Syllabus for subject specific teachers

Physics

Maximum Marks (120) **Time:- 2 Hours**

1. **Mathematical physics**

08 Marks

2. **Electronics**

PN Junction diode, Zener diode as voltage regulator. (At the start).
Classification of multivibrators, monostable and bi-stable multivibrators, their working and comparison saw tooth and stair case wave form generators. 08 Marks

3. **Quantum Mechanics**

Ehrenfest theorem, mathematical principles of linear vector spaces, linear operator, adjoint of an operator, Hermitian operator, commuting and non-commuting operator.

08 Marks

4. **Nuclear Physics.**

Nuclear fission and fussion, Decay law (Before Fermi theory of β-decay).
Nishi jima Scheme, Intrinsic parity, parity conservation and violation, quark model, classification, basic fermion constituents (Quarks and leptom).

08 Marks

5. **Electrodynamics.**

Displacement current (At the Start).
Power radiated by a point charge, free electrons in plasma and reflection from plasma.

08 Marks

Chemistry

1. **Thermodynamics:** Laws of thermodynamics, concept of entropy Gubbs free energy, Partial molar properties Roult's Law and Henry Law. 04 Marks

2. **Chemical Kinetics:** Theories of reaction rates, absolute reaction rates and collision theory, ionic reactions, photochemical reactions, Arrehenic equations and its applications. 03 Marks

3. **Surface chemistry:** Adsorption, types of adsorption, Longmire adsorption isotherm colloids types and their properties catalysis. 04 Marks

4. **Electro Chemistry:** Laws of electrolysis, Nernst equation its applications, electromotive series and different types of commercial cells. 03 Marks

5. **Atomic Structure:** Bohr's Model and quantum mechanical model of an atom, quantum numbers Pauli's exclusion principle Afham's principle, Hund's rule. 03 Marks

6. **Chemical Bonding:** Description of VB, MO and VSEPR theories. There electron bond, hydrogen bond its types. Hybridisation and its types. 03 Marks

7. **Coordination Chemistry:** Nomenclature, isomerism, crystal field theory, spectro chemical series. 04 Marks

8. **Reactive intermediates and Aromaticity:** Structure, stability, methods of generation of carbonation, carbonions free radicals Huckel rules, Homoaromaticity and Anti-aromatcity. 04 Marks

9. **Electrophillic Substitution:** Theoretical treatment, Structure- reactivity, relationship in mono-substituted benzene, isomer proportions, orientation in benzene rings with more than one substituent. Reimer Taiman reaction fries rearrangement. 03 Marks

10. **Addition Reaction:** Addition to carbon-carbon double bond involving addition of electrophiles and nucleophiles general mechanism. 03 Marks

11. **Elemination Reactions:** Discussion of elimination mechanism and orientation Saytzeffs and Hoffman rules. 03 Marks

12. **Reaction Mechanism:** Aliphatic, Nucleophillic substitution, reactions SN^1, SN^2, effect of Substrate, substitution at Allylic and Vinlhci carbon atoms. 03 Marks

Bioscience

Cell Biology and Biochemistry: Cell structure (Prokaryotic and Eukaryotic). Cell organelles, structure, function and chemical composition: Cytoskeleton, cell cycle,and regulation, cell signalling.

1. Enzymes, Classification and types of enzymes, concept of co-enzymes, co-factors mechanism of action (Lock and key theory) and induced fit theory, application of enzymes, Biomolecules, structure and function of carbohydrates, proteins, lipids and nucleic acids (RNA and DNA). 04 Marks

2. **Diversity Living world:** Taxanomy and systematics, concept of species, binomial nomenclature, five kingdom classification viruses, classification of plants- Algae, Bryophytes, pteriodophytes, Angiosperms and Gymnosperms, classification of animals up to phylum and class level (chordates and non-chordates). 04 Marks