

જાહેરાત ક્રમાંક: ૧૨૪/૨૦૧૮-૧૯, સાયન્ટીફિક ઓફિસર (બાયોલોજી જૂથ), વર્ગ-૨  
ની જગ્યા પર ભરતી માટેની પ્રાથમિક કસોટીમાં ભાગ-૧ અને ભાગ-૨ ના ૧૮૦

મિનિટના સંયુક્ત પ્રશ્નપત્રનો અભ્યાસક્રમ

પ્રાથમિક કસોટીનો અભ્યાસક્રમ		
ભાગ-૧		
કુલ પ્રશ્નો-૧૦૦	માધ્યમ: ગુજરાતી	કુલ ગુણ :૧૦૦
૧	ભારતની ભૂગોળ- ભૌગોલિક, આર્થિક, સામાજિક, કુદરતી સંસાધન અને વસ્તી અંગેની બાબતો- ગુજરાતના ખાસ સંદર્ભ સાથે	
૨	ભારતનો સાંસ્કૃતિક વારસો- સાહિત્ય, કલા, ધર્મ અને સ્થાપત્યો- ગુજરાતના ખાસ સંદર્ભ સાથે	
૩	ભારતનો ઇતિહાસ- ગુજરાતના ખાસ સંદર્ભ સાથે	
૪	ભારતની અર્થવ્યવસ્થા અને આયોજન	
૫	ભારતીય રાજનીતિ અને ભારતનું બંધારણ: (૧) આમુખ (૨) મૂળભૂત અધિકારો અને ફરજો (૩) રાજ્યનીતિના માર્ગદર્શક સિદ્ધાંતો (૪) સંસદની રચના (૫) રાષ્ટ્રપતિની સત્તા (૬) રાજ્યપાલની સત્તા (૭) ન્યાયતંત્ર (૮) અનુસૂચિત જાતિ, અનુસૂચિત જનજાતિ અને સમાજના પછાત વર્ગો માટેની જોગવાઈઓ (૯) એટર્ની જનરલ (૧૦) નીતિ આયોગ (૧૧) પંચાયતી રાજ (૧૨) નાણા પંચ (૧૩) બંધારણીય તથા વૈધનિક સંસ્થાઓ- ભારતનું ચૂંટણી પંચ, સંઘ લોક સેવા આયોગ, રાજ્ય લોક સેવા આયોગ, કોમ્પ્ટ્રોલર એન્ડ ઓડિટર જનરલ; કેન્દ્રીયસતર્કતા આયોગ, લોકપાલ તથા લોકાયુક્ત અને કેન્દ્રીય માહિતી આયોગ	
૬	સામાન્ય બૌદ્ધિક ક્ષમતા કસોટી	
૭	સામાન્ય વિજ્ઞાન, પર્યાવરણ અને ઈન્ફર્મેશન એન્ડ કોમ્યુનિકેશન ટેકનોલોજી	
૮	ખેલ જગત સહિત રોજબરોજના પ્રાદેશિક, રાષ્ટ્રીય અને આંતરરાષ્ટ્રીય મહત્વના બનાવો	

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## Syllabus of Preliminary Test

### Part-1

Total Questions-100

Medium:Gujarati

Total Marks- 100

1	Geography of India-Physical, Economic, Social, Natural Resources and population related topics- with special reference to Gujarat
2	Cultural heritage of India-Literature, Art, Religion and Architecture- with special reference to Gujarat
3	History of India with special reference to Gujarat
4	Indian Economy and Planning
5	<u>Indian Polity and the Constitution of India:</u> (1) Preamble (2) Fundamental Rights and Fundamental Duties (3) Directive Principles of State Policy (4) Composition of Parliament (5) Powers of the President of India (6) Powers of Governor (7) Judiciary (8) Provisions for Scheduled Castes, Scheduled Tribes and backward classes of the society (9) Attorney General (10) NITIAayog (11) Panchayati Raj Institutions (12) Finance Commission (13) Constitutional and Statutory Bodies: Election Commission of India, Union Public Service Commission, State Public Service Commission, Comptroller and Auditor General; Central Vigilance Commission, Lokpal and Lokayukta, Central Information Commission
6	General Mental Ability
7	General Science, Environment and Information & Communication Technology
8	Daily events of Regional, National and International Importance including Sports

