



वन जैव विविधता संस्थान  
INSTITUTE OF FOREST BIODIVERSITY  
भारतीय वानिकी अनुसंधान एवं शिक्षा परिषद्



Indian Council of Forestry Research and Education

(An autonomous body under Ministry of Environment, Forest & Climate Change, Government of India)

Dulapally, Kompally S.O., Hyderabad – 500 100

Phone: 040-66309500, Fax: 040-66309521, e-mail: director\_ifb@icfre.org, website: <http://ifb.icfre.gov.in>

No.1-156/IFB/TA/2021-22/1916

Dated: 11<sup>th</sup> February, 2022

**RECRUITMENT NOTIFICATION**

Applications are invited from the eligible individuals for filling up of vacancies in the following posts by DIRECT RECRUITMENT at IFB, Hyderabad .The detailed notification is available in the websites [www.icfre.gov.in](http://www.icfre.gov.in) or [www.ifb.icfre.gov.in](http://www.ifb.icfre.gov.in).

Sl. No.	Name of the Post	7 <sup>th</sup> CPC pay level	No. of Vacancies	Eligibility Qualification			Exam will be held on the subject	Age limit as on 29.03.2022 (i.e the last date of receipt of applications)
				UR	OBC	SC		
1	Technical Assistant ( Field/Lab Research)	Pay Matrix Level-5 ( 29200-92300) of 7 <sup>th</sup> CPC	3 Nos.	1	1	1	Botany	Not below 21 years or exceeding 30 years
2	Technical Assistant ( Field/Lab Research)		1 No.	-	1	-	Biotechnology	
3	Technical Assistant ( Field/Lab Research)		1 No.	1	-	-	Marine Biology	

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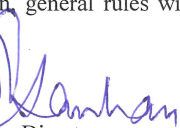
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Director  
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## BOTANY

### BIODIVERSITY

Microbes, Algae, Fungi and introduction to Archegoniate, Bryophytes, pteridophytes, Gymnosperms

### PLANT ECOLOGY AND TAXONOMY

Introduction, Ecological factors, Plant communities, Ecosystem, Phytogeography, Introduction to plant taxonomy, Identification, Taxonomic evidences from palynology, cytology, phytochemistry and molecular data, Taxonomic hierarchy, Botanical nomenclature, Classification, Biometrics, numerical taxonomy and cladistics

### PLANT ANATOMY AND EMBRYOLOGY

Meristematic and permanent tissues, Organs, Secondary Growth, Adaptive and protective systems, Structural organization of flower, Pollination and fertilization, Embryo and endosperm, Apomixis and polyembryony

### PLANT PHYSIOLOGY AND METABOLISM

Plant-water relations, Mineral nutrition, Translocation in phloem, Photosynthesis, Respiration, Enzymes, Nitrogen metabolism, Plant growth regulators, Plant response to light and temperature

### CELL AND MOLECULAR BIOLOGY

Techniques in Biology (Principles of microscopy, Light Microscopy etc.), Cell as a unit of Life, Cell Organelles (Mitochondria, Chloroplast, ER, Golgi body & Lysosomes, Peroxisomes and Glyoxisomes, Nucleus), Cell Membrane and Cell Wall, Cell Cycle, Genetic Material (DNA, DNA replication (Prokaryotes and Eukaryotes), Transcription (Prokaryotes and Eukaryotes), Regulation of gene expression

### ECONOMIC BOTANY AND BIOTECHNOLOGY

Origin of Cultivated Plants, Cereals, Legumes, Spices, Beverages, Oils and Fats, Fibre Yielding Plants, Introduction to Biotechnology, Plant tissue culture, Recombinant DNA Techniques

### GENETICS AND PLANT BREEDING

Heredity (Brief life history of Mendel, terminologies, laws of inheritance etc.), Sex-determination and Sex-Linked Inheritance Linkage and Crossing over, Mutations and Chromosomal Aberrations, Plant Breeding, Methods of crop improvement, Quantitative inheritance, Inbreeding depression and heterosis, Crop improvement and breeding

### ANALYTICAL TECHNIQUES IN PLANT SCIENCES

Imaging and related techniques (principles of microscopy, light microscopy, fluorescence microscopy etc.), Cell fractionation, Radioisotopes,

Spectrophotometry, Chromatography, Characterization of proteins and nucleic acids, Biostatistics

#### **BIOINFORMATICS**

Introduction to Bioinformatics, Databases in Bioinformatics, Biological Sequence Databases, Sequence Alignments, Molecular Phylogeny, Applications of Bioinformatics

#### **RESEARCH METHODOLOGY**

Basic concepts of research, General laboratory practices, Data collection and documentation of observations, Overview of biological problems, methods to study plant cell/tissue structure, plant microtechniques, the art of scientific writing and its presentation

## SYLLABUS FOR BIOTECHNOLOGY

**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.

**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.

**Biomolecules and Metabolism:** Classification, structure and function of carbohydrates, lipids, proteins, nucleic acids, hormones and vitamins; metabolism of 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).

