DIRECTORATE GENERAL OF
SCIENCE & TECHNOLOGY
GOVERNMENT OF KHYBER PAKHTUNKHWA

Preferred Areas for Tech-Interventions/Solutions in 8+3 Priority Sectors

Applicants are encouraged to present innovative, feasible, and contextually relevant solutions or technological interventions in the following priority sectors 8+3 identified under the KP Science Agenda. Suggested focus areas include, but are not limited to:

S. No	Priority sectors	Preferred Interventions or Solutions
1.	Advanced Materials	• **Nanoparticle Applications for Agriculture and Health** Utilize nanoparticles in smart agriculture, water purification, and healthcare with an emphasis on environmental safety and localized adoption. • **Scalable Nanomaterials Manufacturing** Develop cost-effective, scalable production techniques for nanoparticles and nanocomposites to support industrial-scale use. • **Advanced Materials for Renewable Energy** Enhance the efficiency and durability of next-generation photovoltaic materials (e.g., perovskites) for affordable solar energy solutions. Promote the use of non-toxic, locally abundant materials in photovoltaic cells to ensure sustainable and secure energy transitions. • **High-Performance Composites for Industry** Innovate lightweight, durable composites for defense, construction, and transportation, aligned with Pakistan's industrial modernization goals. • **Recycling and Sustainable Use of Composites** Introduce environmentally responsible methods for reuse, recycling, and lifecycle management of advanced composite materials. • **Infrastructure for Materials Research and Testing** Strengthen national capacity through advanced

		labs, nano-fabrication facilities, and pilot plants for rapid prototyping and testing.
2.	**Biomedicine and Bio Manufacturing**	• **Development of Genomic and Precision Medicine Solutions** Apply genomics, proteomics, and metabolomics to design personalized diagnostics and treatment protocols for prevalent diseases in Pakistan. • **Production of High-Value Medical Compounds** Translate lab-scale synthesis of key biomolecules into pilot-scale or commercial-scale production for local pharmaceutical use. • **Enzyme and Antibody Manufacturing** Establish platforms for the domestic production of therapeutic enzymes and monoclonal antibodies to reduce import reliance and enable cost-effective treatments. • **Locally Manufactured Vaccines and Biopharmaceuticals** Develop and scale indigenous production of vaccines, biosimilars, and biologics targeting local health priorities (e.g., hepatitis, dengue, respiratory infections). • **Integration of Omics Technologies in Clinical Settings** Implement genomics and molecular diagnostics in hospitals and labs to improve disease screening, early detection, and targeted therapy. • **Strengthening Bioinformatics and Health Data Analytics** Build national capabilities in computational biology, AI-powered diagnostics, and secure genomic data management to support precision medicine initiatives. • **Translational Research and Clinical Trials Infrastructure** Create linkages between academic research and clinical implementation through biobanks, trial networks, and regulatory pathways.

3.	**Space Sciences**	• **Geological Studies of the Moon and Mars** Conduct planetary surface analysis and simulation studies to understand the mineral composition, terrain, and geological evolution of lunar and Martian environments. • **Research on Meteorites and Extraterrestrial Materials** Analyze meteorites and space-origin samples to explore the early solar system, planetary formation, and potential resources for future space missions. • **Astrobiology and Space Health Applications** Explore life-support systems, microbial survival in extreme environments, and human health in space to contribute to global astrobiology and space medicine research. • **Design and Development of CubeSats and Small Satellites** Promote indigenous development of CubeSats for Earth observation, space research, communication, and education through academic–industry collaboration. • **Space-based STEM Education and Capacity Building** Engage students and researchers in astronomy and satellite programs to build national talent pipelines in aerospace and space sciences. • **Simulation Platforms for Planetary Environments** Develop terrestrial simulation labs and testbeds to study planetary atmospheres, surface dynamics, and rover-based exploration. • **Remote Sensing for Space and Earth Applications** Use space-based imaging for geological mapping, environmental monitoring, and disaster response,

