



उत्तराखण्ड अधीनस्थ सेवा चयन आयोग,
निकट- महाराणा प्रताप स्पोर्ट्स कॉलेज, थानों रोड़, रायपुर देहरादून।
(वेबसाइट-www.sssc.uk.gov.in ई-मेल-chayanayog@gmail.com)

पत्रांक:- 525 / गोपन / 2024-25

दिनांक: 04 मार्च, 2025

संवाद

आयोग द्वारा विभिन्न रिक्त पदों हेतु जारी विज्ञापन संख्या-68/उ0अ0से0च0आ0 देहरादून-2025 दिनांक-31.01.2025 के साथ कतिपय पदों के पाठ्यक्रम को आयोग की वेबसाइट पर जारी किया गया था। तदक्रम में प्रयोगशाला सहायक (रसायन विज्ञान), मशरूम पर्यवेक्षक, प्रयोगशाला सहायक (वनस्पति विज्ञान), प्रयोगशाला सहायक उद्यान विभाग(उद्यान एवं खाद्य प्रसंस्करण), प्रयोगशाला सहायक (पशुपालन विभाग) एवं पशुधन प्रसार अधिकारी का संशोधित पाठ्यक्रम अभ्यर्थियों के अवलोकनार्थ आयोग की वेबसाइट पर प्रकाशित किया गया है।

अतः समस्त अभ्यर्थी जारी संशोधित पाठ्यक्रम से अवगत हों।


(सुरेन्द्र सिंह रावत)
सचिव।

5/5

SYLLABUS
FOR THE POST OF

PRAYOGSHALLA SAHAYAK (RASAYAN VIGYAN), MUSHROOM PRAVEKSHAK,
PRAYOGSHALLA SAHAYAK (VANASPATI VIGYAN), PRAYOGSHALA SAHAYAK
UDHYAAN VIBHAG (UDHYAAN AIVAM KHADYA PRASHANSKARAN), PRAYOGSHALA
SAHAYAK (PASHUPALAN VIBHAG), PASHUDHAN PRASAAR ADHIKARI.

PART I
CHEMISTRY

- I. Atomic, molecular and molar mass. Mole concept. Stoichiometry. Atomic number, isotopes and isobars.
- II. Bohr's atomic model & its limitation. de Broglie's equation. Heisenberg's uncertainty principle, concept of orbitals. Quantum numbers. Aufbau principle, Pauli's exclusion principle and Hund's rule. Electronic configuration of atoms.
- III. Modern periodic law. Periodic table & periodic properties: atomic & ionic radii, ionization enthalpy, electron gain enthalpy and electronegativity.
- IV. Ionic bond, Lattice enthalpy. Covalent bond, Valence bond theory, VSEPR theory, Concept of Hybridization, Structure & shape of simple molecules. Molecular orbital theory, Bond order. Electronic configuration of homonuclear diatomic molecules (H_2 , He_2 , C_2 , N_2 & O_2). Hydrogen bonding.
- V. d and f block elements- Electronic configuration, general trends in properties (metallic character, ionization enthalpy, oxidation state, ionic radii, catalytic property and colour. Magnetic properties, interstitial compounds, alloy formation). Preparation and properties of $KMnO_4$ and $K_2Cr_2O_7$. Lanthanoids & Actinoids: Electronic configuration and Oxidation state. Lanthanoid contraction.
- VI. Coordination compounds: Difference between double salt and coordination compounds. Ligands, coordination number. IUPAC nomenclature of simple coordination compounds. Isomerism. Werner theory. Valence bond theory. Crystal Field theory, Electronic arrangement in Octahedral and Tetrahedral complexes, CFSE, Spectrochemical series. Importance of Coordination compounds (qualitative analysis, extraction of metals & biological system).
- VII. General Organic Chemistry: Classification of organic compounds, IUPAC Nomenclature. Isomerism. Electronic displacement in covalent bond: Inductive effect, Electromeric effect, Hyperconjugation & Resonance. Covalent bond cleavage. Attacking reagents (Electrophile & Nucleophile), Reaction intermediates (Carbocation, Free radical and Carbanion). Types of organic reactions. Methods of Purification of Organic Compounds. Qualitative and Quantitative analysis of Organic Compounds.
- VIII. Hydrocarbons- Alkanes: Conformational analysis of Ethane. Halogenation, Combustion & Pyrolysis. Alkenes-Geometrical isomerism. Method of preparation of alkenes. Chemical reactions of alkenes (with hydrogen, halogen, water, HX, oxidation

