Written Test Pattern for MS programs

(Entry Test 2025)

The duration of the written test shall be ***3 hours (180 minutes)*.** The written test for MS programs shall consist of two sections i.*e,*

(i) General Section

The General Section would be compulsory for all the candidates, and it will contain **50 Questions** with a time allocation of 90 minutes.

- ***20 Questions*** each related to Basic Physics
- ***20 Questions*** related to General Mathematics
- ***10 Questions*** would be from English language.

(ii) Subject Specific Section

To meet the manpower requirements of PAEC, the number of entry level disciplines to PIEAS post-graduate studies has been given below. Consequently, one set of specialized question paper containing subject specific **50 Questions** would be prepared in each of the following areas:

Academic Background	Areas
B.S / M. Sc. / equivalent	• Physics • Geology / Geo Physics • Chemistry • Computer Science • Mathematics
B.E. / B.Sc. (Eng.) / equivalent	• Electrical Engineering (Power) • Electronics Engineering • Computer Engineering • Chemical Engineering • Mechanical Engineering • Mechatronics Engineering • Metallurgy & Materials Engineering • Civil Engineering • Mining Engineering

- **IMPORTANT**: Test for MS Nuclear Medicine and MS Radiation and Medical Oncology will not contain General portion. All questions will be from the course syllabus of MBBS.

- All of the questions would be of **multiple-choice (MCQ**) type with four possible answers, say, A, B, C, and D.

- There will be no negative marking.

(Syllabus Guideline)

PHYSICS
RELATED TOPICS
CLASSICAL MECHANICS (such as Kinematics, Dynamics, Work and Energy, Gravitation, Central Forces, Lagrangian and Hamiltonian Formalism, Non-inertial Reference Frames)
ELECTROMAGNETISM (such as Electrostatics, Magneto statics, AC and DC Circuits, Electromagnetic Induction, Maxwell's Equations and Electromagnetic Waves)
WAVES AND OPTICS (such as Wave Properties, Superposition, Interference, Diffraction, Geometrical Optics, Polarization, Doppler Effect)
THERMODYNAMICS AND STATISTICAL PHYSICS (such as Laws of Thermodynamics and Their Applications, Statistical Interpretation of Thermodynamics, ensembles, kinetic theory, ideal gases, equation of state)
QUANTUM MECHANICS (such as Basics Concepts, Schrödinger Equation and its Solutions, Harmonics Oscillator, Hydrogen Atom, Angular momentum and spin, Perturbation theory)
ATOMIC PHYSICS (such as Rutherford and Bohr models, Atomic Energy levels and Atomic Spectra, Black-body Radiation, X-rays)
SPECIAL TOPICS (such as Nuclear and Particle Physics, Condensed Matter Physics, Mathematical Methods in Physics, Computational Physics, Special Relativity, Laboratory Methods
CHEMISTRY
RELATED TOPICS
Analytical Chemistry (Classical Quantitative Analysis, Instrumental Analysis)
Inorganic Chemistry(Basic Chemistry of Elements, Periodic & family trends, Electronic & Nuclear Structure, Transition Metal / Coordination Chemistry)
Organic Chemistry (Conversion of functional groups, Reactive intermediated and reaction mechanisms, molecular structure)
Physical Chemistry (General Chemistry, Classical and Statistical Thermodynamics, Quantum and Structural Chemistry, Kinetics)
MECHANICAL
RELATED TOPICS
Mechanical Design and Anlysis
Kinematics, Dynamics and Vibration
Materials and Manufacturing
Thermodynamics and Energy Convesion Processes
Heat Transfer, Fluid Mechanics and Hydraulic Machinery
ELECTRICAL ENGINEERING WITH SPECIALIZATION IN ELECTRONICS

