

Tamil Nadu Public Service Commission
Syllabus
Zoology, Botany, Geology and Physics
(Degree Standard)

Code: 619

Unit I: Invertebrata and Chordata (20 Questions)

Non – Chordata: General organization – Evolutionary relationship among taxa.

Protozoa: Amoeba, Plasmodium – Locomotion, nutrition, economic importance.

Porifera: Sponges canal system - skeleton, reproduction and economic importance.

Coelenterata: Corals and coral formation.

Chordata: General organization - characters - outline - classification.

Temporal vacuities: Identification of poisonous and non – poisonous snakes – South Indian snakes.

Mammals: Dentition, adaptive radiation, Protothria, Metatheria, eutherian and their phylogenetic relationships.

Unit II: Cell Biology, Physiology, Immunology and Developmental Biology (20 Questions)

Cell and Molecular Biology: Structure and function – plasma membrane, Mitochondria, Golgi bodies, Endoplasmic reticulum and Ribosomes, Nucleus and Nucleolus, Cell division, Chromosome.

Physiology: Mammals – Digestion, nutrition, balanced diet, metabolism, composition of blood, Mechanism of respiration, muscles, mechanism of muscle contraction, neurotransmitters.

Immunology: Antigens – Immunoglobulins – humoral and cell mediated immunity. T and B cells, mechanism of antibody formation – vaccination.

Developmental Biology: Regeneration – Stem cells – Sources, types and their uses in human welfare, IVF, embryo transfer and cloning.

Unit III: Plant Diversity - I (15 Questions)

Algae: General characters, pigmentation, thallus organization, Economic importance of Algae. Phytoplanktons and their role.

Fungi: General characters and mycelial structures – Phycomycetes, Ascomycetes, Basidiomycetes and Deuteromycetes.

Lichens: Structure, reproduction and ecological importance of Lichens.

Bryophytes: General characters, reproduction and alternation of generation in Hepaticopsida, Anthocerotopsida and Musci.

Unit IV: Plant Diversity - II (15 Questions)

Gymnosperms: A comparative account of vegetative and reproductive structure of Cycadales, Coniferales and Gnetales. Angiosperm characters in Gymnosperms. Economic significances of Gymnosperms.

Palaeobotany: Contributions of Birbal Sahni. Fossil beds of India, Types of fossils, Fossilization methods. Radiocarbon dating method of studying fossils, Geological time scale – Importance of studying Palaeobotany.

Unit V: Stratigraphy and Paleontology (20 Questions)

Principles of Stratigraphy, code of stratigraphic nomenclature, lithostratigraphy, biostratigraphy, chronostratigraphy – Geological Time Scale - Dharwar and Proterozoic rocks - Cuddapah and Vindhyan of India - Study of stratigraphic successions, lithology, fauna, flora and economic

importance of Phanerozoic rocks of India - Cretaceous of Tiruchirappalli, Tertiary of Assam - Species – definition and nomenclature - Megafossils - Modes of preservation of fossils -, paleoclimatic and paleoceanographic studies - Morphology, Classification, evolutionary trends and geological history of Coelenterata, Brachiopoda, Cephalopoda, Echinoids, Trilobita, Graptolites and Foraminifera - Stratigraphic utility of Ammonoidea, Trilobita and Graptoloidea.

Unit VI: Mineralogy and Petrology (20 Questions)

Definition of Minerals – Classification – Physical properties of minerals - Descriptive study of Quartz and its varieties - Feldspar Group - Pyroxene Group - Amphibole Group - Mica Group - Garnet Group - Descriptive study of Calcite, Dolomite, Tourmaline, Topaz, Staurolite, Chlorite and Zircon. Igneous Rocks - Textures and Micro structures – Tyrrell's and Tabular classification of Igneous rocks - Descriptive Study of Granites - Syenites - Diorites - Gabbro – Dolerites - Ultramafics - Dunites, Peridotites, Pyroxenites and Anorthosites. Classification of metamorphic Rocks – Textures and structures – Descriptive study of Marble – Schist and Gneiss – Amphibolites – Pyroxenites – Granulites – Charnockites. Sedimentary Rocks – Classification -Texture and structures – Properties of sediments - Descriptive study of Residual, Clastic, Chemical and Organic deposits – Significance of Heavy minerals.

Unit VII: Introductory Physics

Mechanics and Relativity, Properties of Matter, Sound, Heat and Thermodynamics (20 Questions)

Gravitation- Kepler's law- Gravitational constant and their determination variation of g - Centre of gravity - Friction – Lubricants - Laws of friction - Impulse – Impact- Laws of Impact - Loss of Kinetic energy –Moment of Inertia-Angular momentum and Kinetic energy of a revolving body- Newton's laws and their limitations - postulates of special theory of relativity - Lorentz transformation equations. Elastic moduli - Couple per unit twist - Torsional oscillations - Bending of beams - Uniform and Non uniform bending - Viscosity of liquids - Highly viscous liquids –Surface Tension - Capillary rise - Fick's laws of diffusion. Specific heat capacity - Debye's theory- Meyer's relation -Vanderwaal's equation – J-K effect - Thermal conductivity - Stefan's law - Solar constant - Temperature of the sun. Zeroth, first law and second law of thermodynamics - Isothermal and adiabatic change - Reversible and irreversible process - Carnot's theorem- Carnot engine - Carnot cycle-Entropy - Maxwell's thermodynamical relations and its applications - Third law of thermodynamics. Simple harmonic motion - Composition of two SHMs along a straight line and at right angles - Lissajou's figures - Laws of transverse vibrations - verification by sonometer and Melde's string -Forced vibrations and resonance -Beats -Doppler effect - Velocity of sound in solids and gases –Ultrasonics - production, properties and applications - Acoustics of buildings.