[Signature]

[Signature]

11/41

4/5

- & ozonolysis). Alkynes- Acidic nature, Method of preparation of alkynes. Chemical reactions of alkynes (with hydrogen, halogen, water & HX). Aromatic Compounds- Structure of benzene, Aromaticity, Mechanism of Electrophilic Substitution reactions (Nitration, Sulphonation, Halogenation and Friedel Craft's alkylation & acylation). Directive effect of functional group in monosubstituted benzene. Carcinogenicity & toxicity.
- IX. General methods of preparation, Physical, Chemical properties & uses of haloalkenes, haloarenes, alcohol, phenol, ether, aldehyde, ketones, carboxylic acid & amines. Uses and environmental effects of Dichloromethane, trichloromethane, iodoforms, freons & DDT. Importance of Diazonium salts in synthetic organic chemistry.
- X. Some important name reaction (Hunsdieker reaction, Hoffmann Ammonolysis, Wurtz reaction, Sandmeyer reaction, Gattermann reaction, Esterification reaction, Reimer Teimann reaction, Aldol Condensation, Cannizaro reaction, Benzoin Condensation, Carbylamine reactions).
- XI. Biomolecules: Classification, properties and importance of Carbohydrates (mono-, oligo & Polysaccharides), Proteins, Vitamins & Nucleic acid. Structure of proteins. Denaturation. Elementary idea of Enzymes & Hormones.
- XII. Thermodynamics- Types of systems. Extensive and Intensive properties. State function. First law of thermodynamics. Heat capacity and specific heat capacity. Hess's law. Enthalpy of dissociation, combustion, formation, atomization, sublimation, phase transition and ionization. Concept of Entropy. Free energy, spontaneity and equilibrium. Third law of Thermodynamics (brief introduction).
- XIII. Solution- Method of expression of concentration. Solubility of gases in liquids and solid solutions. Raoult's law. Colligative properties. Abnormal molar mass.
- XIV. Equilibrium- Law of mass action. Equilibrium constant. Le- Chatelier's principle. Ionization of acid and base. Strong and weak electrolytes. Acidic strength, pH, Buffer solutions, Solubility product, Hydrolysis of salts & Common Ion Effect.
- XV. Electrochemistry- Oxidation number. Redox reactions & its application. Conductance, Specific & Molar Conductivity and their variation with concentration. Kohlrausch's law. Electrolysis. Laws of electrolysis. Galvanic Cell, EMF of cell, Standard electrode potential, Nernst equation. Relation between Gibb's energy change & EMF of a cell. Dry cell, Pb-accumulator & Fuel cell. Corrosion.
- XVI. Chemical Kinetics- Rate of reaction. Factors affecting rate of reactions (Concentration, temperature, catalyst). Order and Molecularity. Rate law and rate constant. Integrated rate equation and half life (Zero and First order reactions). Concept of Collision theory. Activation energy and Arrhenius equation.
- XVII. Laboratory methods: Volumetric analysis (Preparation of standard solution of oxalic acid, sodium carbonate; Determination of strength of NaOH & HCl). Inorganic salt analysis. Detection of N, S and Cl in Organic compounds. Determination of pH of solutions, acids, bases and salts using pH meter and universal indicator. Chromatography analysis (Paper chromatography, Rf value) of leave & flower extracts and inorganic mixture. Inorganic compound preparation (Ferrous Ammonium Sulphate, Potash Alum & Potassium Ferric Oxalate). Organic compound preparation (Acetanilide, Di-benzalacetone & p-Nitroacetanilide). Functional group determination (Unsaturation, Alcohol, Phenol, Aldehyde, Ketone, Carboxylic and Primary amine). Characteristic tests of Carbohydrates, fats and proteins.

Tejvato

Prakash

10/41

3
5

PART II BIOLOGY

UNIT-1

ORIGIN OF LIFE AND EVOLUTION

Origin of life. Evolution, theories and evidences of evolution. Variations and causes of variations. Neo-Lamarckism and Neo-Darwinism. Adaptations and adaptive radiations. Human Evolution. Speciation.

UNIT-2

CELL BIOLOGY

Cell Theory. Prokaryotic and Eukaryotic cell. Cell membrane and cell wall. Cell organelles (Plastids, Mitochondria, Endoplasmic reticulum, Golgi Bodies/Dictyosomes, Lysosomes, Vacuoles, Centrioles). Nucleus and Chromosomes. Cell Cycle. Mitosis and Meiosis.