RELATED TOPICS
Microprocessors, FPGA, VLSI, DLD, etc.
Circuit Analysis, Electronics, Process Instrumentation, Electrical Machines
Controls Systems, DSP, Signals and Systems, Probability and Random Variables, Communication Systems
ELECTRICAL ENGINEERING WITH SPECIALIZATION IN ELECTRICAL POWER
Electrical Engineering General (Circuit Analysis, Basic Electronics, Electricity and Magnetism, Digital Logic Design, Signals and Systems, Control Systems, Measurement and Instrumentation, etc.)
Electrical Power Specialization (High Voltage Engineering, Power System Analysis, Power System Protection, Power Generation, Power Transmission and Distribution, Power Electronics, etc.
CHEMICAL
RELATED TOPICS
Material/Energy Balances and Thermodynamics (material/energy balances; humidity; equation of state; thermodynamic properties; laws of thermodynamics; power and refrigeration cycles; phase and reaction equilibria;)
Fluid Mechanics (momentum transfer; differential and integral analysis; dimensional analysis and similarity; pressure drop calculations; flow measurements; pumps and compressors; compressible flows; boundary layer flows;)
Heat Transfer (modes of heat transfer; steady state and transient heat transfer; one-, two- and three-dimensional conduction heat transfer; conduction in series and parallel; energy equation; extended surface heat transfer; internal and external convection heat transfer; analogies; heat transfer correlations; radiation heat transfer; heat transfer equipment;)
Mass transfer (molecular diffusion; mass transfer coefficient; concept of stages; distillation; absorption and stripping; liquid-liquid extraction; adsorption; ion exchange; humidification & dehumidification; selection and design of mass transfer equipment;)
Process dynamics/instrumentation/control (dynamic models; transfer functions; linear low order systems; open loop stability; characteristics and calibration of instruments; control valves; classical feedback controllers; closed loop transfer functions, closed loop stability; controller tuning; feed forward, cascade, ratio, override and selective control;)
Reaction engineering (rate of reaction; rate law and stoichiometry; equilibrium conversion; types of reactors and reactor design; collection and analysis of reaction data; reaction mechanism; multiple reactions; catalysis;)
METALLURGY/MATERIAL
RELATED TOPICS
Ferrous & Non-ferrous Metallurgy (extraction of metals, ferrous & non-ferrous alloys)

Material Processing (fuels and furnaces, solidification & casting, powder metallurgy, welding etc.)
Corrosion, Wear and Surface Engineering (corrosion, corrosion protection, wear, surface hardening, coatings etc.)
Thermodynamics & Kinetics of Phase Transformations
Physical Metallurgy (metallography, microscopy, microstructure, phase diagrams, heat treatment, NDT etc.)
Mechanical Metallurgy (elastic and plastic deformation, mechanical testing, metal forming, fracture analysis, fatigue, creep etc.)
Engineering Materials (metals, ceramics, composites, polymers, nuclear materials, semiconductors, magnetic materials etc.)
Materials Science (crystal structure, XRD, electrical and magnetic properties, thermal properties, optical properties)
COMPUTER
RELATED TOPICS
Programming
Operating Systems
Data Structures
Computer Architecture
Networking
Others (databases, software engineering, discrete mathematics etc.)
CIVIL
RELATED TOPICS
Environmental
Geo-Technical
Structural
Transportation
Water Resources
MECHATRONICS
RELATED TOPICS
Basic Mechanical Engineering
Electrical & Electronic Engineering
Systems Design Engineering

Control Engineering
Computer Engineering &Science
Robotics and Factory Automation
GEOLOGY / GEO PHYSICS
RELATED TOPICS
Plate Tectonic / Earthquake
Physical Geology
Structural Geology
Petrology
Mineralogy
Numerical Mathematics
MINING
RELATED TOPICS
Applied Geology
Mineral Exploration and Valuation
Mining Methods
Mine Machinery, Tools and Equipment
Mine Management and Cost Economics
Rock Mechanics
Explosives and Blasting
Chemical and Physical Processing of Minerals
Health, Safety and Environment
MBBS
RELATED TOPICS
Basic Sciences: - Math, Physics, Chemistry
General Medicine
Surgery
Gynecology and Obstetrics
Anatomy & Physiology
Paeds
Misc

Chemical and Physical Processing of Minerals
Health, Safety and Environment