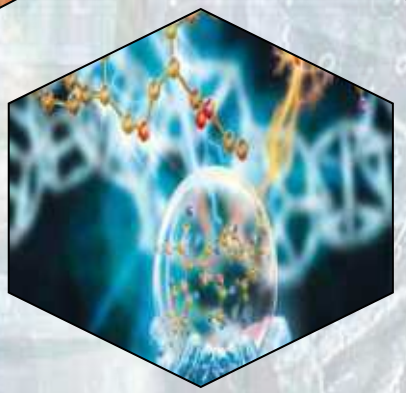
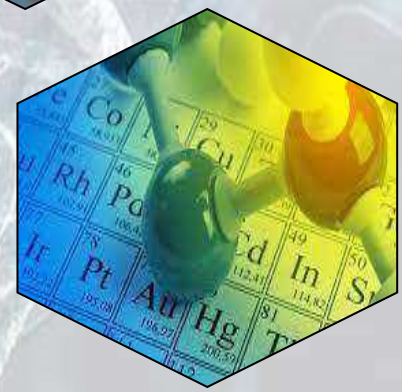
Pakistan Council of Scientific & Industrial Research (PCSIR)

ANNUAL REPORT 2021-2022



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Message from the Chairman

Science, Technology, Innovation and Commercialization are the paramount driving forces for the socio-economic development of human civilization. Technology has become the real game-changer as it has emerged as the most sophisticated and reliable tool for bringing comfort and amenity to life.It is, therefore, important that our strategies in the field of science and technology are geared at bringing about the changes in the daily lives of people.

PCSIR is working on the national agenda to have a sound and sustainable science and technological research base which would lead to the socio-economic development of the country and to achieve the vision for a better Pakistan. The scientists/engineers have been directed to work for developing products, processes and technologies in line with the requirements of the industry and to effectively disseminate/lease-out the products for the benefit of the masses at large.

During 2021-22, PCSIR has made significant progress. PCSIR obtained 3 patents, filed 20 patents, developed 231 processes and leased out 80 processes, published 159 papers, developed 223 analytical equipment, prepared 276 technical reports, organized 103 conferences/seminars and 143 workshops/trainings, signed 31 MoU/Agreements/ToRs, supervised 917 BS/MS/PhD research students, provided 669 consultancy services and 47560 analytical/testing services to 16114 clients.

During the last one-yearPCSIR has initiated several new projects in emerging scientific fields as per government priorities such as Cannabis cultivation and its utilization in industrial and medicinal fields, Digitalization of PCSIR and Development of computer-based fermenters etc. Besides, efforts are being made to enhance collaboration with the Industry and Academia to facilitate clients with novel ideas, to utilize indigenous resources and to ameliorate technology transfer.

I would like to appreciate the passion, commitment and dedication of PCSIR employees who sincerely executed responsibilities and faced challenges with remarkable success.

Several initiatives have been outlined for the next year to make PCSIR an adaptive organization whose structures, systems, staff, research and services are tailored for flexibility.

We look forward to valuable feedback from collaborators, stakeholder and experts to further improve the efficiency of PCSIR.

Dr. Syed Hussain Abidi, *S.I*
Chairman, PCSIR

CONTENTS

Activities and Progress of PCSIR Laboratories and Units

Introduction

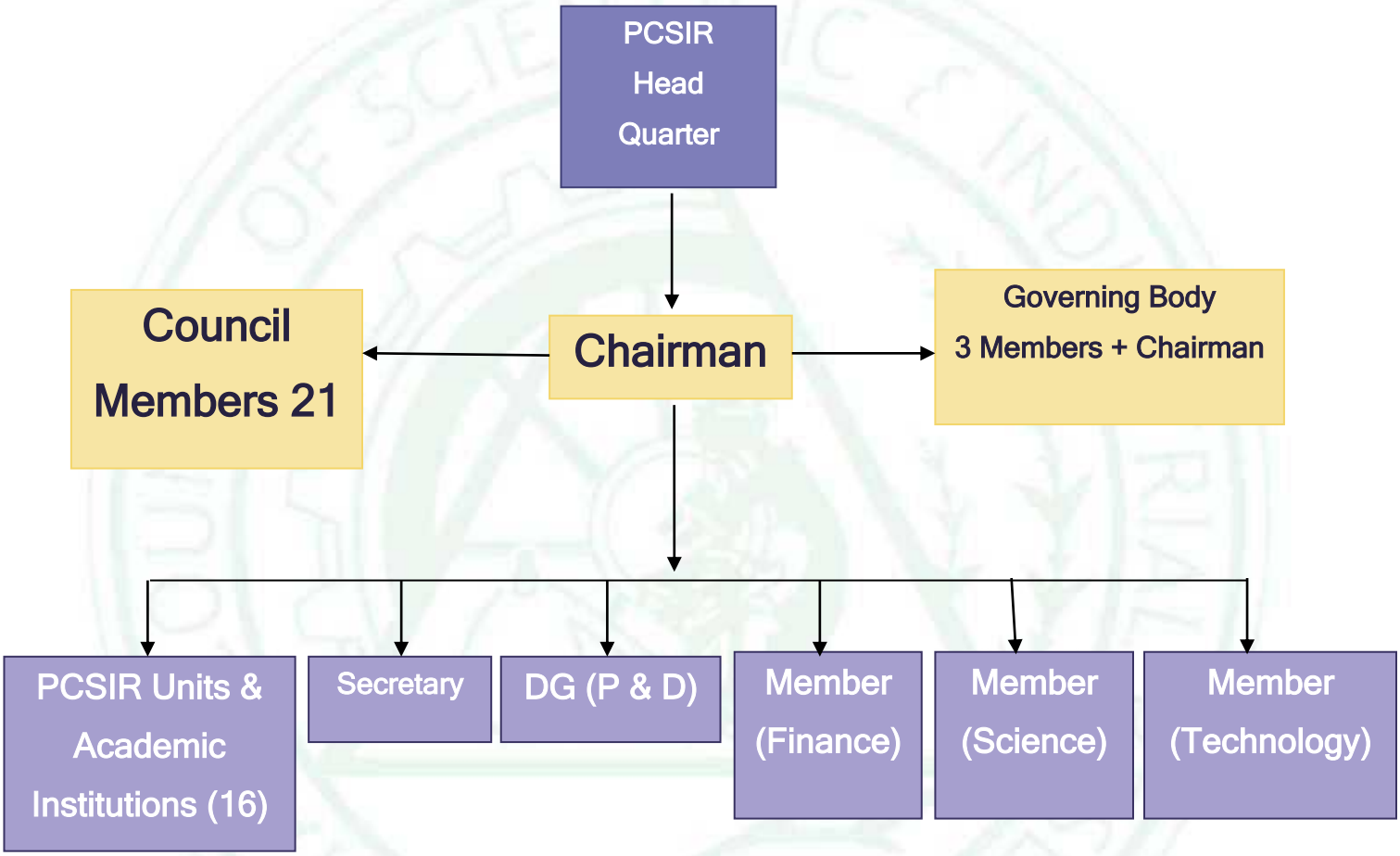
Mandate

Pakistan Council of Scientific & Industrial Research (PCSIR) is the largest public sector R&D organization with network of seventeen (17) laboratories /units including six (06) technical centres in the country. The mandate of the Coucnil is to undertake, promote and guide scientific and technological research related to problems connected with the establishment and development of Pakistani industries and to disseminate the results of research to various sectors for economic development of the country.

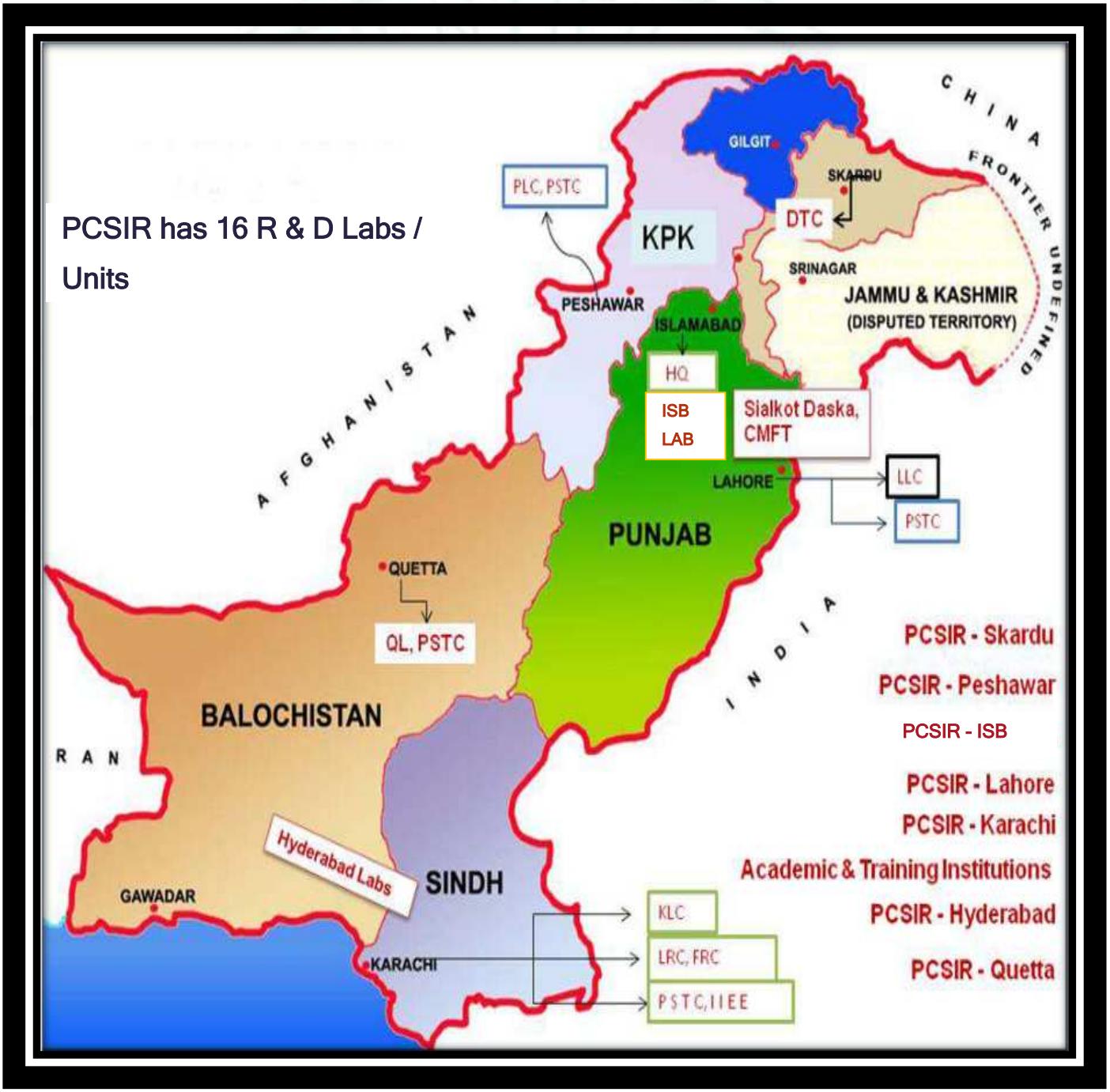
Vision

Since its inception, PCSIR has contributed immensely in terms of production activities and technological processes to boost the national industries of public and private sectors. Simultaneously, PCSIR has also contributed in terms of human resource development to meet the requirements of academic institutions and R&D organizations of the country.

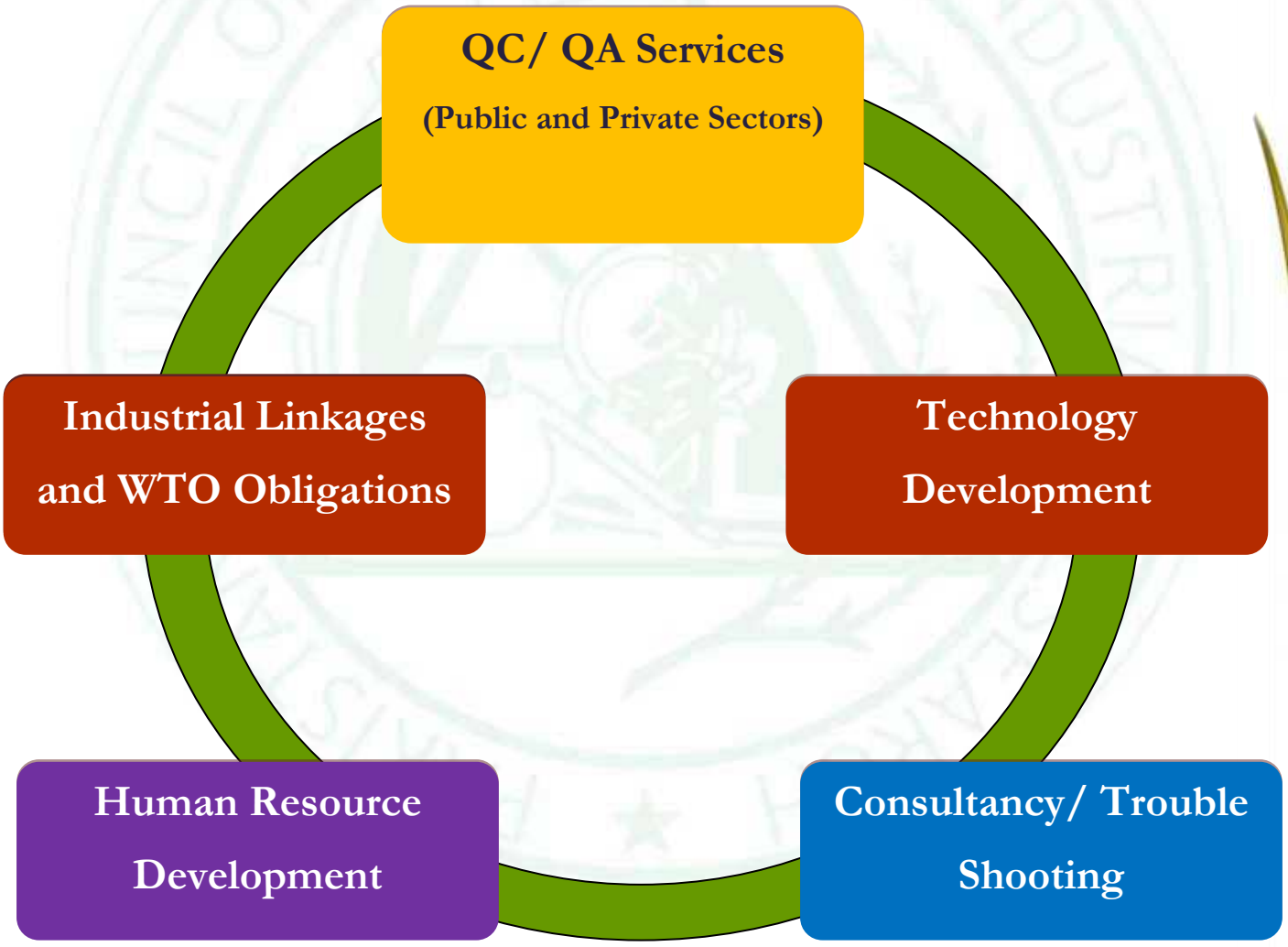
Organizational Chart



Location of PCSIR Labs and Units



Main Activities



Services Sectors

Advance Engineering	Environment
Food and Allied Products	Electronics
Minerals	Industrial Chemicals
Leather and Leather	Paper and Plastic/ Polymers
Textile and Associated	Pesticides/ Herbicides
Glass and Ceramics	Oils and Fats
Biotechnology	Dyes
Strategic Industry	Pharmaceuticals

PCSIR Head Office, Islamabad

PCSIR Head Office, Islamabad

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PCSIR Head Office, Islamabad

Pakistan Council of Scientific and Industrial Research has a network of 16 research laboratories/ units including 06 training institutes located all over the country in Federal as well as all provincial capitals. Several laboratories of PCSIR are ISO-17025 accredited and some are under the accreditation process. PCSIR's Head Office is located in Islamabad.

The Chairman PCSIR is the competent authority of PCSIR. The Council of PCSIR consists of 21 members which is the supreme policy-making body. The executive organ of the Council is the Governing body which consists of four members: The Chairman and the Members for Science, Technology and Finance. Following wings are working under supervision of the Members in Head Office.

Science Wing

Member (Science) is the Head of the wing and responsible for supervision and monitoring of all Research and Development activities of the Council, training and technical matters of units, organizing events and programmes in collaboration with international and national organizations.

The Science Wing is also responsible for scrutinizing and printing of PCSIR Annual Reports and R&D Programmes. Similarly accreditation matters, technical comments, National Assembly/ Senate questions, networking system and software development are also dealt in the Science wing.

Technology Wing

Member (Technology) is the Head of the wing and responsible for supervision of all civil works, PSDP projects, technical training institutes, commercialization of products/ services, exhibitions etc.

Finance Wing

Member (Finance) is the Head of the wing and responsible for supervision of all finance-related matters of PCSIR, audit matters, annual (Development and non-development) budget, payments related to recoupment and hiring etc., monitoring of Self-Generated Income, pension and GP Fund.

Administration/ Establishment Wing

Secretary PCSIR is the Head of the wing and responsible for supervision of administrative matters, establishment matters, security measures, legal matters, promotions and recruitments, holding of PCSIR Council and Governing Body meetings.

Year at a Glance

PCSIR's Continuous Excellence Programme

A summary of the Performance output of PCSIR in 2021-22 to support the industrial sector, as a result of implementing PCSIR's Continuous Excellence Programme, is given below:

S. No	Key Performance Indicators (KPIs)	Achievements
1.	Processes Developed	231
2.	Processes Leased out	80
3.	Patents Filed	20
4.	Patents Obtained	03
5.	Students Supervised	917
6.	Consultancies Provided	669
7.	Technical/ Feasibility Reports	276
8.	Papers Published (International)	124
9.	Papers published (National)	35
10.	Analytical Equipments Developed	223
11.	Exhibitions/ Conferences/ Seminars Organized	103
12.	Workshops/ Trainings Organized	143
13.	MoUs Signed	31
14.	Interaction with Industries (Visits)	1991
15.	No. of Services Provided	47560
16.	No. of Clients Served	16114

SECRETARY, MINISTRY OF SCIENCE & TECHNOLOGY VISITS HEMP CULTIVATION SITE

Ms. Humaira Ahmed, (Secretary, Ministry of Science and Technology) and Dr. Syed Hussain Abidi S.I. (Chairman PCSIR) visited the Hemp Cultivation Site, Institute of Hydroponic, Rawat which was inaugurated on September 30, 2021.

The purpose of the visit was to see the progress of Hemp Cultivation. All the dignitaries visited the site along with their team members and were satisfied with the growth of Hemp Cultivation.

34TH COUNCIL MEETING OF PCSIR WAS HELD IN ISLAMABAD

The 34th Council meeting of PCSIR was held under the Chairmanship of Dr. Syed Hussain Abidi, S.I., Chairman PCSIRon June 30, 2022 at Islamabad Club.

The main agenda of the meeting was to discuss and review the research related activities, administrative and financial matters of the Council. Furthermore, new targets to enhance the current R&D activities/ output, commercialization strategies and future road maps of the Council were also discussed, in detail.

The Chairman PCSIRgave a brief presentation regarding the progress of various Units/ Labs of PCSIR to the members of the Council. The Council members appreciated the efforts of present management of PCSIR. Apart from the proceedings of the meeting, the Members acknowledged the dedicated leadership qualities of Dr. Syed Hussain Abidi, for the historic utilization of Rs. 2.0 billion

allocated for various PSDP projects being executed in PCSIR, amendment of PCSIR Act and Service Rules and massive promotions of over 650 employees in various scales.

The members approved the decision of converting all the units of PCSIR on Solar Power along with building enhancement of PCSIR Head Office, Islamabad.

PCSIR AND SIAPEP JOIN HANDS TO ENHANCE AGRICULTURE PRODUCTIVITY & CONDUCT WELFARE OF FARMERS COMMUNITY

PCSIR Laboratories Complex, Karachi and Sindh Irrigated Agriculture Productivity Enhancement Project (SIAPEP) signed ToRs regarding Research & Development for the enhancement of Sindh Agriculture Productivity through "Determination & Comparative Evaluation of Pesticide Residues in Experimental fields of Okra & Cotton Crops, Soil, Water and Farmers Blood".

TRANSFORMATION OF PCSIR INTO DIGITAL-ENABLED ORGANIZATION

PCSIR is aiming to transform into a digital-enabled organization by deployment of network infrastructure and systems comprising of smart & modern technologies through its PSDP project titled "Digital Transformation, Strengthening and Automation of PCSIR". The project includes provision of latest computers, servers, printers, scanners, allied digital hardware, complete network infrastructure and automation of business processes for day-to-day activities as well as management decision making. About 24 existing employees and 28 new manpower under this project have been hired along with software developers and network administrators. Project comprise of 24 months with a budget allocation of Rs.960.71 million.In the initial phase, survey regarding passive work implementation has been performed by COMMTEL. COMMTEL has completed network infrastructure deployment at NPSL and started working at PCSIR Lab Complex Peshawar and PSTC Peshawar. Civil and electric work of data center at PCSIR head office has been completed. Co-ordination with MoST regarding establishment of data center at Ministry is in progress.

PCSIR KARACHI CELEBRATES WORLD OCEAN DAY 2022

The world ocean day is celebrated around the world on 8th of June every year. This inclusive event provides an opportunity to celebrate the importance of the ocean and to better understand how to interact with it in a sustainable manner. The theme for this year was "Revitalization: Collective action for ocean". PCSIR laboratories Complex Karachi joined the global community and celebrated the world ocean day.

