrations.

### **Electrophoresis and Chromatography**

Principle and procedure of Agar gel electrophoresis, TLC and paper Chromatography. Application in clinical biochemistry.

## **TECHNICIAN-I: REFRIGERATION & AIR CONDITIONING**

**REFRIGERATION SYSTEM:** C.O.P of heat engine – Compressor – principle of working - Condensers - evaporative condenser - natural and forced draught cooling towers - Evaporators

**VAPOUR COMPRESSION REFRIGERATION SYSTEM:** Principle of working of vapour compression system - vapour absorption

**REFRIGERANT FLOW CONTROLS, REFRIGERANTS AND LUBRICANTS AND APPLICATION OF REFRIGERATION** : Capillary tube - automatic expansion valve – thermostatic expansion valve - solenoid valve - evaporator pressure regulator – suction pressure regulator - selection of a refrigerant - properties and Applications of following refrigerants SO<sub>2</sub>, CH<sub>4</sub>, F11, F12, F22, and NH<sub>3</sub> – lubricants used in refrigeration and their applications, Cryogenics.

**APPLICATIONS OF REFRIGERATION:** Slow freezing – quick freezing – cold storage – frozen storage freeze drying – dairy refrigeration – ice cream cabinets – ice making – Water cooler, milk cooler, bottle cooler – frost free refrigeration.

**PSYCHROMETRY AND COMFORT AIR CONDITIONING:** Definitions

**AIR CONDITIONING SYSTEMS:** Equipment for air conditioning and insulation factors – humidifier – dehumidifier – fans and blowers – grills and registers – window type air conditioner – split type air conditioner system –air distribution and duct systems – tools and Installation, servicing and maintenance of R & AC systems.

## **TECHNICIAN-I: PLUMBER**

Fitter's hand tools  
Types of files, pipes  
Description of Carpenter's hand tools  
Gas welding  
Mason hand tools  
Descriptions of the plumber's tools and equipments  
Composition of Water  
PASCAL'S LAW  
Hot gas welding, Electric heat welding  
Description of water fittings  
Types of traps  
Applied workshop problems involving multiplication and division, system of units  
Properties of materials & uses  
Applied workshop problems on fraction & decimal  
Metric measurements  
Calculation of Area  
Square root of a whole number and a decimal  
Shop problem on unit of weight  
Shop problem on percentage  
Applied workshop problems on work, power & energy  
Problem on friction  
Centre of Gravity  
Mensuration  
Free hand sketching  
Reading of drawing  
Use of drawing instruments  
Sketching of views of simple bodies  
Orthographic projection in first angle  
Orthographic projection in third angle  
View of simple hollow & solid bodies  
Isometric view of simple bodies  
Conversion of orthographic views  
Method of laying out pipes alignment and joining  
Description of various pipe joints  
Description of Plumber's materials  
Description and types of pumps  
Description of pipe dies, their uses, care and precaution  
Bending machine and method of bending  
Method of bending pipes by hot and cold process  
Air lock in pipes and its removal  
Description of cocks & valves-their types, materials  
Inspecting and testing of water supply system  
Type of joints used for different materials  
Method of bending Galvanized pipe  
Domestic drainage system  
Concept of heat and temperature  
General layout, specification of materials required and connection of pipes to mains  
Sensor system for urinals and wash basin  
Workshop Calculation and Science  
Shop problems on calculation of area, volume & weight of solid bodies.  
Heat & Temperature

Workshop problems on determination of volume & weight  
Geometrical properties of plain figures.  
Estimation of material for different job  
Determination of pipe length  
Calculation of volume and weight of water in container  
Electricity and its uses  
Reading of simple graphs  
Work, Power & Energy  
Estimation for material required for installation  
Construction of simple figures & types of scales. Lettering-Number & Alphabets  
Freehand sketching in isometric of simple objects Drawing a plan & elevation of different types of bar  
Preparing layout plan for showing the water line for village & town.  
Exercises for practices  
Studying of building plan for marking the position of the sanitary fittings  
Preparation of simple working drawing  
Drawing a longitudinal section of the house drain  
Importance of safety and general precautions required for the trade  
Importance of the trade  
scope of a plumbing work  
Basic Bench fitting  
Fitter's common hand tools - names, description and material from which they are made  
Description, types and uses of holding device, hammers & cold chisels, cutting tools  
Description of simple fitting operations hack sawing punching and filing  
Types of files used commonly  
Marking instruments and their use  
Description of simple drilling machine  
Method of using drills, taps and dies  
Description of simple bench drilling Machine  
Description of different types of locking and fastening devices  
Different types of pipes GI, CI, PVC/CPVC,PPR,AC and HDPE etc.  
Description and uses of Carpenter's hand tools used for  
simple operations such as marking, sawing, planning and making simple joints  
Common types of wood- their description and uses

