

# Aligarh Muslim University

## Scheme of Exam for Direct Recruitment of Post Graduate Teacher in AMU Schools

The written test is of 120 marks (120 objective type multiple choice question) carrying 01 mark for each question. The duration of written test will be 120 minutes without ant time limit for each part individually.

### **Section Name – Nature of Questions**

#### **Part I – Proficiency in Languages**

**(12 marks)**

- A. General English (06 questions)
- B. General Hindi (06 questions)

#### **Part II – General awareness, Reasoning & Proficiency in computers**

**(18 marks)**

- a) General Awareness & Current Affairs and Aligarh Movement (10 questions)
- b) Reasoning Ability (4 questions)
- c) Computer Literacy (4 questions)

#### **Part III – Perspectives on Education and leadership (25 questions)**

**(25 marks)**

- (a) Understanding the learner (5 questions)
- (b) Understanding teaching learning (5 questions)
- (c) Creating Conducive learning (5 questions)
- (d) School Organization and leadership (5 questions)
- (e) Perspectives in Education (05 questions)

#### **Part IV – subject – specific Syllabus**

**(65 marks)**

#### **Professional Competency Test:**

The Professional Competency Test is 70 marks (Demo Teaching 70 marks)

**Note:** The weightage of Written Test & Demo Teaching in drawing the Final Merit list will be 30:70 respectively.

## Scheme & Syllabus of Exam for Direct Recruitment of PGTs:

### Part I – Proficiency in Language

(12 marks)

- (a) General English (06 questions)  
Reading comprehension, word power, Grammar & usage)
- (b) General Hindi (6 questions)  
पठन कौशल शब्द सामर्थ्य, व्याकरण एवं प्रयुक्ति

### Part II – General Awareness, Reasoning & Proficiency in Computers

(18 marks)

- (a) General Awareness & Current Affairs and Aligarh Movement (18 questions)  
(b) Reasoning Ability (5 questions)  
(c) Computer literacy (5 questions)

### Part III – Perspectives on Education and Leadership

(25 marks)

#### (a) Understanding the Learner (10 questions)

- Concept of growth, maturation and development, principles and debates of development, development tasks and challenges.
- Domains of Development: Physical, Cognitive, Socio-emotional, Moral etc., deviations in development and its implications.
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- Understanding Adolescence: Needs, challenges and implications for designing institutional support.
- Role of Primary and Secondary Socialization agencies. Ensuring Home School continuity.

#### (b) Understanding Teaching Learning (15 questions)

- Theoretical perspectives on learning – Behaviorism, Cognitivism and Constructivism with special reference to their implications for:
  - i. The role of teacher
  - ii. The role of learner
  - iii. Nature of teacher-student relationship
  - iv. Choice of teaching methods
  - v. Classroom environment
  - vi. Understanding of discipline, power etc.
- Factors affecting learning and their implications for:
  - i. Designing classroom instructions,
  - ii. Planning student activities and,
  - iii. Creating learning spaces in school.
- Planning and Organization of Teaching – Learning
  - i. Concept of Syllabus and Curriculum, Over and Hidden Curriculum, Principles of curriculum organizations.

- ii. Competency based Education, Experiential learning, etc.
  - iii. Instructional Plans :- Year Plan , unit Plan , Lesson Plan
  - iv. Instructional material and resources.
  - v. Information and Communication Technology (ICT) for teaching – learning
  - vi. Evaluation: Purpose, types and limitations. Continuous and Comprehensive Evaluation, Characteristics of a good tool.
  - vii. Assessment of learning, for learning and as learning: Meaning, purpose and consideration in planning each.
- Enhancing Teaching learning processes: Classroom Observation and Feedback, Reflections and Dialogues as a means of constructivist teaching.

**(c) Creating Conducive Learning Environment (04 questions)**

- The concepts of Diversity, disability and Inclusion, implications of disability as social construct, types of disabilities – their identification and interventions.
- Concept of School Mental Health, addressing the curative, preventive and promotive dimensions of mental health for all students and staff. Provisioning for guidance and counselling.

**(d) School Organization and Leadership (4 questions)**

- Leader as reflective practitioner, team builder, initiator, coach and mentor.
- Perspectives on School Leadership: instructional, distributed and transformative
- Vision building, goal setting and creating a School Development plan
- Using School Processes and forums, for strengthening teaching learning – Annual Calendar, time – tabling, parent teacher forums, school assembly, teacher development forums, using achievement data for improving teaching – learning, School Self-Assessment and improvement
- Creating partnerships with community, industry and other neighbouring schools and Higher Education Institutes- forming learning communities

**(e) Perspectives in Education (2 questions)**

- NEP – 2020: Curriculum and Pedagogy in Schools: Holistic & Integrated Learning: Equitable and inclusive Education: Learning for All: Competency based learning and Education.
- Guiding Principles for Child Rights, Protecting and provisioning for rights of children to safe and secure school environment, Right of Children to free and Compulsory Education Act, 2009,
- Historically studying the National Policies in education with special reference to school education;
- School Curriculum Principles: Perspective, Learning and Knowledge, Curricular Areas, School Stage, Pedagogy and Assessment

**Part IV- Subject – specific Syllabus**

**(65 marks)**

**Note:** The weightage of Written Test & Demo Teaching in drawing the Final Merit list will be 30:70 respectively.

## Syllabus for written examination for PGT (Chemistry)

It contains Class XI & XII Syllabus. However the questions will be testing the depth of understanding and application of these concepts at the level of Post-Graduation.

