RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SCHEME & SYLLABUS FOR THE POST OF ASSISTANT CONSERVATOR FOREST & FOREST RANGE OFFICER GRADE Ist COMPETITIVE EXAMINATION, 2018 FOREST DEPARTMENT

OPTIONAL SUBJECT - CHEMISTRY

1. Atomic structure and Periodicity :

Fundamental particles, De Broglie matter waves, Schrodinger wave equation, quantum numbers, Aufbau principle, Pauli's exclusion Principle, Hund's multiplicity rule. Electronic configuration of elements, periodicity in properties of s,p,d and f block elements.

2. s and p Block Elements and Chemistry of Noble Gases :

s block Elements: Comparative study, diagonal relationships, salient features of hydrides, solvation and complexation tendencies including their function in biosystem.

p block Elements**:** Comparative study (including diagonal relationship) of group 13-17 elements compounds like hydrides, oxides, and halides of group 13-16 hydrides of boron-diborane and higher boranes borazine.

Chemistry of Noble Gases **:** Chemistry, properties of noble gases, structure and bonding in xenon compounds.

3. Chemical bonding and Coordination Compounds - Chemistry of d and f block Elements :

Covalent bond, Valence bond theory, shapes of simple inorganic molecules and ions, valence shell electron pair repulsion (VSEPR) theory for explaining shapes of molecules.

Molecular orbital theory as applied to homonuclear and heteronuclear diatomic molecules, concept of multicentric bonding.

Coordination Compounds : nomenclature and isomerism, variable oxidation states, colour and spectra, magnetic and catalytic properties.

Chemistry of d and f block elements : Electronic configuration, oxidation states, ionic radii magnetic properties and complex formation of d and f block elements. Lanthanide contraction. General features and chemistry of actinides.

4. Biomolecules :

Carbohydrates : Classification and nomenclature, mechanism of osazone formation, configuration of monosaccharides, mechanism of mutarotation, An introduction of disaccharides and polysaccharides. (without involving structure determination)
Amino acids : Classification, structure and stereochemistry of amino acids, isoelectric point and electrophoresis.
Proteins : Structure, classification and properties of proteins, peptide structure determination, protein denaturation / renaturation.
Nucleic acid : Introduction, constitution of nucleic acids, ribonucleosides and ribonucleotides. The double helical structure of DNA.

5. Mechanism of Organic reactions :

Types of reagents and Types of reaction- SN^1, SN^2, SN^i and E_1 and E_2 reactions, reactive intermediates carbocations, carbanions, free radicals, carbene, arynes and nitrenes, concept of aromaticity and arenes.

6. Polymers and Drugs :

Types of polymerization, natural and synthetic polymers.
Drugs (antacids, antihistamines, analgesics, antipyretics, antibiotics and antifertility)
Characterization and techniques **:** Chromatography-Definition, classification, R_f Value, laws of differential migration, paper and thin layer chromatography, chromatographic application.
Elementary idea of IR, UV, NMR, Mass and Raman Spectroscopy.

7. Electrochemistry :

Concept of pH, determination of pH using hydrogen, quinhydrone and glass electrode.
Buffer and mechanism of buffer action.
Migration of ions, Kohlrausch law, ostwald's dilution law.
Electrolytic and galvanic cells, conventional representation of electrochemical cell. EMF and its measurements.

8. Thermodynamics :

First, Second and Third law of Thermodynamics.
Thermochemistry : standard enthalpy of formation standard state, Hess's law of heat summation, Kirchhoff's equations.
Photochemistry : Fundamentals and basic laws of photochemistry.

9. Chemical Dynamics :

Zero, first, second and pseudo order reactions.
Kinetics as applied to conductometic, potentiometric. Polarometic and spectrophotometric methods. Collision and Transition state theories.

Solution, colloidal and solid state :

Solution and Colligative properties
Colloidal state- Definition, Classification, properties and general applications of colloids.
Catalysis and characteristics of catalyzed reactions with miscellaneous examples.
Laws of crystallography.

10. Enviromental and green chemistry :

Understanding of environmental chemistry, atmospheric pollution: water, air and soil pollution, ozone layer deplition, green house effect, photochemical smog, monitering and control of pollution.
Introduction and principles of green chemistry.

Note :- **Pattern of Question Paper**

1. **Objective type paper**
2. **Maximum Marks : 200**
3. **Number of Questions : 120**
4. **Duration of Paper : Three Hours**
5. **All questions carry equal marks.**
6. **There will be Negative Marking.**