E-OFFICE TRAINING FOR OFFICERS AND OFFICIALS OF PCSIR

As per directives of Federal Government of Pakistan, PCSIR started the processes of e-office to go paperless, in collaboration with NITB. It is aimed at improving internal efficiencies in an organization through electronic administration.

After the successful conduction of IT readiness survey, a representative from NITB provided training to the officers and officials of PCSIR Head Office, Islamabad. Pre-requisite of e-Office has been completed at Head office and two officers of PCSIR Head office have been fully trained for e-Office.

SCIENTISTS OF PCSIR LABS ISLAMABAD PARTICIPATE IN PT PROGRAM IACHEJ-2022

Testing Program for Tea Testing IACHEJ-2022 (Round IV) in April-May 2022, from Industrial Analytical Centre at H.E.J. Research Institute of Chemistry International Center for Chemical and Biological Sciences University of Karachi, Pakistan.

The analyzed Parameters were Caffeine, Water Extract, Total Ash, Water Soluble Ash and Crude Fibre. The results were submitted on April 18, 2022 and interim report was received on May31, 2022. The results were found satisfactory with good Z-Score (± 1).

A DELEGATION FROM PCSIR PESHAWAR VISITS CHITRAL CHAMBER OF COMMERCE & INDUSTRIES

A high-level delegation of Scientists from PCSIR Labs Complex Peshawar visited Chitral Chamber of Commerce and Industries on June 22, 2022.

A detailed discussion was held regarding exploration, exploitation, identification, value addition and marketing of various medicinal plants and other products.

Contaminated water is another burning issue of lower and upper Chitral areas. Both the parties agreed to sign an MoU for working jointly towards the sustainable development of the area.

PCSIR PESHAWAR ARRANGES SCIENTIFIC DOCUMENTARY FILM FOR KIDS

PCSIR Laboratories Complex Peshawar arranged a Scientific Documentary Film for kids on May 21, 2022. The main objective of the film was to raise awareness in young generation regarding scientific innovation and to motivate them for taking active part in new inventions.

The following scientific documentaries were presented:

1) James web Space Telescope. 2) Welcome to the Future. 3) The world in 2050. 4) How big is this, Universe. 5) 15 emerging technologies that will change the world.

PRESENTATION OF LRC-PCSIR KARACHI OFFICERS AT AL-KHIDMAT, KARACHI

Dr. M. Kashif Pervez, CSO/ Director LRC and Mr. Noushad, RA participated as key speakers from Leather Research Centre (LRC)-PCSIR Karachi in a seminar held at the Head Office of Al-Khidmat, Karachi on June 22, 2022.

The topic of their presentation was "Preservation of Hides & Skins and Transportation". All the regional representatives of Al-Khidmat, Karachi participated in the

presentation and discussed various issues regarding the proper preservation of hides and skins. LRC representatives briefed the stepsto maintain the quality of raw material and make it beneficial for the organizations working in Pakistan. The participants appreciated the efforts of Leather Research Centre-PCSIR.

FEDERAL MINISTER FOR SCIENCE & TECHNOLOGY VISITS PCSIR LABORATORIES COMPLEX, LAHORE

Honorable Federal Minister for Science & Technology Senator Shibli Faraz along with Chairman PCSIR Dr. Syed Hussain Abidi, visited PCSIR Laboratories Complex, Lahore on February 05, 2022 and inaugurated the following initiatives of PCSIR:

- Cannabis processing pilot plant for development of value-added products from Cannabis.
- Precision green house for ginger cultivation- smart production of ginger as import substitution and technology transfer.
- Technology transfer and capacity building centre and technology innovation support centre.
- Up-gradation of polymer and plastics laboratory.
- Motor testing lab-ISO 17025 accredited services for energy efficacy of electric motors.

ESTABLISHMENT OF PCSIR LABORATORIES ISLAMABAD

As a part of its continuous excellence, PCSIR has marked another historic day on January 14, 2022 by getting approval for the establishment of PCSIR Laboratories, Islamabad. These laboratories have been established in Sector H-9, Islamabad to undertake Research and Development (R&D) and provide analytical testing services to the industrial sector in Islamabad, Rawalpindi and Azad Jammu & Kashmir region.

PAKISTAN MEGA LEATHER SHOW 2022

Leather Research Centre (LRC), PCSIR setup a stall in "Pakistan Mega Leather Show 2022"held at Expo Centre, Lahore from January 28 to 30, 2022. Mrs. Tahira Ayaz SSO and Mr. Shakil Ahmad, JTO from LRC participated in the Show. The Show was inaugurated by Mr. Zahid Hussain, ChairmanPakistan Footwear Manufacturers Association (PFMA).

The visitors showed keen interest in the products & services of LRC. Fifty-fivefeedback forms were received from various industries showing interest in Ostrich Leather, Tannery, Solid Wastes Management, Nano-Materials, Applied Leather, Syntan Dyed Leather, Fatliquors, and Dyes etc. They also suggested LRC to enhance testing capabilities especially for registration, evaluation, authorization and restriction of chemicals (REACH) Compliance.

TWO DAY WORKSHOP ON BIOFLOC & FISH FARMING ORGANIZED BY PCSIR KARACHI

A workshop was jointly organized by PCSIR Karachi and M/s Innovative Pakistan about Biofloc and Fish Farming on March 30-31, 2022. Participants from different localities attended the workshop with the objective to start a fish and shrimps farm as business. Dr. Shahid Masood from Innovative Pakistan and Aquaculture Section, Dr. Farman Ahmed (HOC) & Dr. Omer Mukhtar (PSO) from FMRRC,

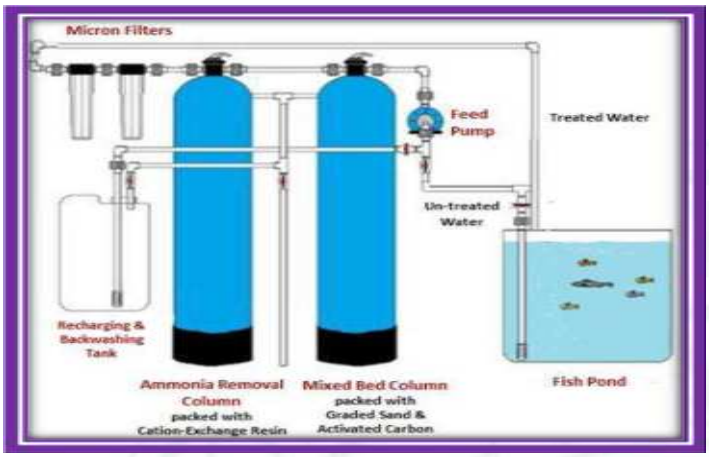
PCSIR Labs, Karachi were the main resource persons for this workshop.

The workshop helped the participants to understand the biofloc system. The participants were given knowledge about microalgae culture, artemia hatching, tilapia fish growth and ammonia removal plant for fish pond. The participants were showed the facilities present in Aquaculture section of FMRRC PCSIR.

PCSIR LABS COMPLEX KARACHI DEVELOPED A SYSTEM FOR THE REMOVAL OF AMMONIA FROM FISH POND WATER

Ammonia accumulation in fish ponds is of a serious concern for fish farmers which is continuously produced in the fish pond due to excretions of the animal and degradation of feed. It is toxic for fish and should be efficiently removed from a pond for healthy fish farming. Scientists of PCSIR Laboratories Complex Karachi have developed an efficient system for removal of ammonia from fish pond. The automated system can be backwashed periodically to improve performance and extend operating life. It can remove up to 2,500 liters of ammonia rich water per hour. The system is designed with high chemical resistance and temperature tolerance for cleaning. The system is simple

and compact with vertical, modular design. The technology is indigenous and provides cost-effective solution for fish farmers.



TREE PLANTATION DRIVE AT KLC FOR GREEN PAKISTAN

PCSIR Labs Complex Karachi initiated Green Pakistan plantation on March 31, 2022. The Director General-KLC along with Consultant, Director (P&D), all HOCs & OICs participated by planting saplings of mango trees (100 Nos.). This will help to restore the ecosystem and may serve for business purpose in future.

PCSIR Established Gems/Minerals Cutting& Polishing Centre at PCSIR Laboratory, Skardu

Pakistan Council of Scientific & Industrial Research (PCSIR) has established facilities for fruit processing & gems, minerals cutting & polishing centre in its laboratory at Skardu. The aim for establishing these technical facilities is to undertake preliminary cutting and polishing of gems, precious & semi-precious stones, whereas, processing, preservation and testing of food products will help SMEs in value addition food, gems and mineral resources.

The Honorable Federal Minister Mr. Chaudhary Fawad Hussain, Chief Minister Giigit-Baitistan, Federal Secretary MoST and other dignitaries unveiling the newly established Lab., at PCSIR Skardu

HONORABLE FEDERAL MINISTER FOR SCIENCE AND TECHNOLOGY, SENATOR SHIBLI FARAZ VISITED PCSIR

Senator Shibli Faraz, the Honorable Federal Minister for Science and Technology, visited PCSIR Laboratories Complex, Peshawar on Wednesday, 2nd June 2021. He was accompanied with Dr. Syed Hussain Abidi, Chairman PCSIR. Mr. Farid Ullah Khan, Director General PCSIR Laboratories Complex, Peshawar and Mr. Jehangir Shah, Director (P&D) received the honorable guests. During the said visit, a detailed presentation/ briefing about the available facilities, achievements and current activities of PCSIR, Peshawar was given. The Honorable Federal Minister urged upon the scientists/ engineers of PCSIR, Peshawar to undertake productive and meaningful research by transferring its benefits to the common people. He also emphasized to the researchers of PCSIR, Peshawar to develop value added products from industrial wastes so as to contribute in national economy.

The Honorable Federal Minister appreciated the efforts of PCSIR researchers and assured his full cooperation for the betterment of S&T infrastructure in the country.

Visit of Senator Shibli Faraz, Federal Minister for Science & Technology to PCSIR Laboratories Complex, Peshawar.

VISIT OF THE HONORABLE FEDERAL MINISTER FOR SCIENCE AND TECHNOLOGY, SENATOR SHIBLI FARAZ TO PCSIR LABORATORIES COMPLEX, KARACHI

The Honorable Federal Minister for Science and Technology, Senator Shibli Faraz visited PCSIR Laboratories Complex, Karachi on 18th June 2021. He was accompanied with Dr. Syed Hussain Abidi, Chairman PCSIR. Dr. Shahnaz Perveen (T.I)Director General along with Dr. Atiq ur Rehman Director (P&D), PCSIR Laboratories Complex, Karachi, welcomed the honorable guests. During the visit, the honorable guests were briefed about the the available facilities, achievements and current activities of PCSIR, Karachi.

During his visit, he insisted on the demand driven & applied research to uplift the economy of the country. He also advised the management of PCSIR, Karachi to prepare a proposal for establishing on-site analytical testing facilities at Sea-Ports and Dry-Ports to facilitate the importers and exporters. The Honorable Federal Minister assured his full cooperation at Ministerial level so as to improve & upgrade the facilities of PCSIR nationwide.





Visit of Honorable Federal Minister for Science & Technology to PCSIR Laboratories Complex, Karachi

MR. NADEEM IRSHAD KAYANI, HONORABLE FEDERAL SECRETARY FOR SCIENCE AND TECHNOLOGY VISITED PCSIR LABORATORIES COMPLEX, LAHORE

The Honorable Federal Secretary for Science and Technology, Mr. Nadeem Irshad Kayani visited PCSIR Laboratories Complex, Lahore on June 12th, 2021. During his vist, a detailed briefing on the current activities of PCSIR, Lahore was given by the Director General and senior management of the Complex. The Federal Secretary appreciated the efforts of researchers & engineers of PCSIR. After briefing, he visited the display centre of PCSIR Lahore and was pleased to see the research products of PCSIR, Lahore. He directed the management of PCSIR, Lahore to reach out the potential investors/ industries so that the meaningful research could be transformed into product for the consumption of end users at national and international level.

Mr. Nadeem Irshad Kayani, Federal Secretary for S&T visited PCSIR Laboratories Complex, Lahore

VISIT OF FEDERAL SECRETARY TO PCSIR'S NATIONAL PHYSICAL STANDARDS LABORATORY, ISLAMABAD

The Federal Secretary, Ministry of Science and Technology, Mr. Nadeem Irshad Kayani visited National Physical & Standards Laboratory (NPSL) – PCSIR, Islamabad on 14th June 2021. Dr. Syed Hussain Abidi, Chairman PCSIR also accompanied the Federal Secretary during the visit. A brief presentation about NPSL activities & its scope was given to the Federal Secretary. He appreciated the activities &services of NPSL being offered to national and international clients and further directed to enhance its scope at par with international organizations.

Mr. Nadeem Irshad Kayani, Secretary MoST visited NPSL (PCSIR), Islamabad

Human Resource Development During 2021-22

Training Received (Long-Term)

Nature of Training	Foreign	Local	Total
Ph.D.	-	03	03
M. Phil./ M.Sc./ MS	-	02	02

Training Received (Short-Term)

Nature of Training	Foreign	Local	Total
Short Training Courses, Webinars Workshops, Seminar, etc.	47	83	130

Training Imparted

Lab/ Unit	No. of Trainings
PCSIR Laboratories Complex, Karachi	40
PCSIR Laboratories Complex, Lahore	9
PCSIR Laboratories Complex, Peshawar	24
PCSIR Laboratories, Skardu	05

Budget and Finance

Non-Development Budget (Fiscal Year 2021-22)

Approved Budget	Rs. 3150.750 million
Released	Rs. 3150.750 million

Development Budget (Fiscal Year 2021-22)

Approved Budget	Rs. 1973.125 million
Released	Rs. 1973.125 million

Development Projects

On-Going Projects during 2021-22

S. No.	PSDP #	Project Name	Total Cost (Million Rs)	PSDP Allocation (Million Rs)	PSDP Allocation Revised (Million Rs)
1.	1048	Establishment of Technical Training Center for Precision Mechanic and Instrument Technology, Gwadar.	1210.150	6.943	**498.044**
2.	1058	Up gradation of Machinery, Equipment and Renovation of Buildings of IIEE & PSTC Karachi.	125.000	50.000	**33.717**
3.	1059	Up gradation of Medicinal Botanic Centre as National Centre for Herbal Medicine, PCSIR Labs. Complex, Peshawar.	286.000	23.686	**63.686**
4.	1060	Up gradation of Polymer & Plastics Laboratory at PCSIR Laboratories Complex, Lahore.	134.695	34.695	**49.695**

5.	1062	Cultivation and Processing of Medicinal and Industrial Cannabis on Experimental Fields and Establishment of testing and product development facilities at PCSIR Laboratories Complex, Lahore, Peshawar and Karachi.	1896.820	300.000	**385.000**
6.	1064	Development of Computer Controlled Fermentors and Production of Biochemicals & Bioproducts	1981.607	335.305	**201.183**
7.	1065	Digital transformation, strengthening and automation of PCSIR.	960.710	350.000	**350.000**
8.	1069	Establishment of Material Resource Centre and development of additive manufacturing and Reverse Engineering Centre at PCSIR.	1951.683	300.000	**350.000**
9.	1070	Establishment of PCSIR Laboratories Complex, Multan (Feasibility Study).	30.000	30.00	**0**
10.	1077	Research, Development and Innovation Program in PCSIR	1500.000	200.000	**55.000**
11.	1080	Up gradation of Calibration Centre Capabilities at PCSIR Peshawar.	35.000	15.000	**15.000**
12.	1081	Up gradation of Halal Authentication Labs at PCSIR Laboratories Complex, Lahore, Karachi and Peshawar.	722.980	200.000	**0.000**
13.	1063	Data Repository of Scientific Instrumentation.	300.000	50.000	**25.000**
14.	1072	Gene Editing of Biological Agents for Nutritional Biochemical and Therapeutical purpose.	1799.598	400.000	**400.000**
15.	1074	Medical Equipment & Devices Innovation Center (MEDICen).	1989.520	100.000	**6.000**
		Total	**14923.763**	**2395.629**	**2432.325**

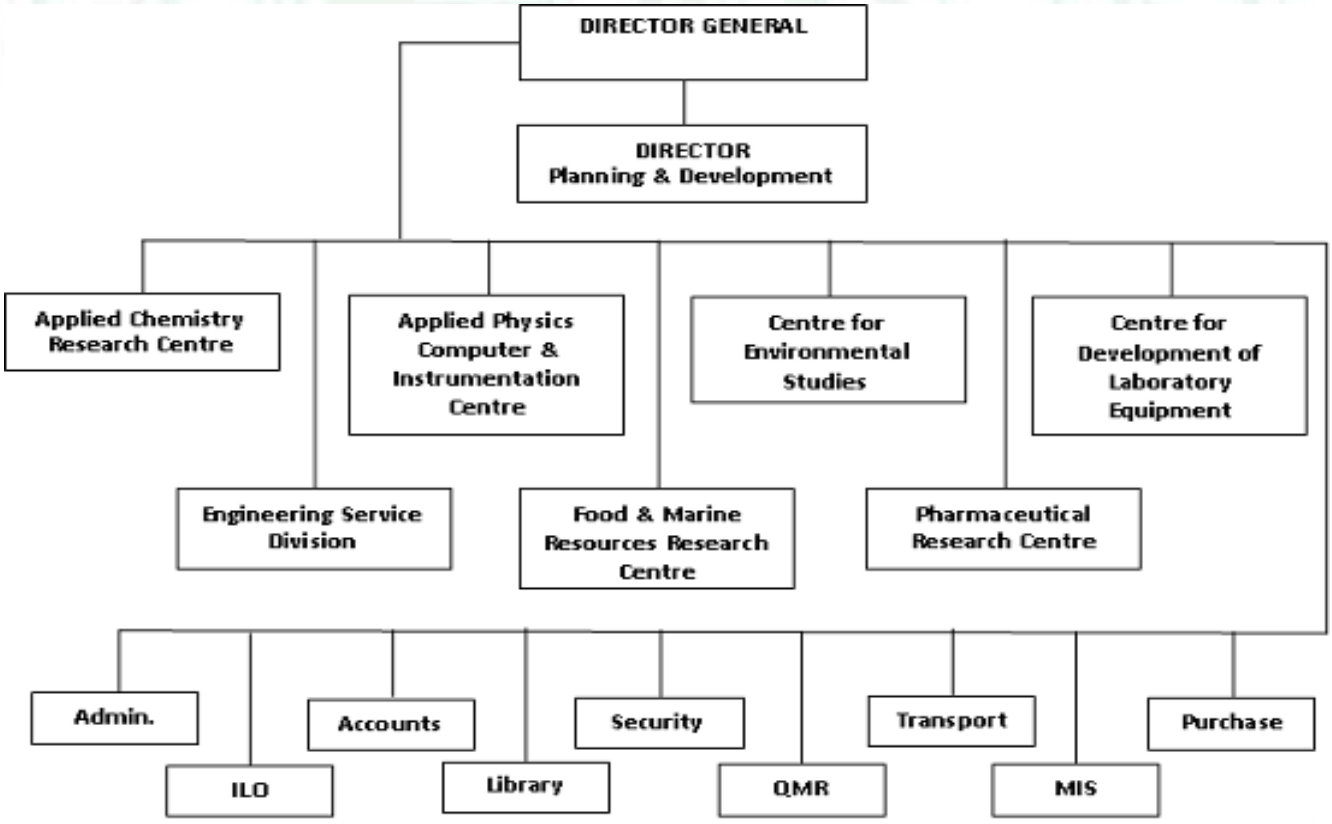
NEWLY APPROVED PROJECTS DURING 2021-22:

S. No.	Title of Project	Approved by	Cost (Million Rs.)	Duration
1.	Establishment of Medical Cannabis Green houses for Biotechnology Derived Bio-Products, National Hemp & Cannabis Analytical Laboratory and National Industrial Hemp & Medicinal Cannabis Authority	DDWP 17-12-2021	1946.014	**36 Months**
2.	**Research, Development and Technology Transfer of Selected Active Pharmaceutical Ingredients (APIs) for Import Substitution (PCSIR)**	**DDWP 17-12-2021**	**1067.639**	**24 Months**

PCSIR LABORATORIES COMPLEX, KARACHI

PCSIR Laboratories Complex, Karachi (KLC) is a multidisciplinary Research Complex having scientists with expertise in the disciplines of Marine & Food Sciences, Environment, Bio-Sciences, Pharmaceuticals, Applied Chemistry & Physics, Instrumentation, Material Science & Computers. Besides carrying out R&D work in particular disciplines, it also provides analytical and technical services as well as academic supervisory services. In the present scenario of ISO and WTO, KLC has contributed a lot by providing quality testing services, accredited under ISO / IEC-17025, to the Pakistani manufactureres, exporters and importers.

During the period under report, besides R&D and sponsored/analytical work, the scientists and technologists of KLC have published research papers in National and International Journalsof high impact factor. Moreover, patents have also been obtained/ filed.



1) Processes Leased Out

1. A Process of Synthesis of Graphene Oxide for Heavy Metal Removal from Tap Water.
2. A Process for the Production of Disinfectant Solution.
3. A Process for the Production of "Phenyl".
4. A Process for theImprovement of Hand Wash Process.
5. A Process for the Production of Dehydration of Fruits and Vegetables.