**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 of 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.

**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.

**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.

**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).

**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.

**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.

## Syllabus for Marine Biology

**Principles of Oceanography:** Geologic history of the oceans - Early history of Oceanography and World exploration - Modern Technology in Oceanography - Seas - Oceans - Ocean floor - Continental shelf - Continental slope - Abyssal basin - Introduction to hydrographic surveying. Marine instrumentation - Structure and motion of the ocean and its environs - properties, populations and energy budget - Oceanic currents. Ocean resources and exploration - Bioresources of the sea - Food production from the sea - Energy production from the sea - Mineral resources of the sea.

**Biology Oceanography:** Life process in the marine environment - Ocean's Food web - Classification of planktons, methods of collection, interrelations. Adaptations of planktons. Organic production, methods of estimation and factors affecting primary production., red tide phenomenon.

Sea weeds - occurrence and distribution in India, economic importance. Sea grasses - morphological and anatomical adaptations, ecological role. Mangroves and salt marshes - distribution - adaptations, ecological role, uses, need for conservation. Marine biodiversity - biodiversity assessment techniques - Marine resources, Fisheries - Pelagic - Benthic and non biological - Threats to marine biodiversity, overexploitation, physical alteration, alien species.

**Marine Flora, Ecology and Zoogeography:** Classification of marine flora - Factors affecting marine life. Marine flora - Bacteria, Fungi, Diatoms, Flowering Plants - Blue green and Red algae. Ecology and Geographic distribution of marine flora - Mangrove associations: Distribution of mangrove plants - Nutrient cycling, ecological significance of mangroves. Marine Environment: zonation, stratification, geographic distributions - ecological factors - light, temperature, salinity, pressure - Classification of marine environment - pelagic environment, planktonic and nektonic adaptations, benthic environment - intertidal, interstitial and adaptation - Coastal environments - coral reefs, estuaries, mangroves, sea grass beds, forests, polar seas and hydrothermal vent - Marine zoogeography. Marine ecosystem structure and function, food chain, food-web, ecological pyramid, energy flow - Systems ecology and modeling. Population ecology - group attributes, population growth, population density variation, carrying capacity, dispersal, prey-predator relationship, density dependent and independent factors. Community ecology - structure and composition, diversity and stability, concept of niche, succession, community wise adaptation - fouling and boring community, animal association in the sea.

**Applied Marine Botany:** Marine Algal Physiology- Marine algae as food, fodder, fertiliser and source of medicine and industrial raw material. Cultivation of Unicellular organisms, sea weeds. Marine Products: Agar-agar, Carragenin, Kiesulguhr, Algin, Laminarin, Phycocolloids.

**Marine Biotechnology:** Marine natural products - Marine organisms: - Pharmaceuticals. Marine Microbiology - Microbial biofilms; Marine polysaccharaides - Molecular pathogenicity; Biochemistry, gene regulation and molecular biology of marine hyperthermophils. Biofouling and Control technology - Genetic engineering and ploidy



manipulation to enhance growth - reproduction and development of disease resistance in aquacultural species.

**Marine Paleobiology:** Principles of fundamental Stratigraphy - Standard Geological time scale - Order of Superposition - Principles of stratigraphic correlation - Various zones of marine realm and their characteristic fauna and flora - Marine habit and habitat. Marine fossils

**Marine Geology:** Structure of the Earth - Origin and structure of Oceans, Plate tectonics, transform faults, ocean trenches, mid-ocean ridges, geothermal vents - Continental shelf, Slope and Rise.

Deep ocean basins, Coastlines and Coastal system beaches - rocky and sandy beaches, bays, inlets, and fjords; physical processes and Classification of coasts - formation of beaches - loss of headlands - formation of barrier islands and lagoons - coastal development. Characteristics of coastal waters - Estuaries - Temperate and tropical wetlands and Lagoons - Marginal seas of the world.

#### **Physical Oceanography**

Characteristics of Ocean Water - major wind systems - Air-Sea Interaction - ocean-atmosphere coupling - marine weather and climate - El Nino/La Nina - global change - storms and hurricanes - methods and measurements - contributors - Ocean currents including wind driven systems - eddies - rings - geostrophic currents - upwelling and down welling processes - tidal waves (Tsunami). Waves and their properties - impact on beaches - marine structures to mitigate wave effects - surfing.

Physical properties of seawater - vertical and horizontal distributions of salinity and temperature - Identification and significance of water masses.

**Chemical Oceanography:** Chemical properties of water and seawater - Chemical processes in oceans - pH and buffering capacity of seawater. Basic properties and processes in estuarine chemistry.

**Marine Mineral Resources:** Marginal marine, Subsurface, Beach placer, Deep sea deposits - Ocean boundaries and Petroleum resources - Petroleum prospects beneath oceans - Relation of boundary to petroleum - Contribution of sea for world's petroleum production - Future prospects of petroleum resources of sea - Contribution of marine petroleum resources in Indian petroleum production.

**Marine Pollution:** Kinds and quantities of ocean pollution. Oil spills, plastics, trace metals, sewage and nutrients. Factors influencing the toxicity of trace metals to marine organisms. Effects on marine organisms. Time scale of global changes in the ecosystem and climate - impact of circulation in atmosphere and ocean on climate, rainfall and agriculture.