		aligned with national resource management goals. • **International Collaborations in Space Science** Establish partnerships with global space agencies and academic networks to share data, technologies, and training opportunities in astronomy and planetary exploration.
4.	**Fruits & Vegetables**	• Smart agriculture technologies regarding production, processing, post-harvest management C advanced handling tools for horticultural products • Eco-friendly innovative methods to fight Fruit Fly; a serious threat to horticultural crops in KP • Simulations C Crop Modelling for Climate Change adaptation • Water management technologies in the agriculture sector (includes challenges relating to low water table, adaptations to water deficits) • Cutting-edge forecasting technology, an Early-warning system as an adaptive measure to climate resilient agriculture in weather stations • Biocontrol C Biopesticides as a sustainable alternative • Integrated Nutrient Management technology in Fruits C Vegetables • Innovative methods to minimize post-harvest losses • Any other high-impact, tech-based solution relevant to the sector
5.	**Fisheries**	• Culture technology in Fisheries to enhance production (Input and processing tools) • Technology intervention in low-cost feed production, disease diagnosis and treatment, formulated feed innovations for enhanced fish growth and feed efficiency, with a focus on local ingredient utilization and nutritional balance. • Development of high-quality, disease-resistant fish seed stock, including selective breeding and hatchery-based seed certification systems. • • Scalable models for quality fish seed production and decentralized distribution • Integrated solutions for seed improvement and cost-effective feed preparation • Technology-enabled harvesting methods and

		smart marketing strategies for fisheries
6.	**Bees & Honey**	• Honey quality testing technology • Novel techniques for diseases/pest management in apiculture • Addressing production and marketing gaps, value addition and chain development • Any other high-impact, tech-based solution relevant to the sector
7.	**Herbs & Medicinal Plants**	• DNA-based identification system for medicinal plants • Scientific validation and formulation of herbal medicines through applied research Conservation models for endangered medicinal plants and promotion of sustainable harvesting practices • Propagation techniques and agri-based models for the large-scale cultivation of medicinal plants • Reducing dependence on imported raw materials through local herbal resource development • Market intelligence studies for mapping international demand and export opportunities of herbal products, local supply chains, and market research • Any other high-impact, tech-based solution relevant to the sector
8.	**Environment**	• Innovative technologies and models to monitor and improve urban air quality and reduce smog • Water conservation and water-saving technologies • Urban forestry • Development and promotion of sustainable green building materials and energy-efficient construction practices • Indoor environmental management • Indoor air quality monitoring systems and integrated indoor environmental management solutions • Technology solutions to support the enforcement of emissions and environmental standards • Traffic Congestion and Urban Mobility Solutions • Any other high-impact, tech-based solution relevant to the sector
9.	**Microhydro**	• Standardization and Regulation of Micro

		Hydropower Systems. • Enhancing Hydrological Data Accuracy for Micro Hydropower Project Site Selection. • Design, Fabrication and Manufacturing Challenges in Micro Hydropower Sector: Modern and Efficient Turbines and other essential components, Alternators, drive, control C protection systems of electromechanical equipment/assembly. Only a limited number of existing manufacturers possess the necessary facilities and scientific approaches, resulting in dependence on imports. • Climate-Resilient Design of Civil Structures for Micro Hydropower Projects: Incorporating Safety Factors and Protection Measures • Bridging the Gap: Technology Transfer and Business Model Development in the MHP Sector. • Any other high-impact, tech-based solution relevant to the sector
10.	Gemstones	• Adoption of precision-based technologies to improve cutting, polishing, and bead-making practices in traditional gemstone markets (e.g., Peshawar Namak Mandi). • Advanced certification systems aligned with international standards (GRS, GIA, LOTUS, AIG, etc.), addressing the lack of credible gemstone testing facilities in Pakistan. • Enabling a digital auctioning, e-commerce platform for the local gemstones industry, enhancing market access, price transparency, and export competitiveness. • Any other high-impact, tech-based solution relevant to the sector
11.	Archeology	• Software for accurate mapping, modeling, and advanced image processing • Advanced Technologies for Data Collection and Visualization • Developing a Public Access Portal for Digital Heritage Any other high-impact, tech-based solution relevant to the sector