**For the post of Laboratory Attendant-I (LAB) the syllabus will be Secondary Level Basic Science and Laboratory Practices**

**For the posts of Laboratory Attendant-I (Instrument Mechanic) & Laboratory Attendant-I (Catering & Hospitality Assistant) the syllabus will be Secondary Level Basic science and relevant Trade.**

**NOTICE FOR SCRIBE FOR PWBD CANDIDATES**

With reference to the advertisement No. ICMR-VCRC/Tech/01, it is mentioned that one post each in Technical Assistant, Technician-I & Laboratory Attendant-I has been reserved horizontally for PwBD candidates as stated below:

| Sl. No. | Name of the post       | Post reserved for PwD | Category of Reservation   |
|---------|------------------------|-----------------------|---|
| 1       | Technical Assistant    | 1                     | Deaf and Hard of Hearing  |
| 2       | Technician – I         | 1                     | Loco-motor disability including cerebral palsy, leprosy cured, dwarfism, acid attack victims and muscular dystrophy |
| 3       | Laboratory Attendant-I | 1                     |   |

**Provision of Compensatory Time and Assistance of Scribe:**

- In case of persons with benchmark disabilities (PwBD) in the category of Loco-motor disability including cerebral palsy, leprosy cured, dwarfism, acid attack victims and muscular dystrophy, the facility of scribe is provided, if desired by the candidate.
- The facility of scribe will also be provided to PwD candidates having disability less than 40% and having difficulty in writing in pursuance to O.M No. 29-6/2019-DD-III dated 10.08.2022 issued by Department of Empowerment of Persons with Disabilities, Ministry of Social Justice and Empowerment. The facility will be provided on production of certificate as per **Annexure-IA**
- The facility of scribes/passage reader will be provided to the PwBD/PwD candidates only, if he has opted for the same by communicating to this office.
- In case the candidate opts for his own scribe, the qualification of the scribe should be one step below the qualification of the candidate taking the examination. The candidates with benchmark disabilities (PwBD) opting for own scribe shall be required to submit details of the own scribe at the time of examination as per Proforma at **Annexure-2(A&B)**. In addition, the scribe has to produce a valid ID proof in original at the time of examination. A photocopy of the ID proof of the scribe signed by the candidate as well as the scribe will also be submitted. If subsequently, it is found that the qualification of the scribe is not as declared by the candidate, then the candidate shall forfeit his right to the post and claims relating thereto.
- If a candidate opts for his own scribe, in that case, that scribe should not be a candidate of this examination. If a candidate is detected as assisting another PwBD/ PwD candidate as scribe in this examination, then the candidatures of both the candidates will be cancelled.
- A compensatory time of 20 minutes per hour of examination will be provided to the persons who are allowed use of scribe as per above paras.
- The candidates referred at paras above, who are eligible for use of scribe but not availing the facility of scribe will also be given compensatory time of 20 minutes per hour of examination.
- No attendant other than the scribe for eligible candidates will be allowed inside the Examination Hall.
- The PwBD/ PwD candidates who desire to avail the facility of scribes and/ or compensatory time must produce relevant documents for the eligibility of scribe/ compensatory time at the time of Document Verification. Failure to produce such supporting documents will lead to cancellation of their candidature for the examination.

The PwBD / PwD candidate requiring scribe either by the nomination of this office or by own, should submit prior intimation of the request / relevant certificates prescribed above to the following address by post / email latest by 22<sup>nd</sup> November 2023, 05.30 PM in the attached proforma for making appropriate arrangements.



**Address:**

**The Director,  
ICMR-Vector Control Research Centre,  
Medical Complex,  
Indira Nagar,  
Puducherry – 605 006  
Email: [director.vcrc@icmr.gov.in](mailto:director.vcrc@icmr.gov.in)**

**Certificate for person with specified disability covered under the definition of Section 2 (s) of the RPwD Act, 2016 but not covered under the definition of Section 2(r) of the said Act, i.e. persons having less than 40% disability and having difficulty in writing**

This is to certify that, we have examined Mr/Ms/Mrs ..... (name of the candidate), S/o /D/o ....., a resident of ..... (Vill/PO/PS/District/State), aged ..... yrs, a person with ..... (nature of disability/condition), and to state that he/she has limitation which hampers his/her writing capability owing to his/her above condition. He/she requires support of scribe for writing the examination.

