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

   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 lepton).  
   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-aromaticity. 04 Marks

9. **Electrophillic Substitution:** Theoretical treatment, Structure-reactivity, relationship in monosubstituted 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. **Elimination Reactions:** Discussion of elimination mechanism and orientation Saytzeffs and Hoffman rules. 03 Marks

12. **Reaction Mechanism:** Aliphatic, Nucleophillic substitution, reactions SN1, SN2, effect of Substrate, substitution at Allylic and Vinilhci 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:** Taxonomy and systematics, concept of species, binomial nomenclature, five kingdom classification viruses, classification of plants- Algae, Bryophytes, pteridophytes, Angiosperms and Gymnosperms, classification of animals up to phylum and class level (chordates and non-chordates). 04 Marks
3. **Plant anatomy and physiology:** Micro and macronutrients and their function, transport system in plants (xylem and phloem) transpiration photosynthesis (photochemical reactions) biosynthetic phase of photosynthesis. Cyclic and non-cyclic photophosphorylation respiration, glycolysis, TCA, (Krebs cycle) ETC, plant growth regulations, biogeochemical cycles, carbon and Nitrogen. 04 Marks

4. **Animal anatomy and physiology:** Tissues, types of tissues, systematic study and digestion, respiration, circulation, erection, nerves, Skelton, and reproduction. Endocrine glands and their hormones. 04 Marks

5. **Immunology:** Concept of Antigens and antibodies active and passive immunity, hypersensitivity vaccines, immunological techniques, ELISA, RIA / Agglutination, Autoimmune disease hybridoma Technology, monoclonal antibody production. 04 Marks

6. **Genetics:** Mendalism, Deviation from Mendalism codominance, incomplete dominance, multiple alleles, polygenic inheritance, chromosomal theory of inheritance, linkage and crossing over gene and chromosome concept, genetic disorders (chromosomal and genetic). Sex determination (Amniocentesis Brief). (Central dogma of molecular Biology, DNA and RNA genetic material, DNA replication transcription, translation, operon concept, (lac operon) (oncogenes). Genetic techniques, PCR, centrifugation DNA finger printing. 04 Marks

7. **Biotechnology:** Genetic engineering, and its tools, vectors, restriction enzymes, gene cloning, gene therapy, genetically modified organisms, IPR, Biosafety, Bioethics, HGP and its goals. Bioinformatics (Basic concept) stem cells (Basic concept). Application of Biotechnology in human welfare. 04 Marks

8. **Microbiology:** Pathogens, Pathogenicity, systematics of bacteria, staining techniques (gram staining, acid fast) Pathogenic microorganism, Bacteria Viruses Malaria, hepatitis, and ringworm and fungus (name of the disease causative agents and parts affected. Reproduction in bacteria, transduction, transformation and conjugation). 04 Marks

9. **Ecology and environment:** habitat and niche, ecosystem and its components, flow of energy, pyramid of number biomass and energy, ecological succession biodiversity importance and conservation ecological interaction (+ve, -ve). (Predation, symbiosis, communalsim, parasitism). Endangered species and extinction, national parks and sanctuaries and environmental issues. Air, water and soil pollution, global warming, greenhouse effect, Ozone depletion, biosensors, bioremediation. 04 Marks

10. **Evolution:** Biological evidences, theories and evolution (Darwinism Lamarckism) modern synthetic theory, Adaptive radiation, Hardy Weanlings principles, human evolution. 04 Marks