### Chapter - I Some Basic Concepts of Chemistry

#### Chapter

General Introduction: Importance and scope of Chemistry. Nature of matter, laws of chemical combination, Dalton's atomic theory: concept of elements, atoms and molecules. Atomic and molecular masses, mole concept and molar mass, percentage composition, empirical and molecular formula, chemical reactions, stoichiometry and calculations based on stoichiometry.

### Chapter –II Structure of Atom

#### Chapter

Discovery of Electron, Proton and Neutron, atomic number, isotopes and isobars. Thomson's model and its limitations. Rutherford's model and its limitations, Bohr's model and its limitations, concept of shells and subshells, dual nature of matter and light, de Broglie's relationship, Heisenberg uncertainty principle, concept of orbitals, quantum numbers, shapes of s, p and d orbitals, rules for filling electrons in orbitals - Aufbau principle, Pauli's exclusion principle and Hund's rule, electronic configuration of atoms, stability of half-filled and completely filled orbitals.

### Chapter –III Classification of Elements and Periodicity in Properties

#### Chapter

Significance of classification, brief history of the development of periodic table, modern periodic law and the present form of periodic table, periodic trends in properties of elements -atomic radii, ionic radii, inert gas radii, Ionization enthalpy, electron gain enthalpy, electronegativity, valency. Nomenclature of elements with atomic number greater than 100.

### Chapter –IV Chemical Bonding and Molecular Structure

#### Chapter

Valence electrons, ionic bond, covalent bond, bond parameters, Lewis structure, polar character of covalent bond, covalent character of ionic bond, valence bond theory, resonance, geometry of covalent molecules, VSEPR theory, concept of hybridization, involving s, p and d orbitals and shapes of some simple molecules, molecular orbital theory of homonuclear diatomic molecules(qualitative idea only), Hydrogen bond.

## Chapter -VI: Chemical Thermodynamics

### Chapter

Concepts of System and types of systems, surroundings, work, heat, energy, extensive and intensive properties, state functions. First law of thermodynamics - internal energy and enthalpy, heat capacity and specific heat, measurement of  $\Delta U$  and  $\Delta H$ , Hess's law of constant heat summation, enthalpy of bond dissociation, combustion, formation, atomization, sublimation, phase transition, ionization, solution and dilution. Second law of Thermodynamics (brief introduction) Introduction of entropy as a state function, Gibb's energy change for spontaneous and nonspontaneous processes, criteria for equilibrium. Third law of thermodynamics (brief introduction)

## Chapter -VII: Equilibrium

### Chapter

Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constant, factors affecting equilibrium - Le Chatelier's principle, ionic equilibrium- ionization of acids and bases, strong and weak electrolytes, degree of ionization, ionization of poly basic acids, acid strength, concept of pH, hydrolysis of salts (elementary idea), buffer solution, Henderson Equation, solubility product, common ion effect (with illustrative examples).

## Chapter -VIII: Redox Reactions

### Chapter

Concept of oxidation and reduction, redox reactions, oxidation number, balancing redox reactions, in terms of loss and gain of electrons and change in oxidation number, applications of redox reactions.

## Chapter -XII: Organic Chemistry – Some Basic Principles and Techniques

### Chapter

General introduction, methods of purification, qualitative and quantitative analysis, classification and IUPAC nomenclature of organic compounds. Electronic displacements in a covalent bond: inductive effect, electromeric effect, resonance and hyper conjugation. Homolytic and heterolytic fission of a covalent bond: free radicals, carbocations, carbanions, electrophiles and nucleophiles, types of organic reactions.

## Chapter -XIII: Hydrocarbons

### Chapter

#### Classification of Hydrocarbons

1. Aliphatic Hydrocarbons: Alkanes - Nomenclature, isomerism, conformation (ethane only), physical properties, chemical reactions including free radical mechanism of halogenation, combustion and pyrolysis.
  - (i) Alkenes - Nomenclature, structure of double bond (ethene), geometrical isomerism, physical properties, methods of preparation, chemical reactions: addition of hydrogen, halogen, water, hydrogen halides (Markovnikov's addition and peroxide effect), ozonolysis, oxidation, mechanism of electrophilic addition.
  - (ii) Alkynes - Nomenclature, structure of triple bond (ethyne), physical properties, methods of preparation, chemical reactions: acidic character of alkynes, addition reaction of - hydrogen, halogens, hydrogen halides and water.
2. Aromatic Hydrocarbons: Introduction, IUPAC nomenclature, benzene: resonance, aromaticity, chemical properties: mechanism of electrophilic substitution. Nitration, sulphonation, halogenation, Friedel Craft's alkylation and acylation, directive influence of functional group in monosubstituted benzene. Carcinogenicity and toxicity.

