

# Pakistan Institute of Engineering and Applied Sciences (PIEAS)

## Written Test Pattern for Intake 2021

**IMPORTANT:** There will be 60 Subject specific MCQs based questions and the applicant will be given 90 minutes to attempt \*.

**\*NOTE:** This test pattern has been specially designed for Admissions in 2021 considering the COVID pandemic situation. Follow SOPs and Stay Safe.

Distribution of Questions will be as follows:

<b>PHYSICS</b>	
RELATED TOPICS	SHARE
<b>CLASSICAL MECHANICS</b> (such as Kinematics, Dynamics, Work and Energy, Gravitation, Central Forces, Lagrangian and Hamiltonian Formalism, Non-inertial Reference Frames)	approx. 20%
<b>ELECTROMAGNETISM</b> (such as Electrostatics, Magneto statics, AC and DC Circuits, Electromagnetic Induction, Maxwell's Equations and Electromagnetic Waves)	approx. 15%
<b>WAVES AND OPTICS</b> (such as Wave Properties, Superposition, Interference, Diffraction, Geometrical Optics, Polarization, Doppler Effect)	approx. 10%
<b>THERMODYNAMICS AND STATISTICAL PHYSICS</b> (such as Laws of Thermodynamics and Their Applications, Statistical Interpretation of Thermodynamics, ensembles, kinetic theory, ideal gases, equation of state)	approx. 10%
<b>QUANTUM MECHANICS</b> (such as Basics Concepts, Schrödinger Equation and its Solutions, Harmonics Oscillator, Hydrogen Atom, Angular momentum and spin, Perturbation theory)	approx. 15%
<b>ATOMIC PHYSICS</b> (such as Rutherford and Bohr models, Atomic Energy levels and Atomic Spectra, Black-body Radiation, X-rays)	approx. 10%
<b>SPECIAL TOPICS</b> (such as Nuclear and Particle Physics, Condensed Matter Physics, Mathematical Methods in Physics, Computational Physics, Special Relativity, Laboratory Methods)	approx. 20%
<b>CHEMISTRY</b>	
RELATED TOPICS	SHARE
<b>Analytical Chemistry</b> (Classical Quantitative Analysis, Instrumental Analysis)	approx. 15%
<b>Inorganic Chemistry</b> (Basic Chemistry of Elements, Periodic & family trends, Electronic & Nuclear Structure, Transition Metal / Coordination Chemistry)	approx. 25%
<b>Organic Chemistry</b> (Conversion of functional groups, Reactive intermediated and reaction mechanisms, molecular structure)	approx. 30%

<b>Physical Chemistry</b> (General Chemistry, Classical and Statistical Thermodynamics, Quantum and Structural Chemistry, Kinetics)	approx. 30%
<b>MECHANICAL</b>	
RELATED TOPICS	SHARE
Mechanical Design and Analysis	approx. 30%
Kinematics, Dynamics and Vibration	approx. 15%
Materials and Manufacturing	approx. 15%
Thermodynamics and Energy Conversion Processes	approx. 20%
Heat Transfer, Fluid Mechanics and Hydraulic Machinery	approx. 20%
<b>ELECTRICAL ENGINEERING WITH SPECIALIZATION IN ELECTRONICS</b>	
RELATED TOPICS	SHARE
Microprocessors, FPGA, VLSI, DLD, etc.	approx. 24%
Circuit Analysis, Electronics, Process Instrumentation, Electrical Machines	approx. 42%
Controls Systems, DSP, Signals and Systems, Probability and Random Variables, Communication Systems	approx. 34%
<b>ELECTRICAL ENGINEERING WITH SPECIALIZATION IN ELECTRICAL POWER</b>	
<b>Electrical Engineering General</b> (Circuit Analysis, Basic Electronics, Electricity and Magnetism, Digital Logic Design, Signals and Systems, Control Systems, Measurement and Instrumentation, etc.)	approx. 50%
<b>Electrical Power Specialization</b> (High Voltage Engineering, Power System Analysis, Power System Protection, Power Generation, Power Transmission and Distribution, Power Electronics, etc.)	approx. 50%
<b>CHEMICAL</b>	
RELATED TOPICS	SHARE
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;)	approx. 20 %
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;)	approx. 20 %
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;)	approx. 20 %

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;)	approx. 20 %
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;)	approx. 10 %
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;)	approx. 10 %
<b>METALLURGY/MATERIAL</b>	
RELATED TOPICS	SHARE
Ferrous & Non-ferrous Metallurgy (extraction of metals, ferrous & non-ferrous alloys)	approx. 15%
Material Processing (fuels and furnaces, solidification & casting, powder metallurgy, welding etc.)	approx. 15%
Corrosion, Wear and Surface Engineering (corrosion, corrosion protection, wear, surface hardening, coatings etc.)	approx. 10%
Thermodynamics & Kinetics of Phase Transformations	approx. 10%
Physical Metallurgy (metallography, microscopy, microstructure, phase diagrams, heat treatment, NDT etc.)	approx. 15%
Mechanical Metallurgy (elastic and plastic deformation, mechanical testing, metal forming, fracture analysis, fatigue, creep etc.)	approx. 15%
Engineering Materials (metals, ceramics, composites, polymers, nuclear materials, semiconductors, magnetic materials etc.)	approx. 10%
Materials Science (crystal structure, XRD, electrical and magnetic properties, thermal properties, optical properties )	approx. 10%
<b>COMPUTER</b>	
RELATED TOPICS	SHARE
Programming	approx. 18%
Operating Systems	approx. 18%
Data Structures	approx. 18%
Computer Architecture	approx. 18%
Networking	approx. 18%
Others (databases, software engineering, discrete mathematics etc.)	approx. 10%
<b>CIVIL</b>	

RELATED TOPICS	SHARE
Environmental	approx. 20%
Geo-Technical	approx. 20%
Structural	approx. 20%
Transportation	approx. 20%
Water Resources	approx. 20%
<b>MECHATRONICS</b>	
RELATED TOPICS	SHARE
Basic Mechanical Engineering	10%
Electrical & Electronic Engineering	30%
Systems Design Engineering	10%
Control Engineering	30%
Computer Engineering & Science	10%
Robotics and Factory Automation	10%
<b>GEOLOGY / GEO PHYSICS</b>	
RELATED TOPICS	SHARE
Plate Tectonic / Earthquake	
Physical Geology	
Structural Geology	
Petrology	
Mineralogy	
Numerical Mathematics	
<b>MINING</b>	
RELATED TOPICS	SHARE
Applied Geology	All topics will have a share of 10 to 15% in the paper
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	