Scientist A - Remote Sensing

Name of the post	Subject	Syllabus
Scientist A **Remote Sensing**	**Remote Sensing**	**Fundamentals:** Definition, history, components (energy source, platform, sensor, etc.). **Electromagnetic (EM) Spectrum:** Laws of radiation, interaction with atmosphere and Earth, spectral signatures (water, soil, veg). **Platforms & Sensors:** Satellite orbits, types (sun-sync, geo), sensor characteristics (optical, thermal, microwave). Resolution: Spatial, spectral, temporal, radiometric. **Data Acquisition & Processing, Data Products:** Formats, storage, display, data quality. Image Processing: Geometric/radiometric correction, noise reduction, enhancement (contrast, PCA).Classification: Supervised, unsupervised, decision trees, accuracy assessment. Geoinformatics: GIS basics (raster/vector), spatial data integration, web GIS.GPS/GNSS: Concepts, constellations (GPS, GLONASS, IRNSS), data processing.
	Geology	**General Geology:** Earth's origin, internal structure, processes (plate tectonics, earthquakes, volcanoes). **Mineralogy:** Crystal structures, physical properties of minerals, and identification. **Petrology:** Igneous, Sedimentary, and Metamorphic rocks (formation, classification, textures).Structural Geology: Rock deformation (folds, faults, joints, foliations) and stress/strain analysis. Stratigraphy: Principles of rock layering, correlation, and geological time. Paleontology: Fossils, evolution, and their use in dating rocks. Geomorphology: Landforms, weathering, erosion, and surface processes. Applied & Specialized Geology. Economic Geology: Ore deposits, mineral resources (metals, coal, hydrocarbons). **Hydrogeology:**

		Groundwater occurrence, movement, and resources.Engineering Geology: Geological factors in construction, site selection, hazards.Geophysics & Remote Sensing: Geophysical methods, GIS applications in mapping.Geochemistry: Distribution of elements, geochemical cycles.
	GIS	**Fundamentals: Definition,** components (hardware, software, data, people, methods), functionality, advantages, and applications.Data: Spatial (points, lines, polygons) and attribute data, data structures, formats, and management.**Mapping & Cartography:** Digital mapping, map projections, design principles, symbolization, and map composition. Geodatabases: Creating, managing, editing, and topology building.
	Physics	**Mechanics:** Motion, Forces, Energy, Rotation, Gravity. **Electromagnetism:** Electricity, Magnetism, EMWaves. **Thermal Physics:** Heat, Thermodynamics. Optics: Light behavior. **Modern Physics:** Quantum Mechanics, Electronics
	Environmental Science	**Fundamentals:** Introduction, Multidisciplinary Nature, Sustainability & SDGs, Basic Ecology. **Ecology & Ecosystems:** Structure/Function, Energy Flow, Food Webs, Succession, Terrestrial & Aquatic Ecosystems, Biodiversity. **Natural Resources**: Forest, Land, Water (over-exploitation, conflicts), Minerals, Marine, Energy (Renewable/Non-renewable). Pollution & Control:**Air:** Composition, Smog, Acid Rain, Ozone Depletion, Particulates. **Water:** Quality, Treatment, Wastewater Management, Heavy Metals. **Soil:** Composition, Contaminants, Soil Health. **Waste Management:** Solid Waste, E-Waste, Biomedical Waste (3Rs, Disposal).**Environmental Chemistry:** Thermodynamics, Kinetics, pH, Electrochemistry, Organic Pollutants (Pesticides, Polymers).**Environmental

		Microbiology: Principles, Water/Soil Microbiology, Recombinant DNA Tech. **Climate Change:** Greenhouse Gases, Global Warming, Urban Heat Islands, El Niño/La Niña.**Environmental Management & Policy:** EIA, EMS (ISO 14000), Auditing, Law (Water Act, EPA, NGT), Sustainable Development Goals. Environmental Geosciences: Weathering, Geomorphology, Natural Hazards (Floods, Earthquakes).
	Geography	**Physical Geography, Geomorphology:** Earth's interior, landforms (mountains, rivers, coasts), geomorphic processes (weathering, erosion).**Climatology:** Atmosphere (composition, structure), solar radiation, climate patterns, climate change.**Oceanography:** Ocean basins, currents, tides, marine resources, coastal processes.**Biogeography:** Soil formation, plant/animal distribution, biomes, biodiversity.**Human Geography, Population Geography:** Distribution, density, growth, composition, migration, demographic transition.**Economic Geography:** Human activities (primary, secondary, tertiary), resources, industries, sustainable development.**Settlements:** Rural and urban patterns, urbanization, urbanization impacts.**Cultural Geography:** Human races, cultural realms, geopolitics.**Geography as a Discipline & Mapping**Nature & scope of geography.Earth's origin, movements, geological time scale.Cartography & map skills.
	Disaster Management	**Introduction to Disasters:** Definitions (hazard, vulnerability, risk, resilience), types (natural & man-made), impacts, global trends, and India's profile. **Disaster Management Cycle:** Phases of mitigation, preparedness, response, and recovery/reconstruction. **Risk and Vulnerability:** Assessing factors affecting

		vulnerability, risk analysis techniques, and community-based approaches. **Disaster Preparedness & Mitigation:** Planning, early warning systems, public awareness, role of IT, and structural/non-structural measures. **Disaster Response:** Search & rescue, logistics, communication, medical response, psychological support, and role of agencies (NDRF, NGOs). **Legal & Institutional Frameworks:** Disaster Management Act 2005, National Policy, roles of central/state/local bodies (NDMA, PRIs). **Technology in DM:** Remote Sensing (RS), Geographic Information Systems (GIS), Drones, AI, ICT applications. **Health & Environment:** Health impacts, psychosocial care, climate change, and environmental aspects.
	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)
	Forestry & Horticulture	Horticulture, Forestry
	Geo-informatics	**Fundamentals of Geoinformatics:** An introduction to the scope of geoinformatics, including its constituent technologies like cartography, geodesy, photogrammetry, GIS, and remote sensing. **Remote Sensing:** The principles of remote sensing, including the electromagnetic spectrum, sensors, satellite programs, and image interpretation (both visual and digital). **Geographical Information System (GIS):** Concepts of GIS, spatial database creation, data management, and spatial analysis techniques. **Digital Image Processing:** Image pre-processing (geometric and radiometric corrections), image enhancement, feature extraction, and classification

		techniques. **Global Navigation Satellite System (GNSS):** Fundamentals of GNSS, its use in surveying, and data acquisition.