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## **Syllabus for the Preliminary Test for the recruitment of Advt. No.**

### **124/2018-19, Scientific Officer (Biology), (FSL), Class-II**

**Marks – 200**

**Questions-200**

**Medium: English**

#### **1. Fundamentals of Forensic Biology**

Scope of Forensic Biology –Structure and Function of Cell – Plant cell and animal cell, Basics of Human anatomy and physiology. Basic Concept of Taxonomy.

#### **2. Forensic Botany**

Various types of woods. Varieties of timber, seeds and leaves – their identification and matching. Study and identification of pollen grains, starch grains. Morphological and anatomical characteristics of plants yielding drugs of abuse like opium, Cannabis, Coca plant, Psilocybe mushrooms, Tobacco, etc.

#### **3. Cell Biology and Basic Biochemistry**

Structure and function of cell and cellular organelles, Amino acids – structure and functional group properties. Proteins and peptides – Composition of proteins – Primary, Secondary and Tertiary structure of protein. Definition, biological importance, classification and chemistry of Carbohydrates and Lipids.

#### **4. Animal and Plant biotechnology**

Cell lines: Definition, development, maintenance and management, established cell lines and their characteristic features. Transgenic animals- Creating transgenic animals, Example of transgenic animals- Dolly, Insects, Primates, mice. Somaclonal and gameto clonal variation: applications and limitations. Transgenic Plants: Herbicide resistant, insect Resistant, drought/stress resistant, delayed ripening, Ti Plasmid and T-

DNA transfer. Gene therapy: potential approach to gene therapy. Southern blotting, Northern blotting, Western blotting, ISO-electric focusing. Overview of Stem cells and its applications. Bonding in Organic Compounds, Gravimetric Analysis, Volumetric Analysis, Analysis of real Samples.

## **5. Basic Serology**

Blood and its composition. Hemoglobin and its variants. Theories and biochemical tests for the identification of blood. Blood Typing/Grouping – ‘ABO’ system and its significance in forensic investigation. Other blood group antigens - ‘Rh sub types’, MN, I, P, Kell, Duffy, Kidd, Lewis, Lutheran and Bombay blood group. Forensic Examination of semen and other body fluids – vomit, feces, urine, saliva and vaginal secretions. Overview of cells and organs of immune system and basic immunology.

## **6. Forensic Microbiology**

Introduction to microbiology, cellwall composition of Gram positive and Gram negative bacteria. Sterilization techniques - Physical agents: Dry heat, wet heat and cold sterilization, filtration, radiation; Chemical agents (Disinfectants, antibiotics, alcohols) and their mechanisms. Microbial growth and environmental factors affecting the growth. Different methods for isolation of microorganisms from forensic samples like vomit, stool, stomach wash and residual food. Introduction to biological warfare, general properties of various biological warfare agents and their toxic effects. Popular case studies of bioterrorism.

## **7. Introduction to Recombinant DNA technology**

DNA modifying enzymes, Cloning strategies: Genomic libraries, cDNA libraries, single gene cloning. RAPD, RFLP and AFLP. Vectors: Types of

vectors and choice of vectors- Plasmids, cosmids, lamda phage vectors, shuttle vectors, BACs and YACs. Transformation and Transfection. Expression systems in Eukaryotic cells, Yeast, Bacteria, Insect cell lines, Gene screening. Biosafety guidelines and containment strategies.