2) Papers Published / Presented

i) International Publications

1. Saeeda Bano, Samina Iqbal, Kauser Siddiqui and Kanwal Abbasi. 2021. Purification and Characterization of β-Galactosidase from *Aspergillus fumigatus* PCSIR-2013. *Pakistan Journal of Pharmaceutical Sciences,* 34(4): 1333-1340.
2. Shagufta Ambreen Shaikh, Kauser Siddiqui and Nazia Masood. 2021. Study of effect of physiochemical parameters on the reproducibility (validation) of biodegradation of textile dyes. *Advancements in Life Sciences,* 9(1): 49-53.
3. S. Bano, S. Iqbal, K. Abbasi, K. Siddiqui, 2021. Catalase Production under Oxidative Stress from *B. subtilis* KIBGE has 1; Optimization of Catalytic Performance of Enzyme. *International Journal of Innovative Science, Engineering & Technology.*
4. Chan MWH, Mirani ZA, Khan MN, Ali A, Khan AB, Asadullah, Rauf N., 2021. Isolation and characterization of small colony variants of *Staphylococcus aureus* in various food samples. *Biocatalysis and Agricultural Biotechnology,* 35: 102097.
5. Chan Malik Wajid Hussain, Amjad Ali, Asad Ullah, Zulfiqar Ali Mirani, Danilo Balthazar-Silva. 2021. A size-dependent Bioaccumulation of metal pollutants, antibacterial and antifungal activities of *Telescopium telescopium*, *Nerita albicilla* and *Lunela coronate*. *Environmental Toxicology and Pharmacology, 87: 103722.*
6. Muhammad Arif Asghar, Rabia Ismail Yousuf, Muhammad Haris Shoaib, Muhammad Asif Asghar, MehrukhZehravi, Ahad Abdul Rehman, Muhammad Suleman Imtiaz and Kamran Khan. 2021. Green synthesis and characterization of carboxymethyl cellulose fabricated silver-based nanocomposite for various therapeutic applications. *International Journal of Nanomedicine,* 16: 5371–5393.

7. Akinsola Akande Adigboye, Uzma Salar, Khalid Mohammad Khan, Shazia Syed, Sherifat Adeyinka Aboaba, Sridevi Chigurupati, Abdul Wadood, Muhammad Riaz, Muhammad Taha, Saurabh Bhatia, Kanwal, Shahbaz Shamim, and Shahnaz Perveen. 2021. Substituted benzimidazole analogues as potential α-amylase inhibitors and Radical Scavengers.*ACS OMEGA,* 6(35): 22726-22739.
8. Uzma Salar, Bukhtawar Qureshi, Khalid Mohammad Khan, Muhammad Arif Lodhi, Zaheer Ul-Haq, Farman Ali Khan, Fouzia Naz, Muhammad Taha, ShaziaPerveen and Shafqat Hussain. 2021. Aryl hydrazones linked thiazolyl coumarin hybrids as potential urease inhibitors. *Journal of the Iranian Chemical Society,* 19(4): 1221-1238.
9. Bilquees Bano, Kanwal, Khalid M. Khan, Almas Jabeen, Aisha Faheem, Muhammad Taha, Syed Moazzam Haider and Shahnaz Perveen . 2021. Sulfonamides and Sulphonyl Ester of Quinolines as Non-Acidic, Non- Steroidal, Anti inflammatoryAgents.*Letters in Drug Design & Discovery*, 18(2): 112-122.
10. Khalid M. Khan, Itrat Fatima, Shahnaz Parveen and Syed Muhammad Saad. 2021. Rapid cesium fluoride catalyzed synthesis of 5-aryloxy-1-phenyl-1H-tetrazoles via nucleophilic aromatic substitution. *Letters in Organic Chemistry,* 18(5): 389-394.
11. Modinat M. Balogun, Shahbaz Shamim, Khalid M. Khan, Uzma Salar, Ibrahim A. Oladosu,Mehreen Lateef, Abdul Wadood, Muhammad Taha, Dorcos O. Moronkola, Ashfaq U. Rahman, Fazal Rahimand and Shahnaz Perveen. 2021. 2-Mercapto Benzoxazole derivatives as novel leads: Urease inhibition, in vitro and in silico studies. *Chemistry Select,6(33):* 8490-8498.
12. Asma Mukhtar, Shazia Shah, Kanwal, Shehryar Hameed, Khalid M. Khan, Shahid Ullah Khan, SumeraZaib, Jamshed Iqbal and Shahnaz Perveen. 2021. Indane-1,3-diones: as potential and selective α-glucosidase inhibitors, their synthesis, in vitro and in silico studies.*Medicinal Chemistry,* 17(8): 887-902.
13. Tooba Naveed, Niaz Ahmed, Shahid Bhutto, Nazir Tunyo and DurdanaRais Hashmi. 2021.A Sustainable Solution to treat Textile Effluent by employing Combined Coagulation, Oxidation and Ultra Filtration Technique. *International Journal of Applied Research in Water and Waste Water,* 8 (1): 66-70.
14. Paras Shah, Muhammad Abid, Kousar Yasmeen, Abdul Hakeem, Nusrat Jabeen Shaikh, Noureen Basheer, DaimDarban and Adam Khan. 2021. Quality measurements of various types of wastes and their impacts on plant growth. *Pakistan Journal of Botany,* 54(2).
15. Muhammad Taha, Nizam Uddin, Syed Muhammad Saad, Naveed Iqbal, Ghulam Fareed, El-HassaneAnouar, Maya Haj Hassan, Noor Barak Almandil, Mohammad Salahuddin, Khalid

Muhammad Khan, Abdul Wadood and Ashfaq Ur Rahman. 2021. An effort to find new α-amylase inhibitors as potent antidiabetics compounds based on indole-based-thiadiazole analogs. *Journal of Biomolecular Structure and Dynamics,* 1-12.

16. Heena Khawaja, Erum Zahir, Muhammad Asif Asghar, Muhammad Arif Asghar and AshirBenjamin Daneil. 2021. A sustainable nanocomposite, graphene oxide bi-functionalized with chitosan and magneticnanoparticles for enhanced removal of Sudan dyes. *Journal of Dispersion Science and Technology,* 1-13.
17. S. Bhutto, M Y. Khan, N. Jalbani, A. Shareef and D. R. Hashmi, 2021. Synthesis of silver impregnated graphene oxide by modified hummers method & its application for water treatment. ICEPE-2021 at UoG (Presented).
18. Asma Mukhtar,Shazia Shah, Kanwal, Khalid Mohammad Khan, Shahid Ullah Khan,SumeraZaib, Jamshed Iqbal, Shahnaz Perveen, Muhammad Taha, Shafqat Hussain, Shahryar Hameed, Naveed Ahmad Khan,Ruqaiyyah Siddiqui and Ayaz Anwar. 2021. Synthesis of chalcones as potential α-glucosidase inhibitors, in-vitro and in-silico studies. *Chemistry Select,* 6(37): 9933-9940.
19. Heena Khawaja, Erum Zahir, Muhammad Asif Asghar, Kashif Rafique and Muhammad Arif Asghar. 2021. Synthesis and application of covalently grafted magnetic graphene oxide carboxymethyl cellulose nanocomposite for the removal of atrazine from an aqueous phase. *Journal of Macromolecular Science, Part B.* 60(12): 1025-1044.
20. Akhtar Shareef and DurdanaRais Hashmi. 2021. Pilot Study of Air Quality during Pre and Post COVID-19 Lockdown: An Inadvertent Assistance to the Environment. *International Journal of Environment and Climate Change.*
21. Z. Akram, R. Perveen, S. Saleem, R. Siddiqui, M. Hussain, S. Shaukat, M. Z. Yusuf. 2021. Novel target of the 4-piperidone thiazole derivative for platelet inhibitions by using inducers collagen and ADP. *Health Biotechnology and Biopharma,* 5(3): 1-16.
22. NazishDildar, Syed Nawazish Ali, Tehmina Sohail, Mehreen Lateef, Salman Tariq Khan, Syeda Farah Bukhari and PerveenFazil. 2022. Biosynthesis, characterization, radical scavenging and antimicrobial properties of *Psidium guajava* Linn coated silver and iron oxide nanoparticles.*Egyptian Journal of Chemistry,* 65(2): 145 – 151.
23. Syeda Abeer Danish, Tooba Haq, Iram Liaqat, Saima Rubab, Mohammad Qureshi and Urooj Zafar. 2022. Succession and catabolic properties of fungal community during composting of fruit waste at subtropical environment. *Waste and Biomass Valorization,* 13(4): 2017–2033.

24. Aijaz Panhwar, Khalida Faryal, Aftab Kandhro, Shahid Bhutto, Uzma Rashid, Nusrat Jalbani, Razia Sultana, Aijaz Solangi, Mehtab Ahmed, Sofia Qaisar, Zain Solangi, MudasirGorar and EidanSargani. 2022. Utilization of treated industrial wastewater and accumulation of heavy metals in soil and okra vegetable. *Environmental Challenges,* 6: 100447.
25. M. Iqbal, A. Panhwar, K. Ahmed, A. Kandhro, R. Sultana, J. Mughal and Z. Solangi. 2022. Textile dyeing of cotton and wool textile material with natural dyes extracted from bluish purple grapes. *Bulgarian Chemical Communications,* 54: 14.
26. Shazia Nisar, Shazia Ishfaq, Saqib Ali, Sadaf Iqbal, Saima Imad, Samina Iqbal, Saeeda Bano, Kanwal Zahid, Nasreen Fatima and Muhammad Shahzaman. 2022. Synthesis, characterization, biological activities and ab-initio study of transition metal complexes of [Methyle 2-((4-chlorophenyl) (hydroxylmethyl) acrylate]. *Acta ChemicaSlovenica,* 69(2): 405-418.
27. Mehwish Solangi, Khalid M. Khan, Sridevi Chigurupati, Faiza Saleem, Urooj Qureshi, Zaheer Ul-Haq, Almas Jabeen, Shatha G. Felemban, Fatima Zafar, Shahnaz Perveen, Muhammad Taha, Saurabh Bhatia. 2022. Isatin thiazoles as Antidiabetic: Synthesis, in vitro enzyme inhibitory activities, kinetics, and in silico studies. *Arhiv der Pharmazie,* 2100481.
28. K. Ahmed and T. Rafique. 2022. Hydro-chemical and statistical assessment of ground-water quality of mithi area of Tharparkar District, Sindh, Pakistan. *Journal of Biodiversity and Environmental Sciences,* 20(3): 1-8.
29. Muhammad Usman, Arslan Ali, Amna Jabbar Siddiqui, Fizza Iftikhar, Sindhia Kumari, Syed Sibt-e-Hassan, Raja Shad, Tahir Rafique, Syed Kashif Raza, Hesham R. EI-Seedi, Jalal Uddin and Syed Ghulam Musharraf. 2022. Evaluation of the chronic intoxication of fluoride on human serum metabolome using untargeted metabolomics. *Arabian Journal of Chemistry,* 15(7): 103928.
30. H. Imran, Z. Yaqeen, N. Fatima, T. Sohail, S. Syed, S. R. Yaqeen, S. S. Yaqeen, 2022. Evaluation of anti-emetic activity of *Prunus domestica* on chick model. *World Journal of Pharmacy and Pharmaceutical Sciences,* 11(5): 24-31.
31. Saima Riaz, Beena Naqvi, Bilquees Gul and Tour Jan. 2022. Multiplication of *Saccharum officinarrum* L. Cv US 633 to develop seeding material at mass scale. *International Journal of Biology and Biotechnology,* 19 (2): 189-196.
32. Zehra Ashraf, Anwar Ejaz Beg, Mirza Tasawer Baig, Nudrat Fatima, Tehmina Sohail and Samina Iqbal. 2022. Phytochemical & physicochemical analysis, invitro antimicrobial and antifungal activities of *Juglans Regia* L. Bark (Walnut Bark). *Journal of Hunan University Natural Sciences,*49(5).

33. Areesha Ahmad, Urooj Zafar, Adnan Khan, Tooba Haq, Talat Mujahid and MehreenWali. 2022. Effectiveness of compost inoculated with phosphate solubilizing bacteria. *Journal of Applied Microbiology,* 133(2): 1115-1129.
34. Naveed Muhammad, He Tianying, Fenghuan Wang, Xian Yin, Malik Wajid Hussain Chan, Asad Ullah, Baocai Xu, Sadar Aslam, Nawazish Ali, Qamar Abbas, Ishtiaq Hussain, Ali Khan and Abdul Majeed Khan. 2022. Isolation of Lysozyme Producing *Bacillus subtilis* strains, identification of new strains *Bacillus subtilis* BSN314 with the highest enzyme production capacity and optimization of culture conditions for maximum lysozyme production. *Current Research in Biotechnology,* 4: 290-301.

ii) National Publications

1. Zainab Siddiqui, Uzma Asghar Rashid, ShaguftaSadozai, Aijaz Panhwar, W. Muhammad and M. Raheem. 2021. Heavy metal content and their health risk assessment in rastrelligerkanagurta, fish form Gawadar Port Pakistan. *Pakistan Journal of Science*, 73(3).
2. Ayesha Jamal Zaidi, Hina Ahsan and Alia Bano Munshi. 2021. A Review on cancer probability in human beings due to environmental impact of polycyclic aromatic hydrocarbons (PAHs) and remediation. *Pakistan Journal of Scientific and Industrial Research (Series A: Physical Science)*, 64A(3): 275-286.
3. Shagufta Riaz, Muhammad AtiqUllahKhan , Zafar Iqbal Shams , Syed Anser Rizvi , Aasia Karim and Sofia Khalique Alvi , 2021 Bioavailability of Ca, K, Mg and Na in Arabian Yellow Finned Sea Bream (*Acanthopagrusarabicus*) with estimated daily intake for human consumption. *Pakistan Journal of Scientific and Industrial Research (Series B: Biological Sciences)*, 3: 225-230.
4. Mujahid Hussain Memon, A. Karim, W. Hyder, F. A. Dharejo, M. A. Jatoi, B. Naqvi, F. Ghazanfar, F. Aziz. 2021. Design of centralized intelligent expert system and contamination detection of tissue cultured sugarcane crop. *Sukkur IBA Journal of Emerging Technologies-(SJET)* 4(2): 47-63.
5. Aijaz Panhwar, Khalida Faryal, Aftab Kandhro, Nazir Brohi, Kamran Ahmed and Mansoor Iqbal. 2022. Treatment of sugarcane industry waste water by combination of chemical coagulation and activated carbon. *Pakistan Journal of Scientific and Industrial Research,* 65A (1): 59-63.
6. Khan Muhammad Malik, Mahboob Ali Rind, Nusrat Jalbani, Aijaz Panhwar, Shahid Bhutto, Iftikhar Ahmed, Amber Rasheed, DurdanaRais Hashmi and Humaira Khan. 2022. Vortex-

assisted and cloud point extraction of cadmium, lead, copper and zinc in different personal care product samples. *Pakistan Journal of Scientific and Industrial Research,* 65A (1): 33-40.

7. Hina Imran,Tehmina Sohail, Sohail Shaukat and Ayesha Khokar. 2022. Wound healing potential/activity of polyherbal ointment containing *Salvadora persica, Azadirachta indica* and *Calendula officinalis* extracts: An experimental study. *Pakistan Journal of Scientific and Industrial Research,* 65B(1): 55-61.
8. Shagufta Ambreen Shaikh, Kausar Siddiqui and Nazia Masood. 2022. Study of effect of physiochemical parameters on the reproducibility (validation) of biodegradation of textile dyes. *Advancements in Life Sciences*, 9(1): 49-53.
9. F. Samoo, G. M. Mastoi, A. Kandhro, A. R. Abbasi, A. Panhwar**,** Y. Khan and S. Almani. 2022. Determination of the heavy metals and proximate analysis from vegetables in Hyderabad, Sindh. *Pakistan Journal of Science*, 74:1.
10. Asif Irshad, Khalil Ahmad Solangi, Asadullah Marri, Nida Shaikh, Alam Khan and Muhammad Dawood. 2022. Fortification of Date Bars with different protein sources and their nutritional profiling. *Pakistan Journal of Scientific and Industrial Research SeriesB: Biological Sciences*, 65(2): 129-134.

3) Patents Obtained

1. A process for extraction and purification process of Phytase enzyme from Wheat bran utilizing at least reagents, Dr. Saeeda Bano, Dr. Samina Iqbal, Dr. Kausar Siddiqui 143731 August, 2021.
2. A process for preparation of chromium complex with glycine ligand and to study its physical and anti microbial activity, Muhammad Kamil, Anila Siddiqui, Samina Iqbal, Syed Junaid Mahmood, Sofia Khalique Alvi and Sheraz Shafique, 14382121 Sept. 2021.

4) Consultancies Provided

1. Proximate analysis of lithium bromide solution to M/s. NOVATEX LIMITED.
2. Residual trichloroethylene analysis in surgical instruments to M/s. Elmed Instruments (Pvt.) Ltd., Sialkot.
3. Isopropyl alcohol analysis in surgical instruments to M/s. Elmed Instruments (Pvt.) Ltd., Sialkot.
4. Ethylene oxide analysis in surgical instruments to M/s. Elmed Instruments (Pvt.) Ltd., Sialkot.

5. Drinking water analysis to M/s. LINZ Pharmaceuticals (Pvt) Ltd.
6. Consultancy on residual trichloroethylene analysis in surgical instruments to M/s. Electro Bismed Instruments, Sialkot.
7. Microbiological bioburden in infusion sets to M/s. Byonyks, Pvt. Ltd.
8. Chemical composition of UHMWPE sheets to M/s. Composite Inspection Dept. C/o. Army-Quality Control Labs (COD Estate).
9. Characterization of wrapper CDM laminated flexible film to M/s. Fazleesons Pvt. Ltd.
10. Technical evaluation of seized goods to M/s. Government of Pakistan Directorate General Intelligence & Investigation-Customs House No. B-105, Chaman Housing Scheme, Quetta.
11. Physico-chemical evaluation of SASSO olive oil to M/s. Universal Trading Corporation, 6th Floor, Siddiqsons Towers, Shahrah-e-Faisal, Karachi.
12. Differentiate between paper no. 1 and 2, basis of Fiber Analysis & Tensile Strength to M/s. International Business Management (IBM).
13. Technical evaluation of diesel to M/s. Soneri Bank Limited, Karachi.
14. Quality evaluation of kraft and printing papers of different GSM to M/s. International Business Management.
15. Characterization of Lithium Bromide Solution to M/s. Gatron (Industries) Limited.
16. Technical evaluation of cables for K3/K4 project to M/s. Karachi Nuclear Power Generating Station (KNPGS) Karachi.
17. Pyrogen test of general surgery instruments to M/s. Beauty Teck International (Pvt.) Limited, Sialkot, Pakistan.
18. Systemic toxicity test of general surgery instruments to M/s. Beauty Teck International (Pvt.) Limited, Sialkot.
19. Performance evaluation of anti riot kits (Anti Riot Suits, Helmets and Shields) to M/s. Government of Sindh Police Department.
20. Testing of transformers to M/s. collectorate of custom appraisement C/o M/s. Prime Steel Re-rolling Mills, Sheikhupura.
21. Testing of disinfection cabinet to M/s. S.Y. office automation, Karachi.
22. Rabbit pyrogen test of medical devices to M/s. Sehar Batool International.
23. Acute systemic toxicity test of medical Device to M/s. Sehar Batool International.
24. In-vitro-cytotoxicity of Black Light Rod-5 m Layrangoscope Blade to M/s. Swenggco Medical, Sialkot.

25. In vitro bioavailability of erythrocin tablets of four batches Erytrocin Tablets 250 mg ETS 3861, 62, 63 and 64 to M/s. Indus Pharma.
26. General surgical instruments to M/s. Sehar Batool International.
27. Sterilized plastic components (Bottle/Caps/Nozzles) for EO, EG, ECH to M/s. Gobble Surgical.
28. Physico-chemical characterization of deformed steel bars to M/s. Naveena Steel Mills Pvt. Ltd. Karachi.
29. Technical evaluation of 500 mm Dia HDPE Pipe (PN 6.3) to M/s. 102 Engineer Battalion RGD Camp Area Karachi.
30. Evaluation of acetic acid, MEG, Jetty and EDC Foams to M/s. Engro Vopak Terminal Ltd., Karachi.
31. Chemical characterization of seawater to M/s. AGVEN (Pvt) Ltd.
32. Physico-chemical characterization of organic compost to M/s. Tassco Chemical Corporation.
33. Chemical testing in water to M/s. PAK Suzuki Motors Co. Ltd.
34. Hand Sanitizer Gel 650 L to M/s. Indus Motors Company.
35. -vitro cytotoxicity of Pin Wire Cutter from Dentstar International for the compliance of ISO-10993-5 to M/s. Dentstar International.
36. In-vitro cytotoxicity of starklingmacintosh laryngoscope blade (Complete Metal) from Swenggco Medical for the compliance of ISO-10993-5 to M/s. Swenggco Medical.
37. In-vitro cytotoxicity of starklingmacintosh laryngoscope blade (Complete Plastic) from Swenggco Medical for the compliance of ISO-10993-5 to M/s. Swenggco Medical.
38. In-vitro cytotoxicity of bipolar forceps from swenggco medical for the compliance of ISO-10993-5 to M/s. Swenggco Medical.
39. Evaluation of assembly part honda model-G to M/s. synthetic products enterprises.
40. Evaluation of Armrest Honda Model-G to M/s. synthetic products enterprises.
41. To analyze the foam samples from different source to M/s. Engro Vopak Terminal Ltd.
42. Insulating paper board to M/s. Model customs collectorate of appraisement (East) Custom House Karachi.
43. Analysis of a Compost Sample to M/s. Hiba Noor, Aga Khan College, Karachi.
44. Linear LED Lights (Model: Y-B1.7 & Model: Y-B1.1) for IP-65 Ingress Protection to M/s. New Mujahid Alcon Industries (Pvt.) Ltd., Karachi.
45. Heavy metals and chemical analysis in cattle manure to M/s. Sea Spire Advisors, LLC.
46. Hand Sanitizer Gel to M/s. Indus Motors.