Biomolecules: Structure, Classification and function of Proteins, Carbohydrates, Lipids. Metabolism of Carbohydrates. Enzymes, classification and enzyme action. Nucleic Acids.

UNIT-3

DIVERSITY OF LIVING ORGANISMS

Taxonomy and Systematics. Concept of species. Nomenclature of species. History of Classification. Taxonomical hierarchies. Classification of Organisms (5- Kingdom System Classification). Salient features of various groups of plants (Algae, Fungi, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms) and animals (Non-Chordata up to Phylum and Chordata up to Classes) with examples and economic importance. Microbial Diversity (Viruses, Viroids, Bacteria). Lichens.

Botanical gardens, Herbaria, Zoological Parks and Museums.

UNIT-4

STRUCTURAL ORGANIZATION IN PLANTS AND ANIMALS

Plants and Animal Tissue systems. Morphology, Anatomy and Functions of different Parts of Flowering Plants (Stem, Root, Leaf, Inflorescence, Flower). Coelom and segmentation in animals.

Morphology, Anatomy and functions of various systems of Earthworm. Cockroach, Frog and Man.

UNIT-5

PHYSIOLOGY

PLANT PHYSIOLOGY: Transportation. Mineral Nutrition. Photosynthesis. Respiration. Plant Growth and development. Plant Movements. Seed Germination. Photoperiodism. Vernalization.

HUMAN PHYSIOLOGY: Types of Nutrition. Digestion and Absorption. Nutritional digestive disorders. Breathing and exchange of gases. Body fluids and circulation. Working of heart, heart sounds, cardiac cycle. Nitrogenous excretion, working of Kidney and osmoregulation.

Signature

Signature

9
41

2
5

Locomotion and movement. Neural control and co-ordination. Receptors (Eye, ear and chemical sense organs). Chemical co-ordination integration.

UNIT-6
REPRODUCTION

ASEXUAL AND SEXUAL REPRODUCTION.

SEXUAL REPRODUCTION IN FLOWERING PLANTS: Flower and its types. Structure and development of anther and male gametophyte. Structure and development of ovule and female gametophyte. Pollination. Fertilization. Post-fertilization events. Endosperm. The embryo. Parthenocarp. Polyembryony. Apomixis. Development of fruits and seeds. Dehiscence of fruits and dispersal of seeds.

HUMAN REPRODUCTION: Gametogenesis. Menstrual Cycle. Fertilization. Embryo Development. Implantation. Placenta. Parturition. Reproductive health. Population explosion and Birth Control. Contraception and Medical Termination of Pregnancy. Sexually transmitted diseases. Infertility. Aminoocentesis. Test Tube baby.

UNIT-7
MOLECULAR BIOLOGY, GENETICS AND BIOTECHNOLOGY

MOLECULAR BASIS OF INHERITANCE: Nucleic acids. Genes. Evidences of Genetic material. Replication of DNA. Genetic Code. Transcription, Translation and gene regulation.

GENETICS: Heredity and variation. Mendel's Laws of inheritance. Post-mendelian Genetics. Gene Interaction. Chromosomal theory of inheritance. Linkage. Crossing-over. Sex Determination. Sex-linked inheritance. Mutations. Human genetic disorders. Pedigree analysis.

BIOTECHNOLOGY: Principals of biotechnology. Genetic engineering. Tools of recombinant DNA technology. Restriction enzymes. DNA fingerprinting. Gene library. Cloning. Application of biotechnology in Agriculture, health and medicine. Human genome project. ELISA.

UNIT-8
BIOLOGY AND HUMAN WELFARE

Human health and diseases. Communicable and non-communicable diseases. Cancer. Pathogens. The Immune system. Antigen and Antibodies. Types of Immunity. Autoimmunity. Role of stem cells in medical treatment.

MICROBES IN HUMAN WELFARE: Microbes in household products. Microbes as food. Microbes in industries. Microbes in sewage treatment. Biofertilizers.

UNIT-9
ECOLOGY AND ENVIRONMENT

Major Biomes of India. Abiotic and Biotic Factors. Bio-geochemical cycles. Food chain and Food-web. Ecological pyramids. Adaptation to environment in plants and animals. Population (density, natality, Mortality, biotic potential, age distribution, sex ratio). Interaction between organisms (Predation, parasitism, mutualism, ammensalism). Ecosystem and its components. Pond, forest, grassland, desert, mountain ecosystems. Ecotone and edge effects. Biotic community and succession. Types of biodiversity. In-situ and ex-situ conservation. Hot spots

Signature

Signature
8
41

1/5

of biodiversity. Wild life and its conservation. Biosphere reserves, national parks, sanctuary. Red data book. Ramsar convention. Project Tiger.

