RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS FOR EXAMINATION FOR THE POST OF

LECTURER - CHEMISTRY

(SCHOOL EDUCATION)

PAPER – II

Part – I (Senior Secondary Standard)

1 **Atomic Structure :**

Fundamental Particles, Modern concept of atomic structure, quantum numbers, Aufbau principle, Pauli's exclusion principle, Hund's Rules. Electronic configuration of elements, classification of elements and periodicity in properties, s, p, d and f Block elements.

2 **Transition Elements**

Transition elements, electronic configuration, absorption spectra including charge transfer spectra and magnetic properties, co-ordination compounds (Werner's theory). Nomenclature (IUPAC) Isomerism, Elementary M.O. approach for metallic bond and bond order. Conductors, insulators, semiconductors and super conductors.

3 **Lanthanides and Actinides**

Electronic configuration, oxidation states, Lanthanide and Actinide contraction, principles of isolation and application.

4 **Chemical Kinetics & Surface Chemistry**

Rate of chemical reaction, order of reaction, factors affecting rate of reactions, Physical adsorption and chemosorption, colloids and emulsions.

5 **Solutions**

Types of solutions, solubility and concentrations, vapour pressure, Ideal and real solutions, properties and calculations of molar mass.

6 **Thermodynamics**

Laws of thermodynamics, zeroth and first law and their applications, concept of work and heat, Gibb's energy, enthalpy and entropy.

7 **Alkanes, Alkenes, Dienes and Halo-alkanes**

Classification, nomenclature (R,S), methods of preparations and chemical reactions of alkanes, alkenes, alkadienes and haloalkanes.

8 **Aldehydes, Ketones, Carboxylic Acids and their derivatives**

Classification, nomenclature, methods of preparation, chemical reactions of aldehydes, ketones, carboxylic acids and their derivatives.

9 **Aromaticity and Arenes**

Aromaticity, Benzene, Alkyl-arenes, structure of benzene, electrophilic substitution reactions, orientation of functional groups.

10 **Bio-molecules**

Elementary treatment of carbohydrates, proteins, enzymes, vitamins & nucleic acids.

Part – II (Graduation Standard)

1 **Chemical Bonding**

Theories of chemical bonding, VB and MO theories of Diatomic molecules, VSEPR theory, Quantum mechanics, Schrodinger's wave equation for one electron system.

2 **Co-ordination Complexes**

Details of Crystal field theory for weak and strong field complexes. Comparison of VB and CFT theories. Factors affecting 10 Dq. Thermodynamic aspects of Crystal fields, John-Teller effect.

3 **Co-ordination chemistry of Lanthanides and Actinides**

Co-ordination behaviour of Lanthanides and Actinide complexes. Magnetic and spectroscopic properties.

4 **Chemical Dynamics :**

Zero, first and second order reactions. Collision and Transition state theories and their comparison.

5 **Electrochemistry**

Electrochemical and Galvanic cells, theory of strong electrolytes. Debye and Huckel theory of activity coefficient, Nernst equation, Ionic equilibria. Fuel cells.

6 **Enthalpy and Entropy**

Enthalpy and its changes at constant pressure and temperature. Entropy as a function of temperature and volume. Hess's Law of constant heat summation, Gibbs and Helmoltz functions.

7 **Conformations and Configuration**

Conformation of alkanes (ethane, butane). Configuration of alkenes (E/Z) nomenclature. Conformations of cyclo-hexane.

8 **Name Reactions**

Nucleophilic Addition reactions and mechanism of Aldol, Cannizzaro, Perkin, Stobbe, Benzoin, Reformatsky, Knovengel, Baeyer–Villiger, Wittig and Mannich reactions.

9 **Halo, Nitro, Amino-Arenes and Diazonium Salts**

Preparations, Chemical properties, elimination and addition mechanism and synthetic applications of diazonium salts.

10 **Polymers and Drugs**

Polymers, Types of polymerization, natural and synthetic polymers. Drugs (antacids, anti-histamines, analgesics, antipyretics, antibiotics and antifertility).

Part – III (Post Graduation Standard)

1 **Molecular Orbital Theory**

M.O. Theory of polyatomic molecules (AX_2, AX_3 and AX_4)

2 **Organometallic Compounds**

Organometallic compounds of Li, Mg, Sn and Fe. Structure, bounding and Applications.

3 **Super Heavy Elements**

Super heavy elements, electronic configuration and their positions in the periodic table.

4 **Kinetics and Catalysis**

Kinetics of photo-chemical reactions, Acid-Base and Enzyme catalysis.

5 **Electrochemistry**

Measurement of E.M.F., Kohlrausch's Law and its applications, Membrane equilibria.

6 **Thermodynamics**

Third Law of Thermodynamics and Joule-Thompson's experiment.

7 **Substitutions and Elimination Reactions**

S_N^1, S_N^2, S_N^i, E_1 and E_2 reactions of haloalkanes, Preparation and Chemical reactions of phenols, ethers and epoxides.

8 **α,β- Unsaturated Aldehydes and Ketones**

Reactions of α,β- Unsaturated Aldehydes and Ketones, Michael addition, Favorskii rearrangement.

9 **Pericyclic Reactions**

Electrocyclic, Cyclo-addition and Sigmatropic rearrangement, Photo-organic chemistry of alkenes.

10 **Environmental Pollution and Spectroscopy**

Ozone depletion, Green house effect, Global warming. Elementary idea of IR, UV and NMR techniques.

Part – IV (Educational Psychology, Pedagogy, Teaching Learning Material, Use of computers and Information Technology in Teaching Learning)

1. Importance of Psychology in Teaching-Learning :
    - Learner,
    - Teacher,
    - Teaching-learning process,
    - School effectiveness.

2. Development of Learner :

    - Cognitive, Physical, Social, Emotional and Moral development patterns and characteristics among adolescent learner.

3. Teaching – Learning :

    - Concept, Behavioural, Cognitive and constructivist principles of learning and its implication for senior secondary students.
    - Learning characteristics of adolescent and its implication for teaching.

4. Managing Adolescent Learner :

    - Concept of mental health and adjustment problems.
    - Emotional Intelligence and its implication for mental health of adolescent.
    - Use of guidance techniques for nurturing mental health of adolescent.

5. Instructional Strategies for Adolescent Learner :

    - Communication skills and its use.
    - Preparation and use of teaching-learning material during teaching.
    - Different teaching approaches:
      Teaching models- Advance organizer, Scientific enquiry, Information, processing, cooperative learning.
    - Constructivist principles based Teaching.

6. ICT Pedagogy Integration :

    - Concept of ICT.
    - Concept of hardware and software.
    - System approach to instruction.
    - Computer assisted learning.
    - Computer aided instruction.
    - Factors facilitating ICT pedagogy integration.

Scheme of Examination

Subject Concerned

S. No.	Subject	No. of Questions	Total Marks
1	Knowledge of Subject Concerned : Senior Secondary Level	55	110
2	Knowledge of Subject Concerned : Graduation Level	55	110
3	Knowledge of Subject Concerned : Post Graduation Level	10	20
4	Educational Psychology, Pedagogy, Teaching Learning Material, Use of Computers and Information Technology in Teaching Learning	30	60
	Total	**150**	**300**

Note : 1 All the question in the Paper shall be Multiple Choice Type Question.

2 Negative marking shall be applicable in the evaluation of answers. For every wrong answer one-third of the marks prescribed for that particular question shall be deducted.
Explanation : Wrong answer shall mean an incorrect answer or multiple answer.

3 Duration of the paper shall be 3 Hours.

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