Unit VIII: Electricity, Magnetism and Electronics (15 Questions)

Coulomb's law - Permittivity of free space - Relative permittivity - Electric field - Gauss theorem and its application – Electric potential – Electric dipole moment-Potential and intensity due to a dipole-Capacitance - Dielectric constant -Ohm's law-Resistivity and conductivity - Internal resistance of a cell - EMF and Potential difference - Thermo Electricity –Peltier and Thomson Coefficients –Laws of Electrolysis - Biot and Savart's law - Ampere's law of magnetic force due to a current - Force between two current carrying parallel conductors- Force on an electron moving in a magnetic field - Faraday's laws of electromagnetic induction - Self and mutual inductance - Eddy currents - Transformers - Energy losses - Advantages of AC distribution over DC - Dynamos and motors - Magnetic poles - Magnetic moments - Susceptibility - Relation between susceptibility and permeability -Hysteresis – Dia, para, ferro magnetism. Kirchoff's laws for a loop and a junction - Complex impedance and phase diagram – LCR Circuits - Series and parallel resonant circuits - Sharpness of resonance Q factor. Classification of materials based on energy bands - Intrinsic and extrinsic semiconductors -Electrons and holes - charge carriers - P-type and N-type semiconductors - Junction diodes - Characteristics of a diode - -Junction transistors -Characteristic of transistors -Rectifier, Amplifier and Oscillators - AM and FM transmission - Basic principles of super heterodyne receiver - Photo conductive cell - Photodiode –Solar cell-LED and LCD- Antenna -Radar -Uses of radar. Number Systems - Logic circuits-AND,OR,NOT NAND,NOR and EX-OR gates-Truth tables-Multivibrators - Flip flop circuits(RS and JK flip flops)

Unit – IX:

(A): Ecology, Evolution and Economic Zoology (10 Questions)

Environmental Biology: Biotic and abiotic factors, Ecosystem – Structure, function and types of ecosystem. Habitat ecology. Wild life, need for conservation – management and methods of conservation. Sanctuaries in Tamil Nadu.

Evolution: Darwinism and Lamarckism, Fossils and Fossilization, Indian fossils – Geological time scale – Origin and evolution of man.

Animal distribution: Zoogeographical distribution – Continental and island fauna – Natural resources and conservation.

Economic Zoology: Sericulture, seaweed culture, Vermiculture - Oyster culture and pearl formation. Aquaculture practices in Tamil Nadu and impact on the environment.

(B): Genetics Plant Systematics and Horticulture (20 Questions)

Mendelism, structure and types of DNA, RNA

Types of classification, (Artificial, natural, phylogenetic and APG system) ICN, BSI and its role preservation of plant specimens, Herbarium techniques.

Formal and informal garden – Components – Garden design and landscape: Rockery, Bonsai.

Topiary and Adornments.

Unit X:

(A) : Applied Geology (10 Questions)

Principles of Geological mapping and field Techniques - Environmental problems in Mining Industries - Applications of Remote Sensing and GIS in Geological Studies - Occurrence of groundwater – Aquifers – Types of Aquifers – Porosity – Specific yield and retention - Electrical methods of groundwater exploration.

(B): Modern Physics (15 Questions)

Spherical aberration -Chromatic aberration and their rectifications - Interference - Colours of thin films - Newton's rings – Fresnel's and Fraunhofer Diffraction - Double refraction - Huygen's explanation – Nicol's prism - Quarter and half wave plates - polarization – Polarimeter- Principle of UV, IR and Raman Spectroscopy- Optical fiber - Fiber optic sensors - Fiber optic communication systems - Lasers - Population inversion - Ruby and Helium Neon Lasers. De Broglie concept of wave theory- Wave velocity and group velocity- De Broglie relations – Heisenberg's uncertainty principle – Basic postulates of wave mechanics- Schrodinger's Wave equation -Eigen function and Eigen values, Planck's quantum theory of black body radiation - Photoelectric effect - Einstein's equation for photo electric effect - Millikan's experiment . Bohr's theory of hydrogen atom - Spectra of Hydrogen and Hydrogen like atoms - Rydberg's constant - Spatial quantization - Sommerfeld atom model – Vector atom model- Seven quantum numbers -Pauli's exclusion principle - Magnetic moment due to orbital motion and electron spin - Bohr magnetron - Zeeman effect - Anomalous Zeeman effect .

Properties of nucleus - size, charge, mass and spin - Nuclear magnetic dipole moment - Binding energy - Packing fractions - Nuclear forces - Shell model and liquid drop model - Nuclear reactions – Radio activity and Radio isotopes - Betatron - Proton Synchrotron - Particle Detectors - Ionization chamber - Elementary particle – Baryons and Leptons – Cosmic rays, Structure of crystals - Symmetry elements - Classification of crystals - Bonding in Metals - X-rays - Bragg's law - Mosley's law - Compton effect.

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