ENVIRONMENTAL ISSUES: Environmental pollution. Pollutants, kinds of pollution; prevention and their control. Pollution related diseases. Land degradation. Sewage and sewage treatment. Solid waste management. Hospital waste management. Remedy for plastic waste. Organic farming. Environmental Acts/laws/legislations.

UNIT-10

ECONOMIC BOTANY, ZOOLOGY AND BIOSTATISTICS

ECONOMIC BOTANY: Green revolution. Main objectives of plant breeding. Cereals and pulses. Non-cereal crops. Methods of crop improvement. Fibre, timber, oil, spices, condiment-yielding plants. Plant tissue culture. Single cell protein (SCP). Biofortification.

ECONOMIC ZOOLOGY: Sericulture, Apiculture, Lac culture. Pisciculture. Poultry and Piggery. Animal husbandry (Dairy, Artificial insemination, Multiple and embryo transfer technology).

BIOSTATISTICS: Data (Primary and secondary), data collection and data classification. Principles and application of measures of central tendency (Mean, Mode and Median).

Note: Current general knowledge of scientific advancements in all the above units is deemed to have been included.

Signature

Signature

7/41

Part III

AGRICULTURE

- I. Classification of crops and package of practices of major cereals, millets, pulses, oilseeds, fodders, fibers, fruits, vegetables, flowers, medicinal, aromatic, spice crops and their post-harvest management and preservation.
- II. Farming systems and sustainable agriculture.
- III. Plant protection measures of agronomical and horticultural crops.
- IV. Plant cell structure, functions & cell division; Plant tissue culture; Plant anatomy (root, stem, leaf); Pollination & Fertilization mechanism; Photosynthesis, Respiration, Transpiration, Photoperiodism and Plant growth regulators.
- V. Classification of soil and their properties; Soil fertility & productivity; types of soil erosion and its conservation techniques; Concept of essential plant nutrients & their classification. Problematic soils and their management. Classification of fertilizers (organic and inorganic) their nutrient content and method of application. Concept of Natural and Organic farming.
- VI. Agro-climatic zones of India; Climate and weather forecast; various types of agro meteorological equipments. Types of irrigation.
- VII. Mushroom, their nutritional status and method of production. Basic concept of Bee keeping, Sericulture, Landscaping, Plant propagation methods, Nursery management, Protected cultivation structures, Type of seeds & their production methods and important schemes (Public & Private sector) for the support of these enterprises.
- VIII. Principles and importance of agricultural economics; Agricultural marketing, finance and co-operation. Extension and rural development programs of the Government agencies run for welfare of farmer's community. Knowledge of different agricultural institutions in India.
- IX. Study of different types of agricultural farm tools, implements and machinery with their usage. Tillage and intercultural operations.

PART IV

ANIMAL HUSBANDRY

- I. Breeds characteristics and salient features of different breeds of cattle, buffaloes, sheep, goat, pig and poultry.
- II. Feeds and its classification. Feeding management of different category of livestock. Cultivation practices of fodder crops (leguminous and non-leguminous), fodder trees, temperate fodder, perennial fodder. Preservation of cultivated fodder and their nutritional enrichment.
- III. Various dairy farm management practices and different methods of identification techniques in domesticated farm animals. Methods of age determination and restraining of livestock.
- IV. Principles of housing management of livestock, hygiene and sanitation practices, hatchery management of poultry.
- V. Morphology and physiology of different farm animals. Digestive and reproductive system of ruminant and non-ruminant animals.

Tejendra

[Signature]

- VI. Care and management of domesticated farm animals. Importance of artificial insemination, embryo transfer technology and cloning of farm animals.
- VII. Principle of clean milk production and its techniques. Composition of milk and factor affecting quality and quantity of milk.
- VIII. Disease management of large ruminants, small ruminants and poultry. Bacterial, viral, protozoal and nutritional deficiency disease of farm animals and poultry.
- IX. Effect of greenhouse gases and climate change on productivity of domesticated farm animals. Economic status of livestock in Uttarakhand. Different institution related to livestock farming.

Note: Current general knowledge of scientific advancement in all the above parts/units is deemed to have been included.

Dejallo

Pand