47. Analysis of HSI Tubular Anodeby Sidra Noman, Sheraz Shafiq and Dr. Saima Imad to M/s. Sui Southern Gas Company Limited.
48. Analysis HSI Double Ended Anode by Sidra Noman, Sheraz Shafiq and Dr. Saima Imad to M/s. Sui Southern Gas Company Limited.
49. Technical evaluation of lithium bromide to M/s. ICEBERG Industries.
50. Technical evaluation of lithium bromideto M/s. Liberty Mills Limited.
51. Physico-chemical characterization of seawater collected at different time from different locationsto M/s. China Harbor Company Ltd.
52. Chemical testing in waterto M/s. Lady Dufferin Hospital.
53. Heavy metals, pesticides and rodent residues in Milling Wheat (MV) to M/s. Control Union (Pvt) Ltd.
54. Uncoated cup stock board to M/s. Government of Pakistan Collectorate of Customs Appraisement - West Custom House, Karachi.
55. In-vitro cytotoxicity of starkling-green system handle from swenggco medical for the compliance of ISO-10993-5 to M/s. Swenggco Medical.
56. In-vitro cytotoxicity of starkling-single use magil forceps from swenggco medical for the compliance of ISO-10993-5 to M/s. Swenggco Medical.
57. Technical evaluation of copper wire to M/s. KNK (Pvt.) Ltd.
58. Chemical composition of himalayan pink salt to M/s. Sheikh Salt Industries.
59. Lithium bromide solution to M/s. M. A Engineering Services Intl.
60. Skin toxicity test of Anti lice Hair oil to M/s. Hemani International.
61. Acute oral toxicity test of AntiMig with Lavender oil to M/s. Hemani International.
62. Acute oral toxicity test of Immun oil to M/s. Hemani International.
63. Acute oral toxicity test of Detox Tea to M/s. Hemani International.
64. Acute oral toxicity test of Digestion Tea to M/s. Hemani International.
65. Acute oral toxicity test of LuxativeTea to M/s. Hemani International.
66. Acute oral toxicity test of Headache Tea to M/s. Hemani International.
67. Acute oral toxicity test of Sleep well Tea to M/s. Hemani International.
68. Acute oral toxicity test of Throat comfort Tea to M/s. Hemani International.
69. Acute oral toxicity test of Tonic Tea to M/s. Hemani International.
70. Acute oral toxicity test of Hemani Honey Sidr with Royal Jelly to M/s. Hemani International.
71. Acute oral toxicity test of Hemani Wheat Germ oil capsule to M/s. Hemani International.

72. Endotoxin levels in RO water from IHHN-Main Campus Korangi and IHHN PIB Campus to M/s. Indus Hospital, Karachi.
73. Alum, salt and water Percentage in Jelly Fishto M/s. DETON (Pvt) Limited.
74. Alum, salt and water Percentage in Jelly Fishto M/s. Shanghai Northern Pole Fisheries.
75. Physical and chemical testing of water to M/s. Lady Dufferin Hospital.
76. Physical and chemical testing of water to M/s. Lady Dufferin Hospital.
77. Chemical & microbiological analysis of macroni pasta and water to M/s. K.S. SulemanjiEsmailji& Sons (Private) Limited.
78. Chemical and heavy metals in water to M/s. Pearl-Continental Karachi.
79. As, Cu, Pb, Fe in Industrial Margarine (Brand: Dilpasand& Zainab) to M/s. Pakistan Standards & Quality Control Authority Government of Pakistan (Ministry of Science & Technol Conformity Assessment (K&Q Zone).
80. Characterization of animal based biodiesel to M/s. Muhammad Daud Sultan Department of Basic Sciences, College of Veterinary and Animal Sciences Jhung.
81. Physico-mechanical characterization of gypsum board to M/s. SGS Pakistan (Pvt.) Ltd.
82. Evaluation of Plastic drum for suitability as Food Contact substance to M/s. FS Food.
83. Evaluation of Plastic drum for suitability as Food Contact substance to M/s. Huzaifa Food.
84. Technical evaluation of 90 mm HDPE Pipes to M/s Osmani & Company (Pvt.) Ltd.
85. Analytical examination of thermoplastic (TP) paints and impact glass beads to M/s. National Highway Authority, Maintenance Unit Quetta.
86. Lithium bromide solution to M/s. ICEBERG Industries.
87. Antioxidant and total polyphenols in plant extracts/compound to M/s. Anum Adil, Department of Pharmacology, Faculty of Pharmacy, University of Karachi.
88. Neuropharmacological & toxicological evaluation of *Vigna unguiulate*& *Phaseolus vulgaris* to Ms.RabiaMunawwar, Dept of Pharmacy, University of Karachi.
89. Biofertilizers 'Symbio" both Liquid and solid for biocharacterization according to PS-5330/2014 M/s. PSQCA.
90. Estimation of heavy metals in powder of aerial parts of plant to M/s. Uzma Urooj Shaikh.
91. Characterization of Pakistani origin seed oils to M/s. University of Karachi.
92. Metals in plant extractto M/s. Ms. Ayesha Maqsood, Department of Botany, University of Karachi.
93. Environmental Test PET CT Scan Departmentby Dr. Akhtar Shareef, PSO, Dr. Nusrat Jalbani, PSO and Mr. Shahid Bhutto PSO to M/s. Medequips S.M.C.

94. Heavymetals in chicken, milk, fruit & vegetable samples to M/s. Mr. Abdul Haseeb, Department of Environmental Sciences, Federal Urdu University of Science & Technology.
95. Heavy metals in vegetable, ground water, soil & chicken to M/s. Ms. Hadiyamaham, Department of Environmental Sciences, Federal Urdu University of Science & Technology.
96. Cr, Pb, Ni, As and aflatoxin in twenty samples of spices to M/s. Faiza Nayyar Zaidi, University of Karachi.
97. In-vitro cytotoxicity of general surgical instruments from SITEC for the compliance of ISO-10993-5 to M/s. SITEC, (Pvt.) Ltd.
98. THC analysis of surgical instruments to M/s. SITEC, (Pvt.) Ltd.
99. Heavy metal testing in ice to M/s. Aqua Sea Food.
100. Chemical and microbiological analysis of water to M/s. Aqua Sea Food.
101. Processing of fertilizer to M/s. Great Agro.
102. Fresh sea food (Frozen Sole Fish, Frozen Ribbon Fish & Frozen 03 Spot Crab) to M/s. Aqua Sea Food.
103. Heavy metals in fish to M/s. Legend International Private Limited.
104. Fresh Sea Food (Frozen Sole Fish, Frozen Ribbon Fish & Frozen 03 Spot Crab) to M/s. Aqua Sea Food.
105. Quality assessment of coolant water to M/s. National Logistics Cell 9th.
106. Absorption Chillier LiBr Solution to M/s. Soorty Enterprises (Pvt.) Ltd.
107. Testing of motor for range hood to M/s. Directorate of Intelligence and Investigation Customs, Regional. Office, 81-C, Block-6, PECHS, Karachi.
108. Repairing of hydrogen generator to M/s. Dalda Foods Limited.
109. Suitability of tooth brush handle as food contact substance to M/s. Gorey International.
110. Analytical examination of thermoplastic paints (TP) and impact glass beads to M/s. National Highway Authority, Maintenance Unit Quetta.
111. Confirmation of water proof terpauline as per tender requirements to M/s. Government of Sindh, Food Department.
112. Analysis of organochlorine pesticides, pyrethroids, carbamatets, triazole and organophophorous pesticides in pulp samples to M/s. Al-Rahim Agri Processing (Pvt.) Limited.

5) Products ready for Commercialization

1. Process development of spray dried fish hydrolysate powder.
2. Process development of spray dried black tea infusion.

3. Removal of flouride from drinking water.
4. A Process for the production of Graphene Oxide (GO) for heavy metal removal from drinking water.
5. Production of waste water treatment via SEPTIK TANK.
6. Process for the production of synthesis of methyl eugenol from eugenol.
7. Process for the production of deinking of Quranic Papers.
8. A Process for the production of formulation and preparation of ready made medium stock for plant tissue culture.
9. Process development of easy spectrophotometric evaluation of erythromycin.
10. Formulation of air freshener gel.
11. Water treatment plant for the removal of ammonia from fish pond.
12. Process developed for production of zinc sulfate (granular) stationery glue.
13. Mosquito repellent spray.
14. A process developed for mushroom oyster technology.
15. Process developed for kitchen degreaser.
16. A process developed for liquid detergent.
17. A process developed for liquid water based formulation of mascara for sensitive eyes.
18. A process developed for hand sanitizer spray (ethanol based).
19. A process developed for PVC base eraser.
20. Best-T, formulation for the treatment of bamboo from termite attack.
21. Process developed for pancreatic lipase inhibition by phenolic compounds extracted from plants.
22. A process for the production of Ultrasound Gel.
23. A process for the production of textile grade glauber's salt (sodium sulfate) on lab scale.
24. A process for the preparation of polyherbal antiseptic analgesic gel.
25. A process for the preparation of metal cleaner.
26. A process for alkaline hydrolysis of feathers.

6) Technical Reports

1. Technical Evaluation of Armrest Model-Y.
2. Technical evaluation of armrest model-Z.
3. Technical evaluation of door trim pp based resin material model Z.
4. Physiochemical, metal and microbiological analysis of drinking water samples.

5. Determination of ethylene dichloride, acetic acid and phosphoric acid in sub-surface ground water.
6. Technical evaluation of CR Paint; Yellow, White and Glass Beads.
7. Chemical investigation of textile chemicals.
8. Residual trichloroethylene analysis in surgical instruments.
9. Residual iso propyl alcohol analysis in surgical instruments.
10. General surgery instruments for (ETO).
11. Pyrogen test of general surgery instruments.
12. Bioburden of peritoneal dialysis fluids from Byonyks.
13. Assessment of aflatoxins & nutrient in zoo animal feed.
14. Nutritional Supplement (Syrups- Drinks).
15. Aircraft engine (LTS10-360KB) verification.
16. Chemical characterization of seawater.
17. Testing for Bank Note Disinfection Cabinet / Machine, FT-/DC Series.
18. Residual trichloroethylene analysis in surgical instruments.
19. Residual trichloroethylene analysis in surgical instruments.
20. Residual isopropyl alcohol analysis in general surgery instruments.
21. Residual isopropyl alcohol analysis in general surgery instruments.
22. General surgery instruments for intracutaneous reactivity.
23. General surgery instruments for pig maximization.
24. General surgery instruments for rabbit pyrogen test.
25. General surgery instruments for acute systemic toxicity.
26. General surgery instruments for hemocompatibility.
27. General surgery instruments for (ETO).
28. Compositional evaluation of hamdard's nutritional supplements.
29. Compositional evaluation of varients of roohafza products of Hamdard Laboratories (Waqf) Pakistan.
30. Chemical composition of FRP Manhole Cover.
31. MSDS of top mines pink salt.
32. In-vitro cytotoxicity and bioburden assessment of syringes.
33. Cannula & disposable syringe for (ETO).
34. Residual trichloroethylene analysis in surgical instruments.
35. Intracutaneous reactivity test of syringe & cannula.
36. GMPT of syringe & cannula.

37. Pyrogen test of syringe & cannula.
38. Acute systemic toxicity test of syringe & cannula.
39. Hemolysis test of syringe & cannula.
40. Nutritional evaluation of food items-collected from PIB Colony.
41. Shelf life study of ginger garlic paste & fried vermicelli.
42. Compositional evaluation of nutritional supplements of Hamdard Laboratories (Waqf) Pakistan.
43. Environmental test of Angiography Department at Indus Hospital.
44. Skin sensitivity test.
45. Hormonal study of herbal extract**.**
46. Technical evaluation of roof head lining Model G.
47. Technical evaluation of PPRC Pipe (25 mm).
48. Suitability of Tin Plate for Food Grade.
49. Analysis of pesticides residues and micro organisms in aseptically packed desi mango pulp.
50. Analysis of pesticides residues in Rice.
51. Frozen fish samples heavy metals in frozen Croaker, Barracuda, Grouper, Squid, Black Pomfret Fish.
52. Acetic acid and phosphoric acid in water.
53. Gas Turbine Engine with Reduction Gear Box.
54. General surgical instruments (EO, EG, ECH Residue Test).
55. Residual isopropyl alcohol analysis in surgical instruments.
56. Determination of acetic acid, ethylene dichloride and phosphoric acid in sub-surface ground water.
57. Extraction of herb.
58. Rosemary hair oil.
59. Clove body oil.
60. Chemical investigation of mixture of slop and sludge with water.
61. General Surgical Instruments (EO, EG, ECH Residue Test).
62. Residual trichloroethylene analysis in surgical instruments.
63. Residual isopropyl alcohol analysis in surgical instruments.
64. On components and composition of acrylic based paints.
65. Technical evaluation of roof head lining model G.
66. Heavy metals, pesticides in fish meal.
67. Heavy metals, pesticides, microbiological study in fish meal.
68. Nutritional Facts in Arq-e-Mako in Calcium Salt in Liquid / Iron in Powdered &Arq-e-Mako.

69. Heavy metals in wheat (Vessel Name: M.V. INCE BEYLERBEYI)
70. Proximate of button oyster mushroom.
71. Amino acid profile in mutton through amino acid analyzer.
72. Development and characterization of gluten free cookies by incorporating buck wheat polysaccahride and chickpea flour.
73. Characterization of Geo membrane.
74. Characterization of geo textile.
75. Technical evaluation of Geo Textile Sheet.
76. Operationalization of poison testing laboratory.
77. Analysis of Pesticides Residues in Rice Samples**.**
78. Chemical composition and PCBs in PVC Scrap.
79. Physical, microbiological and heavy metal analysis in water.
80. Calcium salt in liquid / iron in powdered & nutritional facts in Arq-e-Mako.
81. Laboratory analysis of fruit juices.
82. Heavy metals in Chicken milk & fruits.
83. Laboratory analysis of composite sample of spices and other mixes.
84. Technical evaluation of printed MIS.
85. Chemical investigation of mixture of slop and sludge with water.
86. Characterization of geo membrane and geo textile**.**
87. Analysis of fertilizer.
88. Analysis of boiler tubes.
89. Physico-mechanical evaluation of UPVC pipes for Soil.
90. Estimation of testosterone in human blood.
91. Op residues in blood.
92. Sub-surface ground water.
93. Microbiology and heavy metals in guar gum.
94. RO drinking water.
95. Design and development of gasketed parallel plate heat exchanger.
96. Design and development of thermal conductivity measurement apparatus.
97. In-vitro cytotoxicity of orthopedic Implants (K-wire) for the compliance of ISO-10993-5.
98. Intracutenous reactivity test of Orthopedic implants.
99. Study the effects of beta vulgarison PCOD and associated comorbidities.
100. Acute systemic toxicity of surgical instruments.

101. Security cheque paper.
102. Evaluation of paper.
103. Heavy metals in Guar Gum.
104. Characterization of rapeseed meal.
105. Chemical & microbiological analysis in wells water mixed in storage tank.
106. Microbiology and heavy metals in milk powder (Brand: Maymil)**.**
107. Suitability of plastic drum as food contact substance.
108. Physico-mechanical evaluation of uPVCpipes.
109. Compliance of HDPE bottles with US Pharmacopeia**.**
110. Stability and characterization of packaging material.
111. Evaluation of HDPE Pipe 450 mm.
112. Microbiological analysis of water samples collected from different part of Karachi.

7) Equipment Developed

1. Development of water bath (Digital).
2. Digital pH meter.
3. Fabrication of water de-ionizer.
4. Development of Distributed control system; an analogy of milk pasteurization plant
5. Plate-type heat exchanger apparatus.
6. Thermal conductivity measurement apparatus.
7. System for the removal of ammonia from fish pond water.
8. Design and development of banknote sanitization cabinet.
9. Establishment of water purification plant.

8) Exhibition / Conferences / Seminars Organized

1. 'Aspects of Metallurgy & Materials in Contemporary Industries' organized by Department of Metallurgy and Material Engineering, Dawood University of Engineering and Technology.
2. Health Awareness Session entitled "Diabetes & Ramadan".
3. 'World ocean day' was organized by Seminar Workshop Committee Members and Dr. Sofia Khalique Alvi is chairperson of the committee.
4. Seminar on topic "Cholesterol se aagaahee".

9) MoU / ToR Signed:

1. ToR regarding Co-operation and collaboration in R&D activities, studies and testing with PCSIR Labs. Complex, Karachi with M/s. Hamdard Laboratories (Waqf), Karachi, Pakistan 05-08-2021.
2. ToR regarding Compositional Evaluation of Varients of RoohAfza Products of Hamdard Laboratories Hamdard Laboratories (WAQF), Pakistan December, 2021.
3. ToR regarding to Food Technology, Pharma, Applied Chemistry and Environmental research M/s. Jinnah University for Women, Karachi. 28-02-2022.
4. To R regarding Disinfectant Solution M/s. Americom Technology Pakistan March, 2022.
5. ToR regarding Phenyl M/s. Technology Force, Karachi March, 2022.
6. ToR regarding Process Know How of "Hand Wash"M/s. Alvin sons Pharmaceuticals April, 2022.
7. ToR regarding Collaboration in R&D Activities and Development of Human Resources M/s. Pak Ghiza(Pvt) Ltd., Karachi May, 2022.
8. ToRs regarding Developing and transferring dehydration foods and vegetable processes M/s. Foodex 259, H Block No. 6 PECHS Karachi. May, 2022.
9. ToR signed regarding Research & Development for the enhancement of Sindh Agriculture Productivity for "Determination and Comparative Evaluation of Pesticide Residues in the Experimental fields of Okra & Cotton Crops, Soil, Water and Farmers Blood". M/s. Sindh Irrigated Agriculture Productivity Enhancement Project (SIAPEP) 24th June, 2022.

10) Workshop Training Organized

1. Professional Development and Skills Boosting Towards Effective Entrepreneurship and Employability for Engineers.
2. Microbiological Methodologies for Anti microbial activities assessment.
3. Road Safety Workshop was organized in collaboration with Mobile Education Unit of National and Highway & Motor Police and PCSIR Labs. Complex Karachi.
4. Training of students was conducted in CAD – CAM Program.
5. 5 S Japanese System of Good House Keeping and its Implementation.
6. How to Conduct an Effective Training Needs Analysis.
7. Sales and Brand Management System.
8. Hands on Training on Plant Tissue Culture Technique and Growing Plants in Green House.
9. Gas Chromatography for Fatty Acid and Cholesterol Analysis.

10. Two days training was conducted on Biofloc and Fish Farming.
11. Two days traning on 'Risk management as per ISO-31000'.
12. Five days training on 'Plant Tissue Culture Techniques'.
13. Textile Testing Training to Evaluate Quality of Terry & Fabric.
14. Training on Analysis of Heavy Metals in Blood Sample.
15. Training on Calibration requirements as per ISO-17025
16. Analytical Techniques Applied on Elastomers and Plastics.
17. CAD-CAM Using pro-Engineering.
18. Training on measurement of uncertainty.
19. Importance of calibration of equipment (As per ISO-17025).
20. Quality control maintenance of FMCG (As per ISO-17025).
21. Biofloc fish and shrimp farming & artemia hatching.
22. Determination of heavy metals by atomic absorption spectrometry.
23. Hands on training on micro-vicker hardness tester.
24. QC digital instruments.
25. CAD/CAM using creo parametric.
26. CNC Lathe Programming.

11) Important Events Organized at KLC during July 2021 to June 2022

1. On Site "Covid-19 Vaccination Camp" At PCSIR Laboratories Complex, Karachi.
2. Training on 5S Japanese System of Good House Keeping & Its Implementation.
3. PCSIR Laboratories Complex Karachi signed MoU with Hamdard Laboratories (Waqf), Pakistan.
4. KLC Conducted training workshop for professional development and skills boosting towards effective entrepreneurship and employability for engineers.
5. Scientists of KLC invited to attend seminar and exhibition at Dawood University of Engineering and Technology.
6. Minister of Science and Technology Mr. Shibli Faraz visited KLC.
7. PCSIR Labs Complex, Karachi provided technical support to Hamdard Laboratories (Waqf), Pakistan.
8. Scientists of KLC attended 2nd Pak China Match making workshop.
9. Scientists of KLC attended two days International Workshop entitled "Technology Transfer and Commercialization 2021".

