



वर्षा वन अनुसंधान संस्थान  
भारतीय वानिकी अनुसंधान एवं शिक्षा परिषद्  
(पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय, भारत सरकार के अधीन एक स्वायत्त परिषद्)  
पोस्ट बॉक्स नं. 136, जोरहाट - 785001, असम

RAIN FOREST RESEARCH INSTITUTE  
*Indian Council of Forestry Research & Education*  
(An Autonomous body of Ministry of Environment, Forests & Climate Change, Govt. of India)  
Post Box No. 136, Jorhat- 785001, Assam

No. 3/213/2015-Estt./Vol. XI/449

Dated: the 11<sup>th</sup> August, 2021

## NOTICE

With reference to this office Recruitment Notice No. 3/213/2015-Estt./Vol. XI dated 10<sup>th</sup> August, 2021, the Syllabus and Scheme of Written examination for the post of Technical Assistant (Bio Technology) is attached herewith.

**DIRECTOR**

Rain Forest Research Institute, Jorhat

**Syllabus and Scheme of Written Examination for the post of  
Technical Assistant (Bio Technology)**

There will be an objective type of question paper comprising 100 MCQ in total from different subjects. Questions of relevant subject will be according to graduation level. Duration of exam will be 03 hours. The details of each subject and MCQ are as follows:

**1. General Awareness & Reasoning : 20 marks**

**a) General Awareness**

Questions in this component will be aimed at testing the candidate's general awareness of the environment around him and its application to society. Questions will also be designed to test knowledge of current events and of such matters of everyday observation and experience in their scientific aspects as may be expected from an educated person. The test will also include questions relating to India and its neighboring countries especially pertaining to history, culture, geography, economic scene, general policy and scientific research etc. These questions will be such that they do not require a special study of any discipline.

**b) Reasoning**

Questions of reasoning would include questions of both verbal and non-verbal type. This component will include question of analogies, similarities and differences, spatial visualization, spatial orientation, problem solving, analysis, judgement, decision making, visual memory, discrimination, observation, relationship concepts, arithmetic reasoning, verbal and figure classification, arithmetic number series, non-verbal series, coding and decoding statement, conclusion, syllogistic reasoning etc.

**2. General English & General Science : 20 marks**

**a) General English**

Questions in this component will be designed to test the candidate's understanding and knowledge of English language and will be based on spot the error, fill in the blanks, synonyms, antonyms, spelling/detecting misspelled words, idioms & phrases, one word substitution, improvement of sentences, Active/Passive Voice of Verbs, conversion into direct/indirect narration, comprehension Passage etc.

**b) General Science**

Basic understanding of science expected of a high school student.

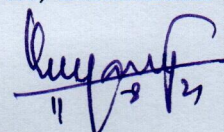
**3. Arithmetic : 20 marks**

The questions will be designed to test the ability if appropriate use of numbers and number sense of the candidate. The part will include questions on problems relating to number system, computation of whole numbers, decimals and fractions, relationships between numbers, fundamental arithmetical operations, percentage, ratio and proportion, average, interest, profit and loss, discount, use of tables and graphs, mensuration, time and distance ratio and time etc.

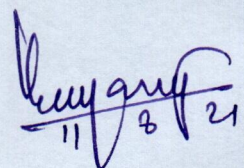
**4. Relevant Subject- Bio Technology : 40 marks**

**a) Biodiversity and Taxonomy:** Principles of taxonomy and classification of plant kingdom; structural, biochemical and molecular systematic; biodiversity and plant genetic resources; germplasm exploration, collection, regeneration and evaluation; principles and methods of germplasm conservation; conservation of plant biodiversity; tools to assess molecular diversity, germplasm exchange and plant quarantine; ecology and biodiversity.

**b) Cell Structure and Function:** Basics of Cell Biology in prokaryotes and eukaryotes; cell wall and cell membranes; structural organization and functions of cell organelles; intracellular transport; biosynthesis and degradation of cellular components; cell division and cell cycle; intracellular and extra-cellular control of cell division; programmed cell death.

  
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- c) **Biomolecules and Metabolism:** classification, structure and function of carbohydrates, lipids, proteins, nucleic acids, hormones and vitamins; metabolism and carbohydrates (glycolysis, citric acid cycle, glycogenesis, glycogenolysis, pentose-phosphate pathway); metabolism of lipids (oxidation of saturated and unsaturated fatty acids, oxidation of odd chain fatty acids, energy yield, ketone bodies); metabolism of amino acids (biosynthesis and breakdown of amino acids) and metabolism of nucleic acids (biosynthesis and degradation of purine & pyrimidine); photosynthesis (oxidative phosphorylation and photophosphorylation); respiration (photorespiration).
- d) **Genetics and Molecular Biology:** Mendelism & chromosome theory, basic principles of inheritance, linkage & crossing over; allelic variation & gene function, co-dominance, incomplete dominance, gene interactions, pleiotropy, genomic imprinting, linkage disequilibrium; sex-linked inheritance, quantitative genetics and polygenic inheritance; population genetics and Hardy-Weinberg equilibrium; extra chromosomal inheritance; gene concept; mutations; transposable genetic elements; structural and numerical alterations of chromosomes; basics of cyto-genetics, karyotyping, chromosome banding and mapping; formulation and testing of genetic hypothesis; DNA as the genetic material; DNA and the molecular structure of chromosomes; Organization and structure of prokaryotic and eukaryotic genomes; DNA replication in prokaryotes and eukaryotes; transcription and RNA processing in prokaryotes and eukaryotes; translation and the genetic code; regulation of gene expression in prokaryotes and eukaryotes; mutation, DNA repair and recombination.
- e) **Microbiology:** History and development of microbiology; classification of microbes; concepts and methods of sterilization; microscopy and staining, microbial culture techniques; concepts of microbial species and strains; growth curves, various forms of microbes; pathogenic microorganisms (bacteria, fungal, viral and protozoan); microbes in extreme environment (photosynthetic bacteria; Cyanobacteria; thermophilic, Methanogenic and halophilic archaea); basic concepts of virology.
- f) **Tissue Culture:** Basic principles of plant tissue culture, totipotency, establishment of aseptic culture, callusing, regeneration and organogenesis, hardening; micro-propagation; somaclonal variations; endosperm and anther culture; embryo culture, somatic hybrids, synthesis of artificial seed; single cell and protoplast culture and regeneration; cryopreservation and conservation of plant genetic resources; production of secondary metabolites, hairy roots and bioreactor technology.
- g) **Recombinant DNA Technology:** Basic principles of cloning, tools for cutting and joining DNA molecules, types of vectors and their properties, bacterial transformation and selection strategies; gene transfer to plants; transgenic technology; Intellectual Property Rights (IPR).
- h) **Molecular tools and Techniques:** Nucleic acids and protein isolation; molecular markers and their applications; polymerase chain reaction (PCR), RT-PCR; techniques for separation of nucleic acids and proteins; nucleic acid blotting; restriction digestion and ligation, restriction mapping; genetic mapping; preparation of genomic and cDNA libraries; molecular cloning; transformation and screening strategies; techniques for differential gene expression; transcriptomics, proteomics; metabolomics; synthesis and sequencing of oligo-nucleotides; genome sequencing, analysis and management of sequence data; bioinformatics; techniques for targeted mutagenesis; genome editing; techniques for gene transfer in plants.
- i) **General Instrumentation:** Principles and applications of chromatography, agarose gel electrophoresis, PAGE, SDS PAGE, centrifugation, microscopy, X-ray crystallography, spectroscopy, spectrophotometer, autoradiography, preparation of microbial and tissue culture media, sterilization.

  
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