Scientist A - Botany/Plant Breeding

Name of the post	Subject	Syllabus
Scientist A - Botany/Plant Breeding	**Botany**	**Plant Diversity & Evolution:** Viruses, Bacteria, Algae, Fungi, Lichens, Bryophytes, Pteridophytes, Gymnosperms, Angiosperms. **Plant Structure & Function:** Morphology, Anatomy (of angiosperms), Embryology, Plant Physiology, Biochemistry. **Genetics & Molecular Biology:** Cell Biology, Genetics, Genomics, Recombinant DNA Technology, Plant Biotechnology. **Ecology & Environment:** Plant Ecology, Phytogeography, Environmental Botany, Plant Pathology. **Applied Botany:** Economic Botany, Plant Breeding, Phytopathology, Biotechnology Applications.
	Agriculture	General Agriculture-All basic courses (Agronomy, Genetics & Plant Breeding, Soil Science & Agricultural Chemistry, Plant Physiology, Plant Pathology, Agricultural Economics & Agricultural Marketing, Statistics, Plant Biotechnology , Plant Biochemistry)
	Genetics & Plant Breeding	**General Genetics & Cytogenetics :** Mendelian laws, gene concept, linkage, DNA structure & replication, mutations, cell structure, chromosomes, polyploidy, aberrations, sex determination. **Molecular Genetics:** Genetic code, gene expression (transcription/translation), gene regulation, molecular basis of mutations, recombinant DNA, gene cloning, DNA fingerprinting, molecular markers (MAS, MARS).**Quantitative Genetics:** Heritability, genetic advance, genotype-environment

		interaction, gene action, population genetics, biometrical genetics. **Plant Breeding Methods Foundations:** Objectives, evolution of crops, plant introduction, germplasm conservation, landraces. **Breeding Methods:** Mass selection, pedigree, bulk, progeny selection, hybridization (heterosis, inbreeding), population breeding, mutation breeding, polyploidy breeding. **Special Techniques:** Marker-assisted selection (MAS), Genetic Engineering (Transgenics, RNAi, Agrobacterium).
	Biotechnology	Biochemistry: Biomolecules (carbs, lipids, proteins, nucleic acids), Metabolism, Enzymes, Photosynthesis, Respiration.Cell Biology: Cell structure, dynamics, signaling, membrane transport.Microbiology: Microbial diversity, culture, growth, antibiotics, human-microbe interactions. Genetics: Mendelian genetics, DNA replication, gene expression, mutations, linkage, mapping.Biophysics & Instrumentation: Principles, basic math, data analysis, use of equipment (spectroscopy, electrophoresis).
	Molecular Biology	**Foundations & Biomolecules:** Introduction to cells, biomolecules (DNA, RNA, Proteins, Amino Acids), cellular structures, and basic biochemistry.**Central Dogma:** DNA structure, replication (prokaryotic/eukaryotic), transcription (RNA synthesis), and translation (protein synthesis). **Gene Regulation:** Operons, prokaryotic/eukaryotic control mechanisms, chromatin structure, and post-transcriptional/translational modifications. **Molecular Techniques:** PCR, DNA Sequencing, Southern/Northern/Western Blotting, Electrophoresis, Chromatography, Spectroscopy, Calorimetry. **Recombinant DNA & Genetic Engineering**: Vectors, gene cloning, genetic modification, and creating transgenics. **Advanced/Applied Areas:** Genomics, Proteomics, Bioinformatics (BLAST, alignments, modeling), Molecular Evolution, Nanobiotechnology, and Bioethics.

	Physiology	Plant Cell structure & function; cell cycle; totipotency and regeneration; Photosynthesis in plants; Water uptake and stomatal movements ; Plant developmental biology; vegetative & reproductive growth and development : germination, pollination, fertilization , seed development seed maturation, dormancy, ripening , senescence and structural changes; flowering in perennial species; Sensory Photobiology; Environmental responses: Plants adaptation to abiotic stresses, such as light, water and temperature ; Phytohormones in growth and development. Metabolism: Cellular respiration, respiration and synthesis. Physiology of plantation crops