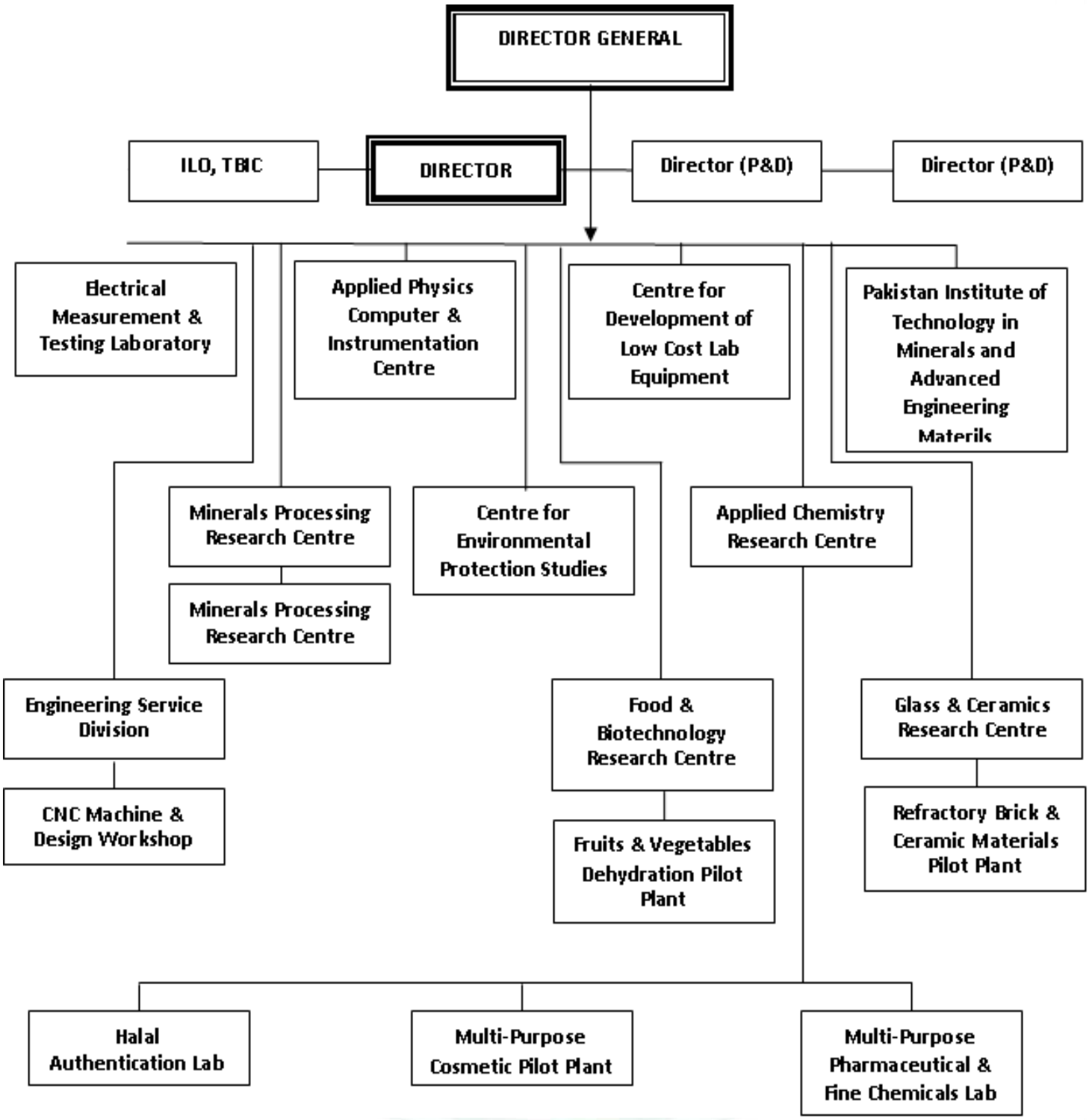
10. Additional Secretary MoST visited KLC PCSIR.
11. Scientists of KLC PCSIR attended the exhibition on “Belarus-Pakistan Business Forum”.
12. Scientists of KLC visited SGS, PSQCA and KS&EW with visitors from Senate Standing Committee.
13. PCSIR Laboratories Complex Karachi signed TOR with Jinnah University for Women Karachi.
14. Professional Training Courses Conducted in PCSIR Laboratories Complex Karachi.
15. PCSIR Labs Complex Karachi developed a system for the removal of ammonia from fish pond water.
16. Plantation Drive at KLC for Green Pakistan.

PCSIR LABORATORIES COMPLEX, LAHORE

Pakistan Council of Scientific & Industrial Research (PCSIR) Laboratories Complex, Lahore (LLC) comprises of **11** research Centres. These Centres are rendering services to local industry and other organizations in diversified fields, such as: Applied Chemistry Research Centre (ACRC), Applied, Physics Computers & Instrumentation Centre(APC&IC), Centre for Development of Laboratory Equipment (CDLE), Centre for Environmental Protection Studies (CEPS), Electrical Measurement and Test Laboratory (EMTL),Engineering Services Center(ESC), Upgraded Modernized Workshop (UMW), Food & Biotechnology Research Centre (FBRC),

Glass & Ceramics Research Centre (GCRC), Minerals Processing Research Centre (MPRC), Pakistan Institute of Technology for Minerals & Advanced Engineering Materials (PITMAEM). These Centres are not only engaged in indigenous technology development, provision of Testing and Quality Assurance Services but also effectively contributing to the Human Resource Development (HRD) through its Precision System Training Centre (PSTC), PCSIR and by providing research guidance to the B.S / M.Sc., M.S/ M.Phil. and Ph.D. students from the Academic Institutions.

Organizational Chart of the Lab/Centre


DIRECTOR GENERAL
ILO, TBIC
DIRECTOR
Director (P&D)
Director (P&D)
Electrical Measurement & Testing Laboratory
Applied Physics Computer & Instrumentation Centre
Centre for Development of Low Cost Lab Equipment
Pakistan Institute of Technology in Minerals and Advanced Engineering Materils
Minerals Processing Research Centre
Minerals Processing Research Centre
Centre for Environmental Protection Studies
Applied Chemistry Research Centre
Engineering Service Division
CNC Machine & Design Workshop
Food & Biotechnology Research Centre
Fruits & Vegetables Dehydration Pilot Plant
Glass & Ceramics Research Centre
Refractory Brick & Ceramic Materials Pilot Plant
Halal Authentication Lab
Multi-Purpose Cosmetic Pilot Plant
Multi-Purpose Pharmaceutical & Fine Chemicals Lab

Processes Leased Out

- **Grease**
- Prime coat
- Tack coat
- Dental products
- Cleaner for electronic
- Meloxifen tablet dissolution
- Adhesive remove solution
- Confirmation against ASTM C-150 of Fauji Cement Ltd.
- Hydrophilic oil for diapers
- Cutting oil
- Working voltage determination and temperature rise of switching device
- Quality requirements of raw materials used for cement production
- Stainless steel based alloy for knife making
- Led adhesive paste
- Detergent
- Dish wash
- Snow foam auto wash
- Masala recipe
- Enhancement study of shelf life of sweets plum salsa
- Increasing service temperature of fire bricks
- Physic-chemical and phase study of cement
- Topological study of glazed tile
- Cutting oil
- Star spray

- Shelf life study of handi masala
- Steel grade
- Dissolution performance along with tablets (prednisone)
- Vinegar preparation
- Evaluation the suitability of bauxite for use in refractories
- Validation of welding qualification in compliance with arc welding specification (0096-tyf-e000)
- Funeral bed
- Sheep/goat slaughtering and meat management
- Bio mass bassed energy efficient cooking stove
- Shelf life of bakery products
- Baby diaper colour
- Laminating glue
- Validation of fire rated doors as per international standards (NFPA 262 & UL 10c)
- Shelf life of desi ghee
- Shelf life of butter
- Formulation of non toxic playdough
- Shelf life of crushed chilli in sachet
- Shelf life of garlic powder in sachet
- Food products
- Physico –chemical evaluation of ridge, roof &floor tiles.
- Pickling for debeaking blades / rolled sheet of nickle based alloy (Ni-Cr-Fe)
- Turmeric (dehydration)
- Wood adhesive glue
- Quantitative evaluation of citric acid in paper

- Evaluation of minerals in herbal products
- Aloe vera juice
- Evaluation of finish of porcelain tiles
- Evaluation of cement for use in melting furnace
- Enrichment of zinc by pyrometallurgy
- Turmeric (dehydration)
- Processing of fresh turmeric as powder form
- Technical evaluation of lactoperoxidase based milk preservation system
- Measurement of direct current resistance & sheath thickness (insulated copper cable)
- Eyes drops
- Medicine
- Depleted wax
- Evaluation of sodium and potassium in concrete admixture
- Tile bond chemical
- Dot-3, brake fluid
- Anti-fog solution for glasses
- Carborator cleaner
- Pressure proof confirmation of liquid receiver (@ 550 ^{0}c holding for 8 hours)
- Technical evaluation and validation of MATK
- Turmeric dehydration
- Usage of apposite material used in mega hydro power project.
- Quality evaluation of low alkali cement for their best usage in hydro power project.
- Beneficiation/up-gradation of graphite from Dargai Aria Dist. Hazara
- Method developed for oil based vitamin (A, D)
- Fire proof canvas

- Hot & cool gel
- Solvent of printing ink

Paper Published / Presented (International)

- **Ruqayya Zakir, Sadia Sagar Iqbal, Atta ur Rehman, SumairaNosheen, Tasawer Shahzad Ahmad, Nimra Ehsan and Fawad Inam. Spectral electrical and dielectric characterization of cd spinal-Mg doped Co-Ce ferrites synthesized by nano gel autocombustion sol method, Ceramics International.**
- **Dr. Phool Shahzadi, Transparent Self-cleaning Environment Friendly Coating for Glass, Springer.**
- Zafar Iqbal, Afifa Saeed, Muhammad Usman Sabri, Mehroz Ahmed Khan, Abeera Zafar and Amna Masood. 2021. Essential oil from the black carrot leaves and their free radical scavening activity, *World Journal of Pharmaceutical Research,* 10(11): 1-9**.**
- Zafar Iqbal, Afifa Saeed, Muhammad Usman Sabri, Mehroz Ahmed Khan, Abeera Zafar and Sumayya Naeem. 2021. Extraction of volatile components from the leaves of Red Carrot and its free radical scavenging activity. *World Journal of Pharmaceutical Research,* 10(11): 10-25.
- Zafar Iqbal, Afifa Saeed, Muhammad Usman Sabri, Mehroz Ahmed Khan, Abeera Zafar and Sumayya Naeem. Essential oil from the roots of *Daucus carota* l. Var. Boissieri (red carrot) and their anti-oxidant activity. *World Journal of Pharmaceutical Research,* 10(11): 26-38.
- Zafar Iqbal, Afifa Saeed, Muhammad Usman Sabri, Mehroz Ahmed Khan, Abeera Zafar and HafzaSaghir Butt. 2021. Essential oil from the roots of black carrot (*Daucus carota* L. Subsp. sativus hoffman) and their antioxidant activity. *World Journal of Pharmaceutical Research,* 10(11): 39-51.
- Shamsha Bibi, Shafiq-ur-Rehman, Layreb Khalid, Muhammad Yasin and Abdul Qayyum Khan Ran Jia. Metal doped fullerenes complexes as promising drug delivery materials against COVU-19, Springer.
- Sumaira Nosheen, Muhammad Irfan, Farzana Habib, Bilal Waseem, Badaruddin Soomro, Hamza Butt and Mubashar Akram. A review: Development of magnetic nano-vectors for

biomedical applications, *GSC Advanced Research and Reviews.*

- SumairaNosheen, Sadia Sagar Iqbal, Muhammad Irfan, Aneela Sabir, Rafiullah Khan and Tasawar Shahzad. 2022. Impact of Mg ion dopping on the structural, morphological, thermal, electrical and dielectric properties of Bismuth cobalt nanoferrites. *Arabian Journal for Science and Engineering,* 47(6): 7467-7472.

Sumaira Nosheen, Sadia Sagar Iqbal, Aneela Sabir, Rafiullah Khan and Tasawar Shahzad. 2021. Fabrication and characterization of novel conductive nanomaterials CO_2, CrO.5x, MgO.5, Fe_2O_4. Korean Journal of Chemical Engineering, 38(12): 2536-2540.

Badaruddin Soomro, Aqil Inam,Muhammad Irfan, SumairaNosheen, M. Ishtiaq, M.A. Hafeez, M.H. Haseeb, M.Usman Tahir and W. Haider. Effect of deposition parameters on the tribological properties of aluminum-bronze coatings by value arc technique on AISI 304 stainless steel. International Journal of Scientific & Engineering Research (IJSER).

- Najam ul Hassan, Mohsan Jelani, Ishfaq Ahmad Shah, Khalil urRehman,Abdul Qayyum Khan, Shania Rehman, Muhammad Jamil, Deok Kee Kim and Muhammad Farooq Khan. 2021. Tunable martensitic transformation and magnetic properties of Sm-Doped NiMnSn Ferromagnetic Shape Memory Alloys. *Crystals,* 11(9): 1115.
- Khalid Iqbal, Nadeem A and Zafar U. 2021. Biostoning of textile effluent with laccase enzyme. *BangladeshJournal of Scientific and Industrial Research*, 56(2): 115-124.
- Badaruddin Soomro, Aqil Inam, Muhammad Irfan, SumairaNosheen, M. Ishtiaq, M.A. Hafeez, M.H. Haseeb and M. Usman Tahir. Effect of deposition parameters on the tribological properties of Aluminum-Bronze coatings by Value Arc Technique on AISI 304 stainless steel. *International Journal of Scientific & Engineering Research (IJSER).*
- Phool Shazadi and Syeda Rubina Gilani. 2021. Contrived approach to novel antibacterial Poly(vinyl acetate-co-[2-(methacryloyloxy) ethyl]trimethylammonium chloride) and Poly(vinyl acetate-co-[vinylbenzyl]trimethyl ammonium chloride) via RAFT Polymerization with Multi-Characterization. *Journal of Polymer Research*, 28(11): 1-15.

- Shaista Nawaz, Muhammad Nasir Subhani, Muhammad Bilal Chattha, Yasar Saleem, Syed Hussain Abidi, Khurram Shahzad, Salman Saeed, Quratulain Syed, Muhammad Irfan and Aisha Ambreen. 2021. Fungal isolates of genus *Trichoderma* induce wilt resistance to pea caused by *Fusarium oxysporum* f. sp. pisithrough competitive inhibition.

Revista Mexicana de IngenieríaQuímica, 20(3): 2475:1-15.

- Dur-e-Shahwar, Khalid Hussain, Nadeem Irfan Bukhari and Zafar Iqbal. 2021. In-vitro anti-inflammatory activity of organic extracts of stems of *ZiZiphus Jujube*Gaerton (L) var. hysudrica, Edgew. *International Journal of Sciences,* 18 (6): 217-227.
- Naseem Zahra, Rida Tanveer, Madeeha Zaheer, Hafsa Moosa, M Khalid Saeeed, Khurram Shahzad, Yasar Saleem and Shaista Nawaz. Aflatoxin types, permissible level, factors responsible for aflatoxin contamination, determination and detoxification methods in animal feed.*Chemical Science and Engineering Research*,.
- Phool Shahzadi and Bakht Bahadur Rana. 2021. Transparent, self-cleaning, scratch resistance and environment friendly coating for glass substrates. *Scientific Report,* 11(1): 1-14.
- Khalid Saeed, Naseem Zahra, Yumna Sadaf, Ijaz Ahmad and Quratulain Syed. Properties, TPC and free radical scavenging activity of some citrus fruits (waste) peel, Published in Proceedings of 3rd International Conference on Emerging Trends in Earth and Environmental Sciences, Organized by College of Earth & Environmental Sciences (CEES), University of the Punjab, LahorePakistan.
- Shahzad Mahmood, Memona Shahid, M Nadeem, Rubina Nelofer and M. Irfan, Enhanced protease production by *Aspergillus niger* mutants in solid state fermentation, *Kuwait Journal of Science.*
- Salman Saeed, Abdul Ahid Rashid, Syeda Youmna Ali Rizvi, Khurram Shahzad, Shaista Nawaz and M. Yasir. 2021. Screening of melamine in milk and milk-based products using enzyme-linked immunosorbent assay. *Nutrition and Food Sciences Research*, 8 (4): 29-36.

Ammara Hassan, Quratulain Syed and Hussain Abidi, A national survey to access the covid-19 vaccine acceptance and concerns in Pakistan. Journal of Public Health and Epidemiology.

- Khaleeq Uz Zaman, Naeem Abbas, Farah Deeba and Jahan Shamsa. Extraction of essential oil from Black Pepper (*Piper nigrum*) by using ionic liquid solution. *Research Journal of Chemistry and Environment,* 25 (11).
- Samreen Zahra, FrahDeeba, Misbah Irshad, Asma Shaikh, Sarwat Zahra and Areeba Mustafa Khan. Synthesis and characterization of Ultra fine titania powder for waste water treatment. *Digest Journal of Nanomaterials and Biostructures*, 16.

Sumaira Nosheen, Sadia Sagar Iqbal, Ali Bahadar, Nazia Hossain and Tasawar Shahzad. Fabrication & characterization of novel conductive nanomaterial. $Cax Cr_{0.5-x} Mg_{0.5}$ Fe_2O_4, Korean Journal of Chemical & Engineering, 38(12): 2536-2540.

- Alim-un-Nisa, S. H. Abidi, Qurat-ul-Ain Syed, A. Saeed, S. Masood and S. Hina. 2021.Aflatoxins in bird feed collected from various areas of Lahore city. *Bangladesh J. Sci. Ind. Res.* 56(4): 249-254.
- S. Masood, Alim-un-Nisa, F. Arif, M. Ashraf, S. Hina and I. Ahmad. 2021. Aloe vera based cookies as a functional food. *Bangladesh J. Sci. Ind. Res.* 56(4): 293-298.
- Zafar Iqbal, Noreen Rafi, Sumra Qasim and Mahak Jalik. 2021. Microwave assisted synthesis of copper phthalocyanine and their applications on cotton fabric. *Journal of Chemistry and Chemical Sciences*, 12(12): 158-168.
- Zafar Iqbal, Noreen Rafi and Sumra Qasim. 2021. Copolymerized urea formaldehyde based binder and their characterization. *Journal of Chemistry and Chemical Sciences*, 12(12): 137-149.

M Khalid Saeed, Naseem Zahra, Syed Hussain Abidi, Qurat-ul-Ain Syed, Shamma Firdous and Asad Riaz. 2022. In vitro assessment of the free radical scavenging activity, proximate and GC-MS analyses of essential and fixed oil of *Nigella sativa* from Pakistan. *Journal of Biochemistry and Biotechnology,* 3(3): 565.

- Najeeb Ullah, Muhammad Nadeem, Malik Mujaddad-ur-Rehman, Rubina Nelofer and Yasir Arfat. Statistical optimization of alkaline protease production by newly isolated Bacillus strain using industrial skin waste as a novel substrate, Punjab University. *Journal of Zoology.*
- K. U. Zaman, N. Abbas, M. Irshad, S. Zehra, M. T. Butt, K. Shehzad and H.-R. Mahmood. 2022. Treatability study of synthesized silica nanoparticles to reduce pollution load of industrial wastewater. *International Journal of Environmental Science and Technology.*
- Jehanzaib Anwar, Mahmood Khan, Muhammad Umar Farooq, Talha Farooq Khan, Ghazanfar Ali Anwar, Abdul Qadeer, Muhammad Adnan Arshad, Muhammad Irfan and Tayyab Subhani. 2022. Effect of B4C and CNTs nanoparticle reinforcement on the mechanical and corrosion properties in rolled Al 5083 friction stir welds. *Canadian Metallurgical Quarterly*, 1-10.

- Naseem Zahra, Muhammad Khalid Saeed, Muhammad Ashraf, Fatima Samiullah and Areesha Shafqat. Detoxification of aflatoxins in food commodities by various methods. *Chemical Science and Engineering Research.*
- Irfan Hafeez. Surface modification of mesoporous silica nanoparticles with heamethyldisilazane and using them as smart carriers by loading tocopherol acetate. Accepted in the journal of Silicon (SCON-D-22 00328).
- Samreen Zahra. Treatality study of Synthsized silica to reduce pol;utionload of industrial wastewater. *International Journal of Environmental Sciences*, 1-18.
- Muhammad Irfan, Amir Shafeeq, Umair Siddiq, Farzana Bashir, Tausif Ahmad and Muhammad Tahir Butt. 2022. A mechanistic approach to evaluate the risk assessment and toxicity of facial cosmetic. *International Journal of Hazardous Materials,* 433: 128806.
- Farzana Bashir, Aysha Saleem, Khalid Iqbal Khichi, Rubina Nelofer and Rauf Ahmad Khan. 2022. Copper nano-particles embedded rice husk for the removal of bacterial contaminants from drinking water. *Pakistan Journal of Zoology.*
- Yousafi Q., Shahzad M.S., Saleem S., Sajid M.W., Hussain A., Mehmood A., Abid A.D., Qandeel A., Shahid A., Khan M.S. and Mazhar S. 2022. Terpinen-4-ol from Trachyspermumammi is a potential and safer candidate molecule for fungicide development against Alternaria solani. *Journal of King Saud University-Science*, 34(1): 101747.
- Phool Shahzadi. Paper on Covid -19, *Pakistan Journal of Chemistry.*
- Phool Shahzadi. Coating on Glass Substrate, Lap Lambent Germany.
- Zahid Mehmood. Extraction of humic acid from coal and its applications as absorbent for removal of Fe^{+2}, Cu^{+2} from aqueous solution. *African Journal of Environmental Sciences & Technology* (AJEST / 22.03.2022/3109).
- Jehanzaib Anwar, Mahmood Khan, Muhammad Umar Farooq, Talha Farooq Khan, Ghazanfar Ali Anwar, Abdul Qadeer, Muhammad Adnan Arshad, Muhammad Irfan and Tayyab Subhani. *The Canadian Journal of Metallurgy and Materials Science* (Canadian Metallurgical Quarterly).
- Aisha Ambreen, Saba Zahra, Imtiaz M. Tahir, Asim Hussain, Naheed Bano,

AlishbahRoobi, Nadia Afsheen and Yasir Saleem. Anticancer L-Asparaginase and phytoactive compounds from plant *Solanum nigrum* against MDR (Methicillin drug resistant) *Staphylococcus aureus* and fungal isolates. *Dose-Response* 20(2): 1-12.

Phool Shahzadi. 2022. Development of functional foods to cure diabetics. Journal Advances of Nutritional Science and Technology, 2(1-7).

Bilal Waseem, Hamza Butt, Muhammad Irfan, Abdul Qadeer, SumairaNosheen, Badaruddin Soomro and A. Karim Aziz. 2022. Root cause analysis of super heat exchanger tubes of bagasse fired power plant. Journal of Failure Analysis and Prevention, 1-6.