## Chapter II –Solutions

### Chapter

Types of solutions, expression of concentration of solutions of solids in liquids, solubility of gases in liquids, solid solutions, Raoult's law, colligative properties - relative lowering of vapour pressure, elevation of boiling point, depression of freezing point, osmotic pressure, determination of molecular masses using colligative properties, abnormal molecular mass, Van't Hoff factor.

## Chapter III –Electrochemistry

### Chapter

Redox reactions, EMF of a cell, standard electrode potential, Nernst equation and its application to chemical cells, Relation between Gibbs energy change and EMF of a cell, conductance in electrolytic solutions, specific and molar conductivity, variations of conductivity with concentration, Kohlrausch's Law, electrolysis and law of electrolysis (elementary idea), dry cell-electrolytic cells and Galvanic cells, lead accumulator, fuel cells, corrosion.

## Chapter V -Chemical Kinetics

### Chapter

Rate of a reaction (Average and instantaneous), factors affecting rate of reaction: concentration, temperature, catalyst; order and molecularity of a reaction, rate law and specific rate constant, integrated rate equations and half-life (only for zero and first order reactions), concept of collision theory (elementary idea, no mathematical treatment), activation energy, Arrhenius equation.

## Chapter VIII - d and f Block Elements

### Chapter

General introduction, electronic configuration, occurrence and characteristics of transition metals, general trends in properties of the first row transition metals – metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, alloy formation, preparation and properties of  $K_2Cr_2O_7$  and  $KMnO_4$ .

**Anthanoids** - Electronic configuration, oxidation states, chemical reactivity and lanthanoid contraction and its consequences.

**Actinoids** - Electronic configuration, oxidation states and comparison with lanthanoids.

## Chapter IX - Coordination Compounds

### Chapter

Coordination compounds - Introduction, ligands, coordination number, colour, magnetic properties and shapes, IUPAC nomenclature of mononuclear coordination compounds. Bonding, Werner's theory, VBT, and CFT; structure and stereoisomerism, importance of coordination compounds (in qualitative analysis, extraction of metals and biological system).

## Chapter X - Haloalkanes and Haloarenes

### Chapter

**Haloalkanes:** Nomenclature, nature of C–X bond, physical and chemical properties, optical rotation mechanism of substitution reactions.

**Haloarenes:** Nature of C–X bond, substitution reactions (Directive influence of halogen in monosubstituted compounds only).

Uses and environmental effects of - dichloromethane, trichloromethane, tetrachloromethane, iodoform, freons, DDT.

## Unit XI - Alcohols, Phenols and Ethers

### Topic/Sub topic

**Alcohols:** Nomenclature, methods of preparation, physical and chemical properties (of primary alcohols only), identification of primary, secondary and tertiary alcohols, mechanism of dehydration, uses with special reference to methanol and ethanol.

**Phenols:** Nomenclature, methods of preparation, physical and chemical properties, acidic nature of phenol, electrophilic substitution reactions, uses of phenols.

**Ethers:** Nomenclature, methods of preparation, physical and chemical properties, uses.

## Chapter XII - Aldehydes, Ketones and Carboxylic Acids

### Chapter

**Aldehydes and Ketones:** Nomenclature, nature of carbonyl group, methods of preparation, physical and chemical properties, mechanism of nucleophilic addition, reactivity of alpha hydrogen in aldehydes, uses.

**Carboxylic Acids:** Nomenclature, acidic nature, methods of preparation, physical and chemical properties; uses.

## Chapter XIII - Amines

### Chapter

**Amines:** Nomenclature, classification, structure, methods of preparation, physical and chemical properties, uses, identification of primary, secondary and tertiary amines.

**Diazonium salts:** Preparation, chemical reactions and importance in synthetic organic chemistry

## Chapter XIV - Biomolecules

### Chapter

**Carbohydrates** - Classification (aldoses and ketoses), monosaccharides (glucose and fructose), D-L configuration oligosaccharides (sucrose, lactose, maltose), polysaccharides (starch, cellulose, glycogen); Importance of carbohydrates.

**Proteins** - Elementary idea of - amino acids, peptide bond, polypeptides, proteins, structure of proteins - primary, secondary, tertiary structure and quaternary structures (qualitative idea only), denaturation of proteins; enzymes. Hormones - Elementary idea excluding structure.

**Vitamins** - Classification and functions.

**Nucleic Acids:** DNA and RNA.