2. The above candidate uses aids and assistive device such as prosthetics & orthotics, hearing aid (name to be specified) which is /are essential for the candidate to appear at the examination with the assistance of scribe.

3. This certificate is issued only for the purpose of appearing in written examinations conducted by recruitment agencies as well as academic institutions and is valid upto \_\_\_\_\_ (it is valid for maximum period of six months or less as may be certified by the medical authority)

Signature of medical authority

| (Signature & Name)   | (Signature & Name)  | (Signature & Name)            | (Signature & Name)                          | (Signature & Name)  |
|--|---|-------------------------------|---|---|
| Orthopedic<br><br>PMR<br>specialist  | Clinical Psychologist/<br>Rehabilitation<br>Psychologist/Psychiatrist<br>/ Special Educator | Neurologist<br>(if available) | Occupational<br>therapist<br>(if available) | Other<br>Expert, as<br>nominated<br>by the<br>Chairperson<br>(if any) |
| (Signature & Name)   |   |                               |   |   |
| Chief Medical Officer/Civil Surgeon/Chief District Medical Officer.....Chairperson |   |                               |   |   |

Name of Government Hospital/Health Care Centre with Seal

Place:

Date:

**Letter of Undertaking for Using Own Scribe**

\_\_\_\_\_ a candidate with \_\_\_\_\_ (name of the disability) appearing for the \_\_\_\_\_ (name of the examination) bearing Roll No. \_\_\_\_\_ at \_\_\_\_\_ (name of the centre) in the District \_\_\_\_\_ (name of the State / UT). My qualification is \_\_\_\_\_.

I do hereby state \_\_\_\_\_ that (name of the scribe) will provide the service of scribe/reader for the undersigned for taking the aforesaid examination.

I do hereby undertake that his/her qualification is \_\_\_\_\_. In case, subsequently it is found that his/her qualification is not as declared by the undersigned and is beyond my qualification, I shall forfeit my right to the post and claims, relating thereto.

(Signature of the candidate with Disability)

Place:

Date:

**LETTER OF UNDERTAKING FOR USING SCRIBE**

NOTE: Candidates who are Visually Impaired (VI)/candidates whose writing speed is affected by Cerebral Palsy / muscular dystrophy / candidates with locomotor disability (one arm)/Intellectual disability (Autism, specific learning disability and mental illness) are eligible for Scribe. PARTICULARS OF SCRIBE PROPOSED

**TO BE ENGAGED BY THE CANDIDATE**

1. Name of the Candidate
2. Roll No
3. Name of Examination Centre
4. Qualification of Candidate
5. Disability Type
6. Name of the Scribe
7. Date of Birth of the Scribe
8. Fathers Name of the Scribe
9. Address of the Scribe .
  - (a) Permanent Address .....,.....
  - (b) Present Address

Paste here recent colour. Passport Size Photograph of the SCRIBE of size 3.5 x 4.5 cm (The colour photograph should not be more than 3 months old)

10. Educational Qualification of the Scribe
11. Relationship, if any, of the Scribe to the Candidate
12. DECLARATION:

i) We hereby declare that the particulars furnished above are true and correct to the best of our knowledge and belief. We have read/ been read out the instructions of the ICMR-<Name of Institute> regarding conduct of the candidates assisted by Scribe/Scribes at this examination and hereby undertake to abide by them.

ii) We do hereby undertake that the qualification of scribe is mentioned correctly and the qualification of the scribe is one step below qualification of candidate. In case, subsequently it is found qualification of scribe is not as declared by the candidate, I (the candidate) shall forfeit my right to the post and claims relating thereto.

iii) We declare that the Scribe himself/herself is not a candidate in this examination. We understand that in case it is found otherwise the candidature of both of us will be rejected.

iv) We declare that the scribe has not acted/will not act as Scribe to any other candidate of this examination.

|   |  |
|---|--|
|   |  |
| Signature of the candidate                                    | (Signature of the scribe)                                  |
| Left thumb impression of the Candidate in the box given above | Left thumb impression of the Scribe in the box given above |