- Samreen Zahra, Sania Mazhar, Sarwat Zahra, Hira Idrees and Ali Hussnain. 2022. Synthesis and characterization of magnesium doped titania for photocatalytic degradation of methyl red. *Journal of Matéria* (Rio J.) 27 (01).
- Sumaira Nosheen, Sadia Sagar Iqbal, Aneela Sabir, Abdulaziz Alturki, Nazia Hossain and Ali Bahadar. 2022. Synthesis and characterizations of novel spinel ferrites nanocomposites $Al_{0.5}$ $Cr_{0.5}$ Zn_0 Fe_2O_4 and $Zn_{0.5}Cr_{0.5}Al_0Fe_2O_4$.*Journal of Cluster Science,* 1-6.
- Amina Asghar, Rahila Hussain, SumairaNosheen, Muhammad Irfan, Hammad Khalid and Shazia Massey. In situ Synthesis and Characterization of Polypyrrole/Al_2O_3/Ag Hybrid Nanocomposites by Oxidative Polymerization, Springer Journals Editorial Office-Chemical Papers.
- Muhammad Khalid Saeed, Naseem Zahra, Ijaz Ahmad and Quratulain Syed. 2022. Quality assessment, sensory evaluation, and radical scavenging activity (RSA) of orange (*Citrus auranthium*) pulp. *Bangladesh J. Sci. Ind. Res.* 57(2): 123-130.
- Naseem Zahra, Muhammad Khalid Saeed, Shaista Nawaz and Esha Gulzar. 2022. Aloe vera cookies preparation, nutritional aspects, DPPH assay and physicochemical assay, *Bangladesh J. Sci. Ind. Res*. 57(2): 117-122.
- Naseem Zahra, Nayyab Naeem, Aaliya Iqbal Butt, Muhammad Khalid Saeed, Jannat Akram and Esha Gulzar. 2022. Determination of aflatoxins in different varieties of chillies collected from Lahore, Pakistan. *InternationalJournal of Food Science and Agriculture*.
- Irfan M, Shafeeq A, Siddiq U, Bashir F, Ahmad T, Athar M, Tahir MT, Ullah S, Mukhtar A, Hussien M and Lam SS. 2022. A mechanistic approach for toxicity and risk assessment of heavy metals, hydroquinone and microorganisms in cosmetic creams. *Journal of Hazardous Materials*, 433: 128806.

- Irfan M, Moniruzzaman M, Ahmad T, Samsudin MF, Bashir F, M Tahir MT and Ashraf H. 2022. Identifying the role of process conditions for synthesis of stable gold nanoparticles and insight detail of reaction mechanism. *Inorganic and Nano-Metal Chemistry,* 52(4): 519-532.
- Ahmad T, Bustam MA, Suleman H, Irfan M, Iqbal J and Asghar HM. 2022. Quantitative Estimation of biocapped surface chemistry driven interparticle interactions and growth kinetics of gold nanoparticles. *Journal of Cluster Science*, 33(2): 557-565.
- Zaman, K.U., Abbas, N., Irshad and M. Tahir. 2022. Treatability study of synthesized silica nanoparticles to reduce pollution load of industrial wastewater. *Int. J. Environ. Sci. Technol*. 19: 6183-6200.
- Muhammad Tahir, Naeem Abbas, Muhammad Muneeb Ahmad, Farah Deeba and Rauf Ahmed Khan. 2021. Phytoremediation potential of *Typha Latifolia* and Water Hyacinth for removal of heavy metals from industrial wastewater. *Chemistry International,* 7(2): 103-111.
- Khalid Iqbal., Nadeem, A. and Zafar, U. 2021. Bio stoning of textile effluent with laccase enzyme. *Bangladesh Journal of Scientific and Industrial Research*, 56(2): 115-124.
- Ahmad T, Iqbal J, Bustam MA, Irfan M and Asghar HM. 2021. A critical review on photosynthesis of gold nanoparticles: Issues, challenges and future perspectives. *Journal of Cleaner Production*, 309: 127-460.
- Bashir F, Irfan M, Ahmad T, Iqbal J, M Tahir MT, Sadef Y, Umbreen M, Shaikh IA and Moniruzzaman M. 2021. Efficient utilization of low cost agro materials for incorporation of copper nanoparticles to scrutinize their antibacterial properties in drinking water. *Environmental Technology & Innovation*, 21: 101-228.
- Noman Habib, Waseem Akram, Shahid Adeel, Nimra Amin, MohganHosseinnehad and Ehsan ul Haq. 2022. Environment friendly extraction of Peepal Bark Waste Reddish Brown Tannin Natural Dye for Silk Coloration. *Environmental Science and Pollution Research,* 29(7): 35048-35060.
- Aisha Nawaz, Adil Jamal, Amina Arif and Zahida Parveen. 2021. In vitro antifungal activities of essential oils from selected species of Family Myrtaceae. *Pharmacology online* 3: 1612-1625
- Noman Habib, Waseem Akram, Shahid Adeel, Nimra Amin and Ehsan ul Haq. 2021 Environment friendly sustainable application of plant-based mordants for cotton dyeing using Arjun bark-based natural colorant. *Environmental Sciences and Pollution Research*

28: 54047-57.

- RabihaSalam , Syeda Nayyab Batool, Rizvi , Naqi Hussain , Shama Firdous , Muhammad Zaheer and Muhammad Naeem. 2022. Roll of Hesperidine and fresh orange in altering the bioavailability of Beta Blocker, Metoprolol Tartrate. An In-vivo Model. *Xenobiotica*, 26: 1 6.
- Muafia, S., Abdul, Q., Naqi Hussain and Shamma F, Sajid. Assessment of ameliorative effects of vitamin C and E supplementation on hematology indices, oxidative stress and antioxidant enzyme status of renal tissue in flonicamid intoxicated male rabbit, *Pharmaco Online.*
- Muhammad W. Yaseen, Maria Sufyan, Rabia Nazir, Amjad Naseem, Raza Shah, Ali. A Sheikh and Mudassar. 2021. Simple and cost-efective approach to synthesis of iro magnesium oxide nanoparticles using *AlstoniaScholaris* and *Polyalthia Longifolia* leave extracts and their antimicrobial, antioxidant and larvicidal activities. *Applied Nanoscienc* 11: 2479-2488.
- Iris Earnes, Rabia Nazir and Almas Hamid. 2021. Quality assessment of drinking water o Multan City, Pakistan in context with arsenic and fluoride and use of iron nanoparticl doped kitchen waste charcoal as a potential adsorbent for their combined removal. *Applie Water Science*, 11: 191.
- Ghulam Mustafa, Muhammad Zia-ur-Rehman, Sajjad Hussain Sumrra, Muhammad Ashfaq Wardha Zafar and Maryam Ashfaq. 2022. A critical review on recent trends o pharmacological applications of pyrazolone endowed derivatives. *Journal of Molecula Structure,* 1262: 133044.
- Wajeeha Saleem, Rabia Nazir, M. N Chaudhry, Murtaza Saleem and Syed Hussain Abidi 2022. Packaging material-based polystyrene Zn Fe_2 O_4 /Clay nanocomposite: Preparatio characterization and degradation studies. *Applied Nanoscience*, 12: 1459-1473.
- Khaleeq Uz Zaman, Naeem Abbas, Farah Deeba, Naqi Hussain and Jahan Shamsa. 202 Extraction of essential oil from Black Pepper (*Piper nigrum*) by using ionic liquid solutio (Acetic acid and Glucose Solution). *Res. J. Chem. Environ*, 25 (11): 47-56.
- Zafar Iqbal, Afifa Saeed, Muhammad Usman Sabri, Mehroz Ahmed Khan, Abeera Zafar and HafzaSaghir Butt. 2021. Essential oil from root of Black Carrot (Daucu caropalSubspsatiushoffnan) and their antioxidant activity. *World Journal of Pharmaceutica Research,* 10: 39-54.
- Zafar Iqbal, N Rafi, S Qasim and M Jalik. 2021. Essential oil from root of red carro

(*Daucus carotal*) and their anti-oxidant activity. *World Journal of Pharmaceutical Research* 10: 26-38.

- Shafiq, M., Qadir, A., Hussain, N., Firdous, S., Naeem, M. and Ahmad, S. A. 2022 Appraisal of acute oral LD_{50} of flonicamid and ameliorative effects of selected vitamins on hepato toxicity of exposed rabbits. *Pollution Journal of Environmental Studies*, 31(5): 1-8.

Paper Published/ Presented (National)

- **Alim-un-Nisa, Sajila Hina, Imran Kalim, Muhammad Khalid Saeed, Ijaz Ahmad, Naseem Zahra, Sania Mazhar, Shahid Masood, Muhammad Ashraf, Qurat-ul-Ain Syed and Rabia Shad. 2021. Quality assessment and application of red natural dye from Beetroot (*Beta vulgaris*). *Pakistan Journal of Agricultural Research,* 34(3): 552-558.**
- Naseem Zahra, Syed Hussain Abidi, Qurat-ul-Ain Syed and Muhammad Khalid Saeed. 2021. Development and quality evaluation of nutritious and healthy biscuits for dogs, LGU-Journal of Life Science, 5(3): 164-170.
- Abdul Qadeer, Hamza Butt, Haris Ikram, Jehanzaib Anwar, Bilal Waseemand Muhammad Irfan. Failure Analysis of Agricultural Diesel Engine Crankshafts, Pakistan Engineering Congress (PEC).
- Bilal Waseem, Muhammad Irfan, Badaruddin Soomro, Hamza Butt, SumairaNosheen and Abdul Qadeer. Wear Protection and Topographical Performance of TiAlN Nano structured Thin Films by Physical Vapor Deposition, Pakistan Engineering Congress (PEC).
- Alim-un-Nisa, Sajila Hina and Hamood-ur-Rehman. The truth on artificial sweeteners, Noor Publishing.

- Irfan Hafeez. 2022. Isolation, purification and characterization of phospholipase D from Almond *(Amygdalus spinosissima)* from Ziarat Balochistan. *Pure Applied Biology*, 11(2): 661-669.
- Khadija Summia, Roheela Yasmeen and Naseem Zahra. 2021. Detection of aflatoxins B1 from layer and broiler feed samples collected from different cities of Punjab, Pakistan, *Journal of Animal Health and Production,* 9(4): 435-442.
- Muhammad Zheer, Muhammad Zia ur Rehman, Rubina Munir, Nadia Jamil, SaiqaIshtiaq,

Rahman Shah Zaib Saleem and Mark R.J. Elsegood. 2021. (Benzylideneamino) triazole-thione derivatives of flurbiprofen: An efficient microwave-assisted. *ACS Omega*, 6(46): 31348-31375.

- Zahra, N., Abidi, S. H. and Saeed, M. K. 2021. Development and Quality Evaluation of Nutritious and Healthy Biscuits for Dogs. *Lahore Garrison* University *Journal of Life Sciences*, 5(3): 164-170.
- Muafia, S., Abdul, Q., Naqi, H., Shamma F. and Sajid R. A. 2021. Assessment of ameliorative effects of vitamin c and e supplementation on hematology indices, oxidative stress and antioxidant enzyme status of renal tissues in flonicamidinotxicated male rabbits. *Pharmacology Online*, 3: 753-767.
- Muhammad Irfan, Amir Shafeeq, Tahir Saleem Nasir, Farzana Bashir, Tausif Ahmad, Naeem Abbas, Muhammad Tahir Butt and Farah Deeb. 2021. Evaluation of enhancement factor for removal of heavy metal ions from water through adsorption by non-activated and activated carbon prepared from rice husk. *Pak. J. Sci. Ind. Res. Ser. A: Phys. Sci*, 64A (3): 206-213.
- M. Khalid Saeed, Naseem Zahra, Syed Hussain Abidi, Qurat-ul-Ain Syed, Shamma Firdous and Asad Riaz. In vitro assessment of the free radical scavenging activity, proximate and GC-MS analyses of essential and fixed oil of *Nigella sativa* from Pakistan. *Journal of Biochemistry and Biotechnology.*
- Ibrar Ahmed, Muhammad Irfan and BadaruddinSoomr. Temperature-properties relationships of martensitic stainless steel for improved utilization in surgical tools, *Proceedings of the Pakistan Academy of Sciences: A. Physical and Computational Sciences*.
- Farzana Bashir, Iqra Nadeem, Romana Shahzadi, Rubina Nelofer, Yumna Sadef, Rauf Ahmed Khan and Irfan Ahmed Sheikh.Application of artificial neural network technique for the production of biotoxin from locally isolated strain of Bacillus thuringiensis Bt. used as biotoxin against dengue vector. Journal of the Chemical Society of Pakistan.
- M Khalid Saeed, Naseem Zahra, Khurram Shahzad, Shamma Firdous, Ijaz Ahmad, M. Ashraf, Syed Hussain Imam Abidi and Quratulain Syed. DPPH assay and reducing power activity of water extract of (*Mentha longifolia*) mint. *LGU Journal of Life Sciences* 6(1).
- Naseem Zahra, Muhammad Khalid Saeed, Khurram Shahzad, Shamma Firdous, Ijaz

Ahmad, Muhammad Ashraf and BukhtawarTariqand Rabea Yaseen. 2022. Beta carotene determination in different vegetables by high performance liquid chromatography, Pakistan. *Journal of Analytical and Environmental Chemistry*, 23(1): 160- 167.

- Samreen Zahra, Zahid Mahmood, Farrah Deeba, Asma Shaikh, Hamin Bukhari and Habiba Mahtab. Modification of coconut shell charcoal for metal removal from aqueous Solution. *Journal of Chemistry*.
- Rehana Badar, Asma Ahmed, MehmoodaMunazir, Noman Khalique, Hafsa Waheed, Shehryar Munawar, Shamma Firdous and Hira Basheer. 2022. Aphicidal effects of organic formulations against tomato aphid *MyzusPersicae* (Sulzer) to overcome crop damage / diseases. *Pakistan Journal of Phytopathology*, 34(01): 161-171.
- Muhammad Irfan, Amir Shafeeq, Tahir Saleem Nasir, Farzana Bashir, Tausif Ahmad, Naeem Abbas, M Tahir and Farah Deeba. 2021. Evaluation of enhancement factor for removal of heavy metal ions from water through adsorption by non-activated and activated carbon prepared from rice husk. *Pakistan Journal of Scientific and Industrial Research, Ser. A: Phys. Sci*. 64A (3): 206-213.

Consultancies / Advisory Services

1. Quality evaluation of oil
2. Quality evaluation of lithium bromide
3. Quality evaluation of paper
4. Quality evaluation of waste water
5. Quality assurance of ghee and beverages
6. Quality assurance of drinking water.

10. Toxicology studies of chlorantraniliprole 0.4% and 20%.
11. Quality assurance of fruit drinks samples.
12. Nutritional analysis of bread products.
13. Quality assurance of rice samples
14. Quality assurance of carbonated beverages.
15. Quality assurance of rice samples.
16. Quality assurance of cable.
17. Quality assurance of visi cooler.
18. Quality assurance of LPG metallic cylinder.

19. Quality assurance of SID cable.
20. Quality control of deformed steel bars grade-60 for dasu dam project.
21. Material grade identification of different nutt& bolts as per ASTM a-354.
22. Quality control pqr of welded parts as per ASME section.
23. Quality control pinion gears and crown gears.
24. Conducting water, solid waste, sludge/ soil and leachet and air quality monitoring and assessment of lakhodairlandfil site.
25. Quality evaluation of HDPE.
26. Quality evaluation of PVC pipe.
27. Quality evaluation of edible oil.
28. Analysis of aflatoxins in rice.
29. Assessment of pathogens load in poppy seeds.
30. Toxicology studies of Chlorantraniliprole 110g/L, Chlorantraniliprole 2.67g/Kg, Triadimefon 125g/L.
31. On-site emission of NOX testing.
32. Evaluation of soil at various depths.
33. Estimation of vehical emission, generator emission and analysis of waste water.
34. Quality evaluation of hair dyes.
35. Quality assurance of fruit drinks.
36. Toxicology studies of Dinotefuron 5%+ Diafenthiuron 35%.
37. Toxicology studies of Mesosulfuron methyl 3%+Iodosulfuron methyl sodium 3%.
38. Toxicology studies of Mesosulfuron methyl 3%+MCPA 4%.
39. Estimation of vehicle emission, generator emission and analysis of waste water.
40. Evaluation of ground water, surface water and waste water analysis.
41. Quality assurance of LED Lights.
42. Quality assurance of fans and cables.
43. Quality assurance of street lights.
44. Evaluation of refractory clay for use in high temperature furnace.
45. Evaluation of coal.
46. Material identification of SS spring of safety belt as per WAPDA specification.
47. Welding qualification of coupons as per ASME Sec. IX.
48. Reclamation/remetalization of single cylinder head.
49. Quality control of aluminum composite panels as per pak railway specification.

50. Strength verification of bolt cutters as per WAPDA specification.
51. Hardness check of bolt cutters as per WAPDA specification.
52. Reclamation/remetalization of cylinder head of power generation plant.
53. Energy efficient cooking stove.
54. Quality evaluation of foods items.
55. Quality evaluation of lubricant oil.
56. Quality evaluation of coolant.
57. Quality control of billet and wire rod grade material.
58. Material identification of prime quality hot rolled HC alloy steel wirers.
59. Material identification for Islam Barrage.
60. Material identification of MS rods/channels as per ASTM standard.
61. Non destructive testing and macro-examination of welded swing arms.
62. Energy efficient stove as compare to mud stove.
63. Quality assurance of tea samples.
64. Material identification of steel reinforcements for Dasu Dam project.
65. Quality control of steel material for (CAREC) project.
66. Material identification of stainless steel materials, wedge anchors.
67. Quality assurance of PPGL Sheet & G.I Purnels.
68. Evaluation of mortar used in irrigation project.
69. Testing and evaluation of aggregate.
70. Quality assurance energy meter.
71. Quality assurance LED street light.
72. Quality assurance VISI Cooler (According to IEC 60335-2-89).
73. Quality assurance LT PVC SID Cables.
74. Bio mass energy efficient cooking stove.
75. Quality evaluation of petroleum product.
76. Quality evaluation of milk.
77. Quality evaluation of pesticide.
78. Quality assurance of rubber insulating gloves.
79. Quality assurance of XLPE ABC core cable.
80. Quality assurance of cable, cooler and conductors.
81. Quality assurance of mayonnaise.
82. Quality assurance of liquid milk, beverages, energy drinks.

83. Toxicology studies of Mesosulfuron methyl 1.5%+florasulum 1.0%+MCPA45.5%.
84. Quality assurance of turmeric.
85. Toxicology studies of pesticides and different samples.
86. Chemical evaluation of fly ash.
87. Chemical evaluation ballast.
88. Rehabilitation & modernization of Islam Barrage.
89. Prototype assessment of ACSR rabbit, dog & osprey conductors as per WAPDA specification (P-50:88 & DD-PD-7/US).
90. Bio mass bassed energy efficient cooking stove.
91. Quality evaluation soyabean oil, sunflower oil.
92. Quality evaluation bitumen.
93. Quality evaluation IRI Blue, IRI GEL (HPMC).
94. Quality evaluation admixture, water.
95. Quality evaluation fertilizer, bio organo phosphate.
96. Remark material quality of surgical instruments as per AISI 410/420.
97. Metallurgical assessment/root cause analysis of furnace tubes (Economizer) Unit-3 (REF-48798).
98. Mechanical testing of provided samples.
99. Quality assurance rubber insulating gloves.
100. Quality assurance FI rod, bulb, street light.
101. Quality assurance DO cutout, knife switch.
102. Quality assurance covers for drop out cutouts.
103. Quality assurance champion inverter pents series fan.
104. Quality assurance energy meter.
105. Quality assurance of nectars, fruit drink.
106. Quality assurance of LED light fixture.
107. Quality performance of DEWAN brands of cement.
108. Quality control and mechanical verification of fencing material.
109. Material identification and mechanical verification of SS & MS pipes.
110. Quality authentication of surgical tools as per BS/EN/ISO 10447-2015 for CE marking.
111. Testing of final molasses process water.
112. Testing of pickle in oil.
113. Quality assurance of fruit squash, jellies and marmalade.

114. Quality assurance of bakery items.
115. Material evaluation of different steel grades.
116. Material confirmation of steel bolts.
117. Material identification of steel bars for 300MW Balakot hydro power project.
118. Stainless steel spring of safety belts.
119. Material evaluation of different steel grades.
120. Material evaluation of brazing specimens.
121. Quality evaluation of plastic chairs.
122. Quality assurance of energy meter.
123. Quality assurance of lights and fans.
124. Conformance of cement as per ASTM standard.
125. Physio chemical evaluation of floor ceramic tiles.
126. Failure investigation/root cause analysis of auxiliary boiler tube (PR-49902).
127. Quality evaluation of washbasin and vanity according to SASO standard for export to UAE.
128. Quality evaluation of porcelain tiles.
129. Quality assurance of steel bar.