## **8. Forensic DNA analysis**

Chemical structure of DNA and RNA. Overview of DNA replication, transcription and translation. Procedure for collection and preservation of biological sample for DNA analysis. Techniques of DNA isolation and its quantitation. DNA separation techniques. History of DNA fingerprinting and DNA polymorphism. Genes and DNA markers in forensic DNA analysis. Introduction to Polymerase Chain Reaction and its applications. Introduction to mitochondrial DNA and its forensic importance. Fundamentals of RFLP and PCR based DNA typing. STR genotyping, Result of STR marker analysis and its interpretation. Single Nucleotide Polymorphism (SNP) and its applications in forensic investigation. LCN typing. Mitochondrial DNA analysis in Forensic investigation. Y-STR analysis and its significance in establishing paternal relationships. Non-human DNA analysis. Amplifying DNA: PCR and Cell based DNA Cloning.

## **9. Recent Developments and future Directions in DNA profiling**

Methods of DNA sequencing. Prediction of physical characteristics, such as eye, hair, and skin color based solely on DNA. Molecular autopsy. Genetic genealogy in the genomic era. Evolving technologies in forensic DNA analysis. Forensic tissue identification with nucleic acids: Classical, RNA based and DNA methylation based approaches.

## **10. Immunology**

Antigen – Epitope, essential factors for antigenicity, haptens and adjuvant. Immunoglobulin – structure, classes of immunoglobulin, antigen – antibody reactions and their techniques in serological analysis. Application of various polymorphic enzymes and proteins in criminal investigation. Antigen Processing and presentation. Production of Monoclonal and polyclonal antibodies, hybridoma technology. Autoimmunity and hypersensitivity. HLA typing and its forensic importance. Vaccines, Lectins and their forensic significance.

#### **11. Environmental Forensic**

Introduction and applications of environmental forensic. Principles and methods of chemical fingerprinting (crude oil and refined products). Forensic techniques used in environmental litigation. Environmental forensic microscopy.

#### **12. Nano Biotechnology**

Introduction, history and development in nanotechnology. Physical synthesis of nanoparticles. Biological production of nanoparticles: fungi, bacteria, yeast and actinomycetes. Properties and characteristic of nanomaterials. Tool for the characterization of nanomaterial: Optical microscopy, Electron microscopy (TEM and SEM), scanning probe microscopy, atomic force microscopy, fluorescence microscopy. DNA based nanostructure, DNA-protein nanostructure. Carbon nanotubes, nanorods and fullerenes. Application of nanoparticles as molecular imaging probes (Quantum dots). Application of nanoparticles as therapeutic drug carriers, gene delivery and diagnostics. Application of nanomaterials in forensic and life science. Nanoparticles as a tool for cleaning environment: Remediation of heavy metal. Nanoparticles as sensors.

**13. Forensic Toxicological Examination.**

Law relating to poisons. Introduction to Poisons, form of poisons, classification and methods of administration of poison. Mode of action of poison, Diagnosis and management of poisoning cases. Factors affecting the effect of poison and medico-legal aspects in poisoning cases. Collection and preservation of biological evidences (viscera and /or body fluids) and circumstantial evidences in fatal and survival cases. Submission of samples to the laboratory, postmortem examination, specific analysis plan / approach to toxicological examinations of poisoning samples. Isolation and Extraction of poison/ drug by various classical and modern methods using instrumental techniques.

**14. Microscopy:** Light microscopy, Bright and Dark Field microscopy, Fluorescence microscopy, Phase Contrast microscopy, TEM, SEM.

**15. Regulatory affairs and IPR**

Basic principles of quality control (QC) and quality assurance (QA). Guidelines for QA and QC: raw materials, products and validation. Introduction to pharmacopoeia. Intellectual Property Rights. Importance of protecting scientific discoveries. IPR policy of Government of India. Patent: Qualification (novel, commercial and non-obvious), jurisdiction of patent laws, Indian and international patent laws, filing procedures.

**16. Current Trends and Recent Advancements in Forensic Biology.**