

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 any 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.

Guidelines for Syllabus for the post of PGT –Physics

Subject specific syllabus includes the concepts of NCERT/CBSE syllabus and Text Books (Classes XI & XII), however, the questions will be testing the depth of understanding and application of these concepts at the level of Post- Graduation.

Units and Measurements

Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units, significant figures. Dimensions of physical quantities, dimensional analysis and its applications.

Motion in a Straight Line:

Frame of reference, Motion in a straight line, Elementary concepts of differentiation and integration for describing motion, uniform and non- uniform motion, and instantaneous velocity, uniformly accelerated motion, velocity time and position-time graphs, Relations for uniformly accelerated motion.

Motion in a Plane:

Scalar and vector quantities; position and displacement vectors, general vectors and their notations; equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors, Unit vector; resolution of a vector in a plane, rectangular components, Scalar and Vector product of vectors. Motion in a plane, cases of uniform velocity and uniform acceleration, projectile motion, uniform circular motion.

Laws of Motion:

Intuitive concept of force, Inertia, Newton's first law of motion; momentum and [3] Newton's second law of motion; impulse; Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces, Static and kinetic friction, laws of friction, rolling friction, lubrication. Dynamics of uniform circular motion: Centripetal force, examples of circular motion- vehicle on a level circular road, vehicle on a banked road.

Work, Energy and Power:

Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power, Notion of potential energy, potential energy of a spring, conservative forces: non- conservative forces, motion in a vertical circle; elastic and inelastic collisions in one and two dimensions.

Motion of System of Particles and Rigid Body & System of Particles and Rotational Motion

Centre of mass of a two-particle system, momentum conservation and Centre of mass motion, Centre of mass of a rigid body; centre of mass of a uniform rod, Moment of a force, torque, angular momentum, law of conservation of angular momentum and its applications, Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions. Moment of inertia, radius of gyration, values of moments of inertia for simple geometrical objects.

Gravitation:

Kepler's laws of planetary motion, universal law of gravitation, Acceleration due to gravity and its variation with altitude and depth. Gravitational potential energy and gravitational potential, escape velocity, orbital velocity of a satellite.

Mechanical Properties of Solids

Elasticity, Stress-strain relationship, Hooke's law, Young's modulus, bulk modulus, shear modulus of rigidity, Poisson's ratio; elastic energy.

Mechanical Properties of Fluids

Pressure due to a fluid column; Pascal's law and its applications -hydraulic lift and hydraulic brakes. effect of gravity on fluid pressure, Viscosity, Stokes' law, terminal velocity, streamline and turbulent flow, critical velocity, Bernoulli's theorem and its simple applications, Surface energy and surface tension, angle of contact, excess of pressure across a curved surface, application of surface tension ideas to drops, bubbles and capillary rise.

Thermal Properties of Matter

Heat, temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion of water; specific heat capacity; C_p , C_v - calorimetry; change of state - latent heat capacity Heat transfer-conduction, convection and radiation, thermal conductivity, qualitative ideas of Blackbody radiation, Wein's displacement Law, Stefan's law.

Thermodynamics

Thermal equilibrium and definition of temperature, zeroth law of thermodynamics, heat, work and internal energy, First law of thermodynamics, Second law of thermodynamics: gaseous state of matter, change of condition of gaseous state -isothermal, adiabatic, reversible, irreversible, and cyclic processes.

Behavior of Perfect Gases and Kinetic Theory of Gases:

Equation of state of a perfect gas, work done in compressing a gas, Kinetic theory of gases assumptions, concept of pressure. Kinetic interpretation of temperature; rms speed of gas molecules; degrees of freedom, law of equi-partition of energy and application to specific heat capacities of gases; concept of mean free path, Avogadro's number.

Oscillations and Waves:

Periodic motion - time period, frequency, displacement as a function of time, periodic functions and their application, Simple harmonic motion (S.H.M) and its equations of motion; phase; oscillations of a loaded spring- restoring force and force constant; energy in S.H.M. Kinetic and potential energies; simple pendulum -its time period. Transverse and longitudinal waves, speed of travelling wave, displacement relation for a progressive wave, principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats.

Electric Charges and Fields:

Electric charges, Conservation of charge, Coulomb's law-force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution, Electric field, electric field due to a point charge, electric field lines, electric dipole, electric field due to a dipole, torque on a dipole in uniform electric field. Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell-field inside and outside.

Electrostatic Potential and Capacitance:

Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two-point charges and of electric dipole in an electrostatic field. Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarization, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor.

Current Electricity:

Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation with electric current; Ohm's law, V-I characteristics (Linear & Non-Linear), electrical energy and power, electrical resistivity and conductivity, temperature dependence of resistance, Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel. Kirchhoff's rules, Wheatstone bridge.

Magnetic Effects of Current and Magnetism:

Concept of magnetic field, Oersted's experiment, Biot - Savart law and its application to current carrying circular loop, Ampere's law and its applications to infinitely long straight wire. Straight solenoid, force on a moving charge in uniform magnetic and electric fields. Force on a current carrying conductor in a uniform magnetic field, force between two parallel current-carrying conductors-definition of ampere, torque experienced by a current loop in uniform magnetic field; current loop as a magnetic dipole and its magnetic dipole moment, moving coil galvanometer - its current sensitivity and conversion to ammeter and voltmeter.

Magnetism and Matter

Bar magnet, bar magnet as an equivalent solenoid (qualitative treatment only), magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis (qualitative treatment only), torque on a magnetic dipole (bar magnet) in a uniform magnetic field (qualitative treatment only), magnetic field lines. Magnetic properties of materials- Para-, dia- and ferro magnetic substances with examples, Magnetization of materials, effect of temperature on magnetic properties

Electromagnetic Induction and Alternating Currents

Electromagnetic induction; Faraday's laws, induced EMF and current; Lenz's Law, Self and mutual induction, Alternating Current Alternating currents, peak and RMS value of alternating current/voltage; reactance and impedance; LCR series circuit, resonance, power in AC circuits, power factor, wattless current, AC generator, Transformer.

Electromagnetic Waves

Basic idea of displacement current, Electromagnetic waves, their characteristics, their transverse nature (qualitative idea only). Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, gamma rays) including elementary facts about their uses.

Ray Optics and Optical Instruments Ray Optics:

Reflection of light, spherical mirrors, mirror formula, refraction of light, total internal reflection and optical fibers, refraction at spherical surfaces, lenses, thin lens formula, lens maker's formula, magnification, power of a lens, combination of thin lenses in contact, refraction of light through a prism. Optical instruments: Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers.

Wave optics:

Wave front and Huygen's principle, reflection and refraction of plane wave at a plane surface using wave fronts, Proof of laws of reflection and refraction using Huygen's principle. Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light, diffraction due to a single slit, width of central maxima.

Dual Nature of Radiation and Matter: Dual nature of radiation, Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation-particle nature of light, Experimental study of photoelectric effect Matter waves-wave nature of particles, de-Broglie relation.

Atoms & Nuclei:

Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model of hydrogen atom. Expression for radius of n th possible orbit, velocity and energy of electron in its orbit, hydrogen line spectra, Composition and size of nucleus, nuclear force Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number; nuclear fission, nuclear fusion.

Semiconductor Electronics:

Energy bands in conductors, semiconductors and insulators, Intrinsic and extrinsic semiconductors- P and n type, p-n junction Semiconductor diode - I-V characteristics in forward and reverse bias, application of junction diode -diode as a rectifier..