Products Ready for Commercialization

1. Dye for baby diaper
2. Laminating glue
3. Antiflog lens solution
4. Lip balm
5. Wood adhesive glue
6. Carborator cleaner
7. Fire proof canvas chemicals
8. Hot & cool gel
9. Printing ink solvent
10. Non-alcoholic deodorant spray
11. Cocoa butter
12. Depilatory wax
13. Herbal beauty cream
14. Insect repellent floor cleaner
15. Fairness cream

16. Thioglycolates for skin and hair applications
17. Anti-acne cream
18. Foot lotion
19. Pimple lotion
20. Foot powder
21. Hair tonic
22. Liquid cone mehndi
23. Cold cream
24. Aloe vera cold cream
25. Aloe vera cooling gel
26. Aloe vera anti-acne ceam
27. Mud mask
28. Mascara
29. Aricot scrub
30. Crack cream
31. Citrus face mask
32. Wind screen cleaner
33. Deodarant cream
34. Aloe vera crack cream
35. Fat free lipstick
36. Depilatory cream
37. Fat free chapstick
38. Herbal mud mask
39. Whitening mud mask
40. Depilatory lotion
41. Fairness cream
42. Deodorized kerosene oil
43. Herbal anthalmintic powder
44. Deodarant stick
45. Face wash
46. Lens cleaning solution
47. Cocoa butter cosmetic (animal fats free cosmetics)
48. Grease thickener for auto part

49. Prime coat and tack coat for construction of roads
50. Charcoal powder for teeth whitening
51. Cleaner for electronics
52. Adhesive remover solution
53. Hydrophilic oil for diapers
54. Cutting oil
55. LED adhesive paste
56. Detergent for cleaning purpose
57. Handi masala
58. Pomegranate candies
59. Purple natural food dye from purple cabbage
60. Taste safe playdough for kids
61. Papaya jam
62. Organic apple cider vinegar
63. Herbal turmeric ginger tea
64. Kalonji biscuits
65. Cannabis cookies
66. Organic grapes vinegar
67. Cannabis strawberry jam
68. Cannabis flour
69. Lemon squash
70. Guava squash
71. Plum tamarind sauce
72. Diet strawberry jam
73. Red herbal syrup
74. Orange, falsa and mango squash
75. Apple, mango, orange and strawberry jam
76. Biryani and chat masala
77. Tomato ketchup
78. Diet apricot jam
79. Imli Alu Bukhara squash
80. Development of disinfection corridor utilizing mist fan technology
81. Paddle operated mechanical sanitizer dispenser

82. Foot operated wall mounted mechanical sanitizer dispenser
83. Laboratory scale production mold for biodegradable spoon
84. Lock covid gadget
100. Door paddle
101. Cascade impactor
102. Disinfection cabinet based on radiation, ozone and thermal treatment
103. Aluminum Bronze coatings for Sub-marine applications by thermal spraying technique
104. Nickle-Chrome coatings (Wear/Friction resistant) for Cylinder Heads of Power Generation Plants
105. Zinc based coatings (anti-corrosion) for sub-marine hulls by thermal spraying technique
106. Alumina ceramic coatings for Hot plates by thermal spraying system
107. Titanium (bio-compatible) coatings for surgical implants by thermal spraying
108. Nickel, copper and aluminum based alloys
109. Cast iron and steel (special grade)

Technical Reports

- Operation manual of equipment.
- A novel technique for isolation and purification of curcumin (*Curcumin longa*).
- Development of antifriction & wear resistant coating for bearing applications by value arc technique.
- Pressure Cyclic Test of 6 kg capacity LPG composite cylinder manufactured by BGC (Burhan gas company).
- Sugar can juice machine restoration report.
- Deposition and characterization of hard chrome coatings on steel substrate by value arc technique.
- Burst test of 6 kg capacity LPG composite cylinder manufactured by BGC (Burhan gas company).
- Time and cost effective grooving on H13 band saw grooving.
- Energy efficient cooking stove.
- Drum filter design.
- Exploring the effect of sintering temperature on Hydroxyapatite (HA) for biological applications.
- Feasibility studies for the establishment of Electromagnetic Compatibility (EMC) test facilities for electrical products (submitted to Head Office, Islamabad).
- Preparation of Aloevera cookies.

- Design and development of energy efficient stove as compare to mud stove.
- Antimicrobial and UV protected glass coatings.
- Process of Indus river sand to recover valuable minerals.
- Sheep/goat slaughtering and meat management.
- Bio mass energy efficient cocking stove.
- Special purpose deep groove ball bearing and bearing housing assembly for drum filter.
- Evaluation and analysis of surface and ground water from samples.
- Synthesis of polymeric coatings for protective and corrosion resistance applications.
- Technical evaluation of water chemicals.
- Technical evaluation of sodium carbonate.
- Technical evaluation of δ-cyhalothrin.
- Preparation of refined manganese dioxide (MnO_2) from indigenous manganese ore.
- Synthesis and characterization of polyaniline graphene copper nanocomposites and their applications in electronics.
- Process for welding qualification in compliance with arc welding specification.
- Fire and water hose stream testing of fire rated door assembly as per NFPA 252 and UL 10C.
- Pickling of nickle-iron-chromium alloys.
- 100 micron sieves for drum filter.
- Inhalation chamber for six rats chamber.
- Technical evaluation of chemicals.
- Development of pickling for debeaking blades/rolled sheet of nickel based alloy (Ni-Cr-Fe).
- Development of melon instant drink.
- Synthesis and application Pf self-cleaning glass coatings.
- Coal quality evaluation.
- Seaspire Advisor 310s Mishigun Avenue Suit 1303 CHICAGO.
- Performance evaluation of ceiling fans.
- Inter laboratory comparison results for efficiency measurements of eleven (11 Nos.) electric motors (PCSIR Lahore, ITU Lahore & PSQCA Lahore).
- Desulphurization and deashing of coal by washability studies.
- Thermal behavior of hydroxyapatite (HA) synthesized from waste egg shells.
- Failure investigation/root cause analysis of furnace economizer tube-(HUBCO Power Plant).
- Manuals of separate magnetic stirrer hot plate.

- Technical evaluation of different compost and its uses.
- Technical evaluation of water and chemical.
- Failure investigation/root cause analysis of furnace economizer tube-(Combine Engg. Works).
- Solution spraying system for cloud seeding.
- Solution spraying system by mist mechanism for cloud seeding.
- Solution spraying system by adjustable nozle throwing mechanism for cloud seeding.
- Ramping tube furnace.
- Method development for growth promotion test of solid and liquid biological culture media.
- Root cause analysis of turbine guide vane distribution assembly of (7.64 MW) Marala hydropower plant.
- Heavy duty load bearing shaft.
- Heat treatment of ASI 4340 alloy steel for the purpose of high rpm and load bearing of about 500 kg.
- Dumble shape UTM sample making machine.
- Investigating the performance of thermal spray coatings on agricultural equipment/tools.
- Upgradation of software of emission spectrometer.
- Failure investigation/root cause analysis of boiler tube (HUBCO Power Plant).
- Extraction of hydroxyapatite from biogenic source of waste bovine bones.
- Development of polycrystalline energy materials in the form of thin films on glass by glow discharges and its applications in new generation photovoltaics.
- Process developed for hydrostatic pressure proof of liquid receiver (NESTLE-Pakistan).
- Technical evaluation and validation of milk adulteration test kit (MATK) submitted to Punjab Food Authority (PFA).
- Critical assessment of chemical quality of bottled water commercialized in Pakistan.

Equipment Developed

- Digital Magnetic Stirrer Hot Plate.
- High Temperature Muffle Furnace 1200°C.
- Analogue Hot Plate Magnetic Stirrer.
- Drying oven 30L.

- Soxhlet extraction 500 ml.
- Protein digester.
- Gas blowing furnace.
- Vacuum evaporator.
- Digital magnetic stirrer hot plate.
- Heating mantle 1lit.
- Muffle furnace 1400°C.
- Over head stirrer.
- Tube furnace 1000 °C (large).
- Muffle furnace 1000 °C.
- Heavy duty hot plate 300°C.
- Digital magnetic stirrer hot.
- Over head stirrer.
- Heavy duty hot plate.
- COD apparatus.
- Digital drying oven 60 lit.
- Dig magnetic stirrer hot plate.
- Over head stirrer.
- Homogenizer.
- Over head stirrer.
- Muffle furnace 1000 °C.
- Vertical tube furnace 1200 °C.
- Protein digester.
- High temperature tube furnace 1200 °C.
- Centrifuge.

- Over head stirrer.
- Inhalation chamber for toxicity studies of pesticide/ herbicide.

Exhibition / Conference / Seminars Organized

1. Identification of Gemstones was organized.
2. Beneficiation of Quartz, Barite and Calcium Carbonate.
3. Failure Investigation of Ceiling Fan Blade Carrier.
4. Collaboration on R&D Projects.
5. PCSIR existing testing facilities/consultancy services for Building Construction Industry.
6. Advocacy Seminar on improving access to safe & nutritional food.
7. Validation of fire rated doors as per international standards.
8. 3rd International Conference on emerging trends in earth and environmental sciences.
9. Seminar was organized on "8th Industrial Boiler & Pressure Vessels Technology".
10. Up-gradation of Central Laboratories of Pak Railways, Lahore.
11. Exploring alternative of natural gas as pyrolysis and coal water slurry (CWS).
12. Deepen China-Pakistan STI Cooperation to support the construction of Chia-Pakistan Economic-Corridor.
13. Conference was organized in collaboration with NESCOM.
14. 2nd Pak-China match-making conference held at Kuming China & Islamabad.
15. Process development of zinc enrichment by pyrometallurgy technique.
16. 31st All Pakistan Food Science Conference & Food and Nutrition Expo.
17. Development of manufacturing root of gun metal gear.
18. Root cause analysis of turbine blades at marala hydropower plant.
19. Seminar was held on safer food better health on world food safety day by Nestle Pakistan in collaboration with PCSIR & Punjab University.
20. Gene editing of biological agents for nutritional, biochemical and therapeutic purposes.
21. One day training workshop on Genome editing using CRISPR/Cas9.
22. Role of PCSIR for surgical of Pakistan regarding MDR testing requirements.

MoU / ToRs Signed

- MoU between Citi Pharma Ltd. and PCSIR.

- MoU between University of Lahore and PCSIR.

Workshops/ Trainings Organized

- One day training on ISO/IEC 17025: 2017.
- Training on chemical analysis of metal (ferrous / non ferrous) was arranged.
- Training on bio organic phosphate fertilizer (BOPF) was organized.
- Training on wear & friction behavior of Suzuki engine parts under bio lubrication environment was provided.
- Training on iCheck Chroma 3 for determination of vitamin A in oil and ghee was conducted.
- Training regarding crushing of pine needle at forestorydeptt site Rawalpindi was given.
- Training regarding accreditation of toxicology laboratorys was dispensed.
- Training on testing of ores was provided.
- Training on Laboratory Information Management Systems (LIMS) was organized.
- Training on analytical techniques of different parameters of waste water as per NEQS was given.
- One day training workshop on National and International Regulatory framework on food and food products was organized in collaboration with Nestle Pakistan at University of Agriculture, Faislabad.
- One day training workshop on Genome editing using CRISPR/Cas9 was provided.

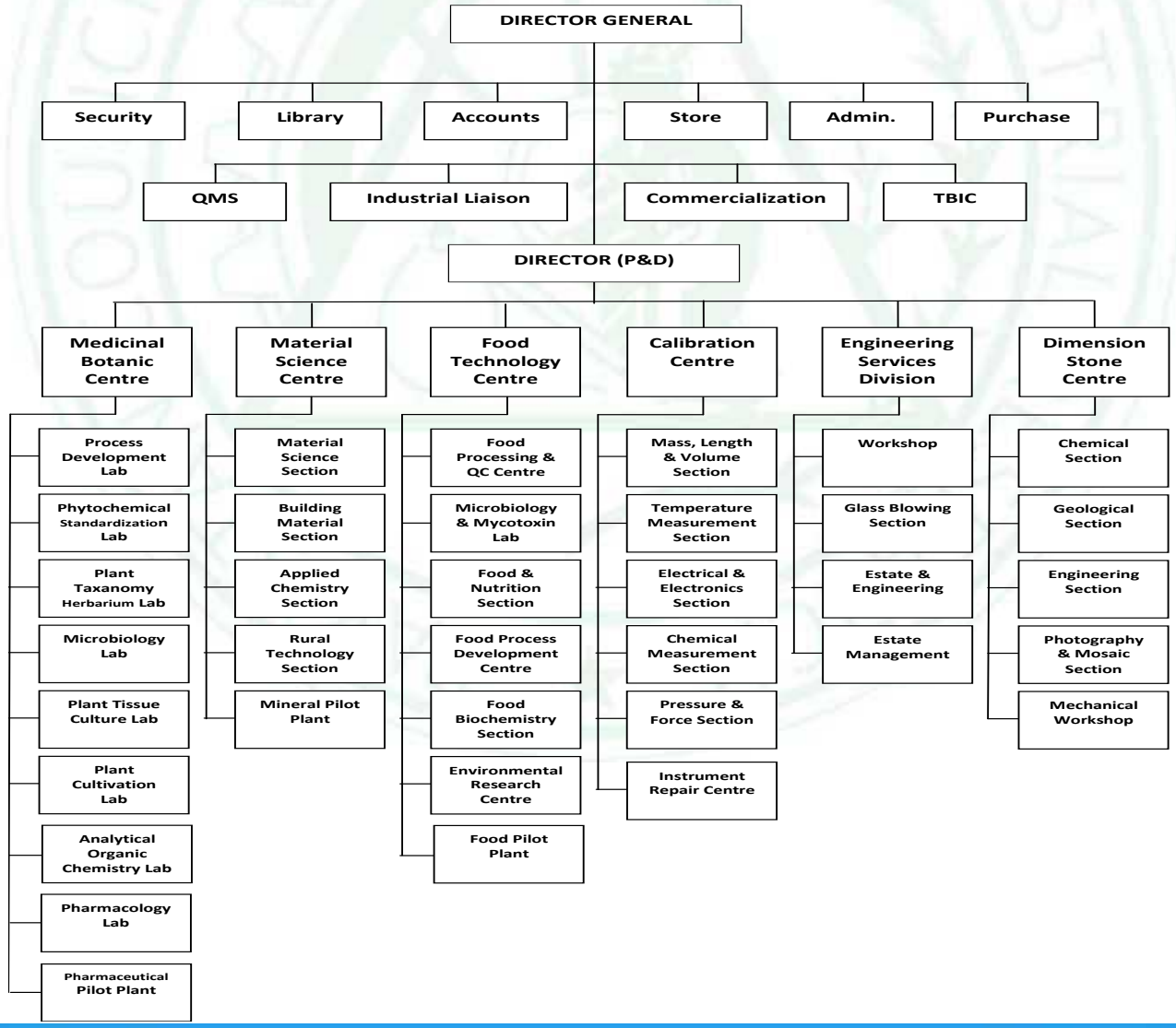
Important Events Organized LLC during July 2021 to June 2022:

1. Meeting with Punjab Small Industrial Corporation and UNIDO Official with DG PCSIR, regarding Establishment of Surgical Laboratory for the compliance of MDR regulations at Sialkot Surgical City was held at PCSIR Labs. Complex, Lahore.
2. Ambassador of Argentine Republic Mr. Leopoido Francisco visited PCSIR Labs. Complex, Lahore.
3. Honorable Federal Minister for Science and Technology Senator Shibli Faraz inaugurated "Technology Transfer and Capacity Building Centre and Technology Innovation Support Centre", visited "Precision Green-house for Ginger Cultivation" – Smart Production of Ginger as Import substitution and technology transfer, "Cannabis Processing Pilot Plant" Development of Value-added products from Cannabis, inaugurated Project "Upgradation of Polymer and Plastics Lab" and visited Motor Testing Lab" – ISO 17025 Accredited Services for Energy Efficacy of Electric Motors.

4. Exhibit the PCSIR Stall in COMSTECH International Workshop & Exhibition on Research Commercialization Challenges and Opportunities to Commercialize the Laboratories Facilities of LLC.
5. Chairman Surgical Instrument Manufacturers Association of Pakistan (SIMAP) Mr.Waqas Raza and Mr.JamilKhan, Member Executive Committee visited PCSIR Labs Complex Lahore.

PCSIR LABORATORIES COMPLEX PESHAWAR

PCSIR Laboratories Complex Peshawar was established in 1955 with a view to investigate raw material resources of the region and assist the industrial development of the country. The Complex comprises of six main Centres. These Centres are providing services to local industry, Government and Non-Government Organizations in diversified fields besides carrying out research for development of economical and effective indigenous raw material-based technologies. These Centres are also engaged in providing research supervision to students of almost all Government Universities of KPK in various fields of Science and Technology.



A) **Papers Published** (International/ National):

1. Waheed Ur Rehman, Muhammad Younas, Sarrah Farukh, Mashallah Reza kazemi, Sher Ahmad and Gabriela Vollet Marson. 2021. Development of mass and heat transfer coupled model of hollow fiber membrane for salt recovery from brine via osmotic membrane distillation. *Environmental Sciences Europe*, 33(1): 1-18.
2. Hizbullah Khan, Muhammad Tariq, Mutabar Shah, Mahmood Iqbal Khattak, Inamullah, Muhammad Haris Mahmood, Shafi Ur Rehman and Abdur Rahim. 2021. Exploring the NH_3 gas sensing efficiency of polyvinylpyrrolidone based tungsten trioxide (PVP/WO3) Nano composites: A recent progression in the toxic gas sensing materials. *Materials Science and Engineering: B,* 273: 115422.
3. Rehman Ullah, Waqas Ahmad, Muhammad Yaseen, Mansoor Khan, Mahmood Iqbal Khattak, Badrul Muhammad Jan, Rabia Ikram and George Kenanakis. 2021. Fabrication of MNPs/rGO/PMMA composite for the removal of hazardous Cr (VI) from tannery wastewater through batch and continuous mode adsorption. *Materials*, 14(22): 6923.
4. Muhammad Younas, Mashallah Rezakazemi, Muhammad Siddiq Arbab, Jehangir Shah and Waheed Ur Rehman. 2022. Green hydrogen storage and delivery: Utilizing highly active homogeneous and heterogeneous catalysts for formic acid dehydrogenation. *International Journal of Hydrogen Energy*, 47: 11696-11724.
5. Muhammad Younas, Waheed Ur Rehman and Mashallah Rezakazemi. 2022. Transport Theory in Membrane Contactor: Operational Principle. Membrane Contactor Technology: Water Treatment, Food Processing, Gas Separation, and Carbon Capture, 45-98.
6. Waheed Ur Rehman, Zarrar Salahuddin, Sarrah Farukh, Muhammad Younas and Mashallah Rezakazemi. 2022. Mode of Operation in Membrane Contactors. Membrane Contactor Technology: Water Treatment, Food Processing, Gas Separation, and Carbon Capture, 143-183.
7. Waheed Ur Rehman, Sidra Saqib, Ahmad Mukhtar, Muhammad Younas, Mashallah Rezakazemi and Bazia Sarwar. 2022. Applications of Membrane Contactors in Food Industry. Membrane Contactor Technology: Water Treatment, Food Processing, Gas Separation, and Carbon Capture, 219-245.
8. Mushtaq Ahmad, Amin Ur Rehman, Humaira Inayat, Farah Gul, Yaqoob Ur Rehman, Muhammad Qaisar, Jehangir Shah, Noor Rehman, Saadullah Mir, Muhammad Tariq,

Muhammad Siddiq Arbab and Hamid Ali. 2021. Photochemical and pharmacological studies on medicinally important plant *Opuntia dillenii* collected from Pakistan. *International Journal of Biosciences*, 19(2): 82-89.

9. Mahmood Iqbal Khattak, Qatrina Manzoor, Manzoor Iqbal Khattak and Rukhsana Jabeen. 2021. Trace elements in some selected fruits at Mastung in region of Balochistan. *Sci. Int. (Lahore),* 33(4): 353-359.
10. Manzoor Iqbal Khattak, Shams-Ul-Kinat Manzoor and Mahmood Iqbal Khattak. 2021. Determination of heavy metals level in dairies milk of Quetta City of Balochistan. *Sci. Int. (Lahore)*, 33(4): 361-366.
11. Manzoor Iqbal Khattak, Mahmood Iqbal Khattak, Rukhsana Jabeen and Munazza Saeed. 2021. Comparative study of heavy metals in grapes irrigated by clean and dirty water in Quetta city Balochistan. *Sci. Intl. (Lahore)*, 33(6): 495-501.
12. Saima Siddique, Zahida Parveen, Firdaus-e-Bareen, Asma Manzoor and Muhammad Akram. 2021. In vitro antifungal activities of essential oils from selected species of family Myrtaceae. *PharmacologyOnline*, 3: 1612-1625.
13. Ilyas Muhammad, Wahid Ali Khan, Tariq Ali, Nisar Ahmad, Zafran Khan, Hina Fazal and Nasib Zaman et al. 2021. Cold Stress-induced seed germination and biosynthesis of polyphenolics content in medicinally important *Brassica rapa*. *Phytomedicine Plus*, 2(1): 100185.
14. Shafaat Ullah, Umar Rehman, Ghazala Yasmeen, Yaqoob ur Rehman, Anwar Saeed Khan, and Aishma Khattak. 2021. Pharmacological potentials of crude extract and different fractions of *Prangospabulari*. *International Journal of Biosciences*, 19(1): 141-145.
15. Nisar Ahmad, Palwasha Khan, Abdullah Khan, Maliha Usman, Mohammad Ali, Hina Fazal Durrishahwar, Muhammad Nazir Uddin, Christophe Hano and Bilal Haider Abbasi. 2021. Elicitation of submerged adventitious root cultures of *Stevia rebaudiana* with *Cuscutareflexa* for production of biomass and secondary metabolites. *Molecules*, 27(1): 14.
16. Arshad Hussain, Ziaur Rehman and Mudassar Khan. 2021. Detection of aflatoxin in peanut oils marketed in Peshawar Pakistan using thin layer chromatography. *Journal of Food Quality and Hazards Control*, 8: 87-91.
17. Arshad Hussain, Zia ur Rahman, Muhammad Usman Amin, Muddasir Khan and Javed Abbas Bangash. 2021. Diversity of fungal contamination in Peanut products locally

available in Peshawar Region. *Pakistan Agricultural Science Research Journal*, 5(4): 88-91.

18. Arshad Hussain, Zia-ur-Rehman and Muddasar Khan. 2021. Current trends of antibiotic resistance among human skin infection causing bacteria; a cross-sectional study. *Journal of Dermatology & Cosmetology*, 5(4): 88–91.
19. Arshad Hussain, Muddasir Khan, Ziaur Rahman and ZobiaAfsheen. 2022. Antibacterial and antifungal activities of garlic (*Allium sativum*) against common pathogens. *Bio Scientific Review,* 4(2): 2663-4201.
20. Javed Abbas Bangash, Abdul Wajid Khalil and Ghulam Mohi Uddin Paracha. 2022. Effect of various clarification techniques on the storage studies of carbonated sugarcane juice. *Pakistan Journal of Life and Social Science.*
21. Arshad Hussain, Zia-ur-Rehman and Muddasar Khan. 2022. Microbiological evaluation of different types of branded and un-branded snacks sold at elementary schools of Peshawar. *Journal of Food Quality and Hazards* (Accepted).
22. Arshad Hussain, Zia-ur-Rehman and Muddasar Khan. 2022. Microbiological evaluation of different types of branded and un-branded snacks sold at elementary schools of Peshawar *Journal of Food Quality and Hazards Control* (Submitted).

B) Consultancies Provided

1) Alkali Silica Reactivity of materials used in concrete construction of Diamer Basham Dam.
2) Optimization of HDL-202 alkaline liquid concentration.
3) Floatation Studies of Graphite Ore.
4) Statement of conformity of High density polyethylene pipes.
5) Statement of conformity of tents.
6) HDPE Pipes for drinking water & Food grade purpose.
7) Elemental analysis of Coal samples.
8) Environmental Pollution Monitoring.
9) Honey Quality Study to M/S Serena Hotels, Pakistan.
10) Determination of saponin content in Vigitab capsules.
11) Supervision & Research lab. Facilities.
12) Phytochemcial screening and antioxidant activity of leaf.
13) Total flavonoids, Total phenolics and antioxidant activities.

C) Products Ready for Commercialization

1) Exfoliated vermiculite composite tile
2) Calcium stearate from marble waste powder
3) Calcium acetate from marble waste powder
4) Single super phosphate (SSP) fertilizer
5) Stevia leaf powder
6) *Moringa leaf powder*
7) Dengue drops
8) Hemp herbal hair oil
9) Hemp anti-acne cream
10) Gluten free multigrain flour

D) Technical Reports

1. Synthesis and characterization of PMMA/Mxene/Fe_2O_3 nanocomposites.
2. Synthesis of Sodium Nitrate from indigenous raw materials.
3. Preparation of wood/tile adhesive from waste extended polystyrene material.
4. Application of lightweight aggregate in the production of concrete hollow blocks, solid blocks, and tuff pavers
5. Utilization of exfoliated vermiculite in the development of lightweight composite panels.
6. Reverse engineering, design and making of rear sprocket of Motorcycle.
7. Designing and development of foot operated hand Sanitizer Stand (In progress).
8. Designing and development of foot operated hygiene hand washer (In progress).
9. Designing and fabrication of rechargeable Biomass Stove (In progress).
10. Validation of ETO Chamber (Microbiology sterility tests) for M/S Lasani Health care Pvt. Ltd. KP.
11. Nutritive evaluation, elemental analysis, antibiotic potential of *Mentha Longifolia* (L.).
12. *Neem based biopesticides* formulation (*BioNeem)* for treatment of vegetables seed-borne disease.
13. Development of nutritious gluten free flour for Celiac patients.
14. Biogenic synthesis and characterization of silver nanoparticles from *Melia azedarach* L. aqueous leaves extracts.

15. Bioinspired synthesis and characterization of silver nanoparticles from *Azadirachta indica* aqueous leaves extracts
16. Bio-fabricationand characterization of silver nano
17. Particles from *Eucalyptus* aqueous leaves extracts.
18. Validation of ETO chamber (Microbiology sterility tests) for M/S Lasani Health care Pvt. Ltd. KP.
19. Comparative bioactive compounds evaluation of *Azadirachta indica* leaves, seeds and twigs extracts and its potential as biofungicides against plant pathogenic fungi.
20. Development a process for the production of *Bacillus subtilis* (Phosphate Solubilizing Bacteria) based solid biofertilizer.
21. Physical and chemical quality evaluation of drinking water of different localities of District Peshawar.
22. Development a process for the production of *Pseudomonas aeruginosa* (Phosphate Solubilizing Bacteria) based solid biofertilizer.
23. Development of guava aloe vera blended squash.
24. Decontamination of aflatoxin in some dried fruits.
25. Reduction of Aflatoxin in edible nuts applying biological methods.
26. Phytochemical screening, hypoglycemic activity & Metal determination of some selected anti-diabetic medicinal plants.
27. Preparation of iso-propyl nitrite from lab scale to commercial.
28. *In-vivo* protective effect of Cedar wood Oil against hepatotoxicity, renal toxicity and hyperlipidemia.
29. Development of *Calendula arvensis* cream for burning/wound healing.

E) Equipment Developed

1. Prism Gang Mold for material Building section.
2. Attachments for Material Science Centrealfornia Bearing Ratio Mold and Testing.
3. Equipment for Modulus of Rupture for Marble and Tile Testing for UTM in MS.
4. Designing and modification of development of specialized polishing machine for emission of spectrograhy for MSC Centre.
5. Designing and fabrication of flask lid with multiple opening and different type stirrer for different solution.
6. Modification of mechanical stirrer.

7. Designing and manufacturing of solenoid valve.
8. Equipments for modulus of rupture for marble and tiles testing for UTM in MSC.
9. Bio Mass Stove.
10. CBR Mold.
11. Double jacketed vessel.
12. MBBR Version HDPE Media.

F) Exhibitions /Conferences/ Seminars Organized

1. Seminar on "LC-MS-MS on natural products".
2. Nanotechnology in agriculture, food and medicine.
3. Concentration of pomegranate juice through non-thermal osmotic distillation using membrane contactors.
4. Nanotechnology in agriculture, food and medicine.
5. Optimizing sowing windows for wheat hybrid liner under varying irrigation regimes.
6. Nanotechnology: Application in agrofood industry.
7. Biofertilizer: A hope for sustainable agriculture.
8. Reverse engineering and additive manufacturing.
9. Seminar on "Application of nanotechnology and agriculture food and medicine".
10. International Seminar on sustainable technologies in modern energy: A road map toward green economy.
11. Youth Tech Festival.
12. Meeting of the provincial food committee.
13. Concentration of pomegranate juice through non-thermal osmotic distillation technique using membrane contactors.
14. Strategic priorities for adoption of emerging technologies in the energy sector for climate change mitigation.
15. Optimizing sowing windows for hybrid lines under varying irrigation regimes.
16. Wheat performance under N-application rates and timings for grain yield and quality assessment.
17. Production and characterization of recombinant β-Glucosides and its application in modification of herbal products.

G) MoUs/ ToRs /Agreements Signed

1. PCSIR with NAVTTC regarding skill development to promote technical and vocational education and Training (TEVT) and Youth Empowerment through Employment and Self Employment.
2. Hundreds of Original Projects for Employment (HOPE's) With PCSIR Laboratories Complex Peshawar for training on Marble Mosaic.
3. MoU signed by PCSIR Peshawar with M/s Serena Hotels for Logo Authorization.

H) Workshops/ Trainings Organized

1. Analytical Instruments (Scanning Electron Microscope, Atomic Absorption Spectrometry, X-RayDiffractometry, High Performance Liquid Chromatography).
2. The Chemical Safety and Security in Academic and Industrial Laboratories.
3. Training on coal/coke analysis.
4. HPLC Operation.
5. Textile testing.
6. Standardized Stamp Pad Ink Production.
7. Reverse Engineering and Additive Manufacturing.
8. Software Training: GOM Inspect.
9. Awareness about Science & Technology.
10. Concentration of Pomegranate Juice through non-thermal osmotic distillation technique using membrane contactors.
11. Two weeks training provided on Microbiological analysis in food and water.
12. Anti Microbial activity of samples.
13. Test of Anti-bacterial activity of crude plant extracts.
14. Sample analysis on GC-MS.
15. GC-MS analysis of ethanolic extract.
16. Analysis of plants extraction on GCMS.
17. Analysis of Canola Oil seed on GC-MS and extraction.
18. Sample analysis on FTIR.
19. Crude plant extract and methanolic fraction on GCMS.
20. Plant methnol extract on FTIR.
21. FTIR Analysis UV for Metal Based herbal research sample (Nano particles).

22. FTIR Analysis.
23. GCMS analysis of plant sample.
24. Analysis of Fish Feed and BSF.

I) Important Events Organized

A high level delegation of PCSIR Scientists visited Chitral Chamber of Commerce and Industries 22/6/2022, wherein a detail discussions regarding exploration, identification, exploitation, value addition and marketing were discussed in detail.

It was also discussed that Chitral is rich in fresh fruits, vegetables and medicinally important plants therefore, its value addition is required for the enhancing the life standards of locals. Drinking contaminated water is another burning issue of lower and upper Chitral areas. During discussions, both parties agreed to ink an MoU for working towards sustainable development of the area.

PCSIR Laboratories Complex Peshawar arranged a Scientific Documentary Film for kids on 21.05.2022. The main objective of the film was to raise awareness in young generation regarding scientific innovation and to motivate them for taking active part in new inventions. The following scientific documentaries were presented:

i) Jamesweb Space Telescope.

ii) Welcome to the Future.

iii) The world in 2050.

iv) How big is this Universe.

v) 15 emerging technologies that will change the world.

A detail presentation was arranged by the team from Head Office on the project titled "Research Development Innovation (RD&I) in PCSIR. The team explained that RD&I program is designed for the Scientists to initiate new technology and innovative initiates in the field of Food Production processing, alternative energy technologies, construction technologies, new generation communicating technologies, pilot plants production of PCSIR products, AI 3 D printing etc.

In the light of the above presentation, a number of new project proposals have been prepared and were submitted to head office for funding.

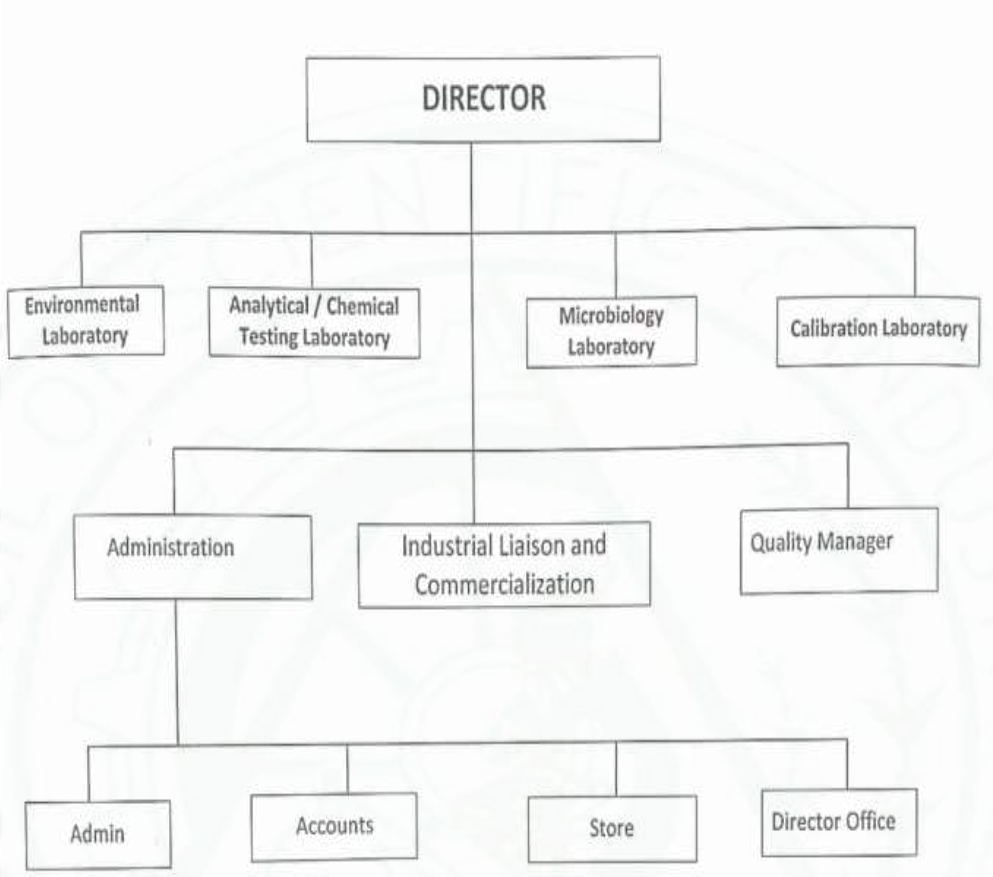
PCSIR LABORATORIES ISLAMABAD

The Federal Government grants approval for establishment of PCSIR Laboratories Islamabad. As a part of its continuous excellence, PCSIR has marked another historic day on 14th January, 2022 by getting approval for the establishment of PCSIR Laboratories, Islamabad. PCSIR laboratories Islamabad have been established in Sector H – 9, Islamabad on 14th January, 2022 to undertake Research and Development (R&D) and provide analytical testing services to the industrial sector in the Federal Capital and Rawalpindi region, Azad Jammu & Kashmir region. PCSIR Laboratories Islamabad is currently providing testing/analytical and advisory services to clients from public and private sectors in the disciplines of food, material, environmental monitoring, halal testing. Being a premier R & D and testing organization, this establishment would serve a great technical support to Academia also. In addition, it also provides research facilities to M.Sc., M. Phil and Ph.D students.

The PCSIR Laboratories Islamabad comprises of four major laboratories i.e. Environmental Laboratory; Analytical/Chemical Testing Laboratory; Microbiology Laboratory; Calibration Laboratory. The PCSIR Laboratories Islamabad will also house a **National Industrial Hemp and Medicinal Cannabis Analytical Laboratory** for extraction and research on cannabis under a PSDP programme.

Dr. Muhammad Tahseen Aslam (Principal Scientific officer) has assumed the charge of first Director of PCSIR Laboratories Islamabad. He has done his doctorate from Austria in the field of Environmental Sciences / Engineering. The main research focus during doctorate studies was on water and wastewater treatment. German standards for municipal wastewater treatment have been modified on the basis of his PhD research studies. He has been considered as an environmental expert in Pakistan and played a significant role in devising National Drinking Water Policy and National Hazardous Waste Management Policy. He has envisioned a modernized state of the art PCSIR Labs Islamabad to promote the image of PCSIR by extending its collaborative services in research and development activities with special focus to uplift the Industry/Academia of Pakistan. This can be achieved by promoting the scientific culture within the organization and industry/Academia.

ORGANOGRAM OF PCSIR LABORATORIES ISLAMABAD



Paper Published

i) Paper Published (International)

Iram Fatima, Syeda Anber Zahra, Amir Shahbaz, Sana Naseer, Sobia Kanwal, Naseem Rauf, Tahir S.S. Malik, Razia Kalsoom and Tariq Mahmood. 2022. Relative bio-efficacy of seventeen poaceae extracts targeting oxidative stress related diseases coupled with elemental profiling using ICP-MS. *South African Journal of Botany,* 147: 586-595.

1. Consultancies Provided

1.1 Pharmaceutical evaluation of personal care products (Shampoo &Lotions)(ADV-CONS/PLI-01/028-2022) , Fouzia Hussain, Razia Kalsoom Dr. Tahseen Aslam, Ammara Kanwal, Dr. Uzma Rashid.

2. Technical Reports

1. Evaluation of milk adulteration in fresh milk samples collected from various district of AJ&K.
2. Microbiological evaluation of orange concentrate.

3. Exhibition / Seminars / Conference

- **Conference/Workshops/Seminar:**
  - Director PCSIR Labs Islamabad has attended 02 Workshops/meetings of Expert Committee on "*Development and Review of Policy & Regulations for Sound Chemicals & Hazardous Waste management*" on 17.02.2022 and 16.03.2022 at Ministry of Climate Change, Sector G-5/2, Islamabad. Dr. Tahseen has given his input in devising and finalizing the policy document and it is incorporated in the document.
  - Two officers of PCSIR Laboratories Islamabad attended Five (05) days training conducted by NCRD (National Centre For Rural Development) on "*Disaster Risk Reduction in Pakistan*" from May 9-13, 2022 at AHKNCRD, ChakShahzad.

4. Workshop/ Training Organized

PCSIR Laboratories Islamabad has organized a Technical Training Course of 5-days from February 21 – 25, 2022, on request from M/s Central ITD Laboratory, Chaklala; Rawalpindi. The training was imparted by the officials of PCSIR Laboratories Islamabad:

- Alfatoxindetermination in Food/Feed by HPLC
- Microbiology of food items

- **<u>Research Support for Students Under Development Project for Sample Analysis</u>**

  Under Data Repository of Scientific Instrumentation Development Program; three (03) students Mr. Israrullah, Mr. Ahsan Shakeel and Mr. Asif Aslam from Department of Earth and Environmental Sciences, Bahria University Islamabad Campus have been facilitated to carry on their research using advance analytical techniques against testing charges of Rs. 460000/-. This amount will be paid by PCSIR Project (DRSIDP).

- **Participation in PT program IACHEJ-2022 (Round IV) for Tea Analysis**

  The laboratories have to participate in various Proficiency Testing Programme annually, in order to monitor lab's quality performance and to meet the requirement of **ISO/IEC 17025:2017**. In this connection **PCSIR Laboratories Islamabad** has participated in Proficiency Testing Program for Tea Testing **(IACHEJ-2022 (Round IV))** in April-May 2022, from Industrial Analytical Centre at H.E.J. Research Institute of Chemistry International Center for Chemical and Biological Sciences University of Karachi, Pakistan.

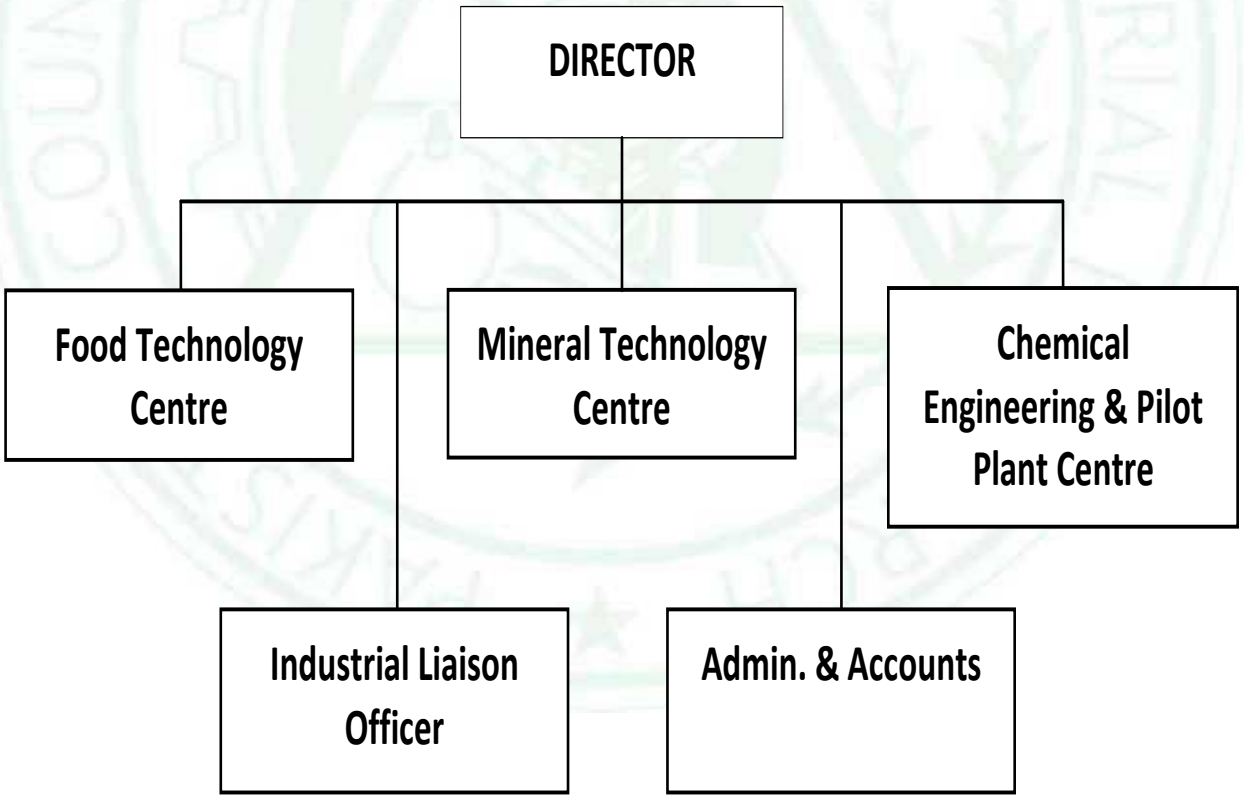
  The analyzed Parameters were **Caffeine, Water Extract, Total Ash, Water Soluble Ash and Crude Fibre**. The results were submitted on 18th April 2022 and interim report was received on 31st May 2022. The results of PCSIR Labs. Islamabad were found satisfactory with **good Z-Score(± 1).**

- **Method Validation Exercise of Aflatoxins**

  PCSIR Laboratories Islamabad (PLI) in its revolutionary phase; has been striving to upgrade the existing facilities and skills of manpower. In order to extend the scope of testing, the Officers of PLI exercised the method validation practice of aflatoxin facility using Thin Layer Chromatography (TLC) and HPLC

PCSIR LABORATORIES COMPLEX, QUETTA

PCSIR Laboratories, Quetta was established in 2004 with Food Technology Centre, Mineral Technology Centre, Chemical Engineering and pilot plant Centre. PCSIR Laboratories, Quetta is presently engaged in R&D activities along-with testing/analytical and advisory services to clients from public and private sectors in the disciplines of food and mineral technologies. In addition, it provides research facilities to M.Sc., M. Phil and Ph.D. students.



A) Papers published

1. Sadia Sabir, Mujeeb-ur-Rahman et al. 2022. Mycotoxic effects of medicinal plants on the asexual reproduction of *Aspergillus niger* ATCC 1015. *Pak-Euro Journal of Medical and Life Sciences*, 5(2): 195-202.
2. T. Hussain, F. Bashir, A. Mujahid, A. Intisar, M. A. Raza, M.N. Ahmad, M. I. Din, U. Jabeen, A. Mushtaq, H. Tareen. 2022. Highly stable APTES incorporated CNTs based ternary polymer composites with improved dielectric and thermal properties. *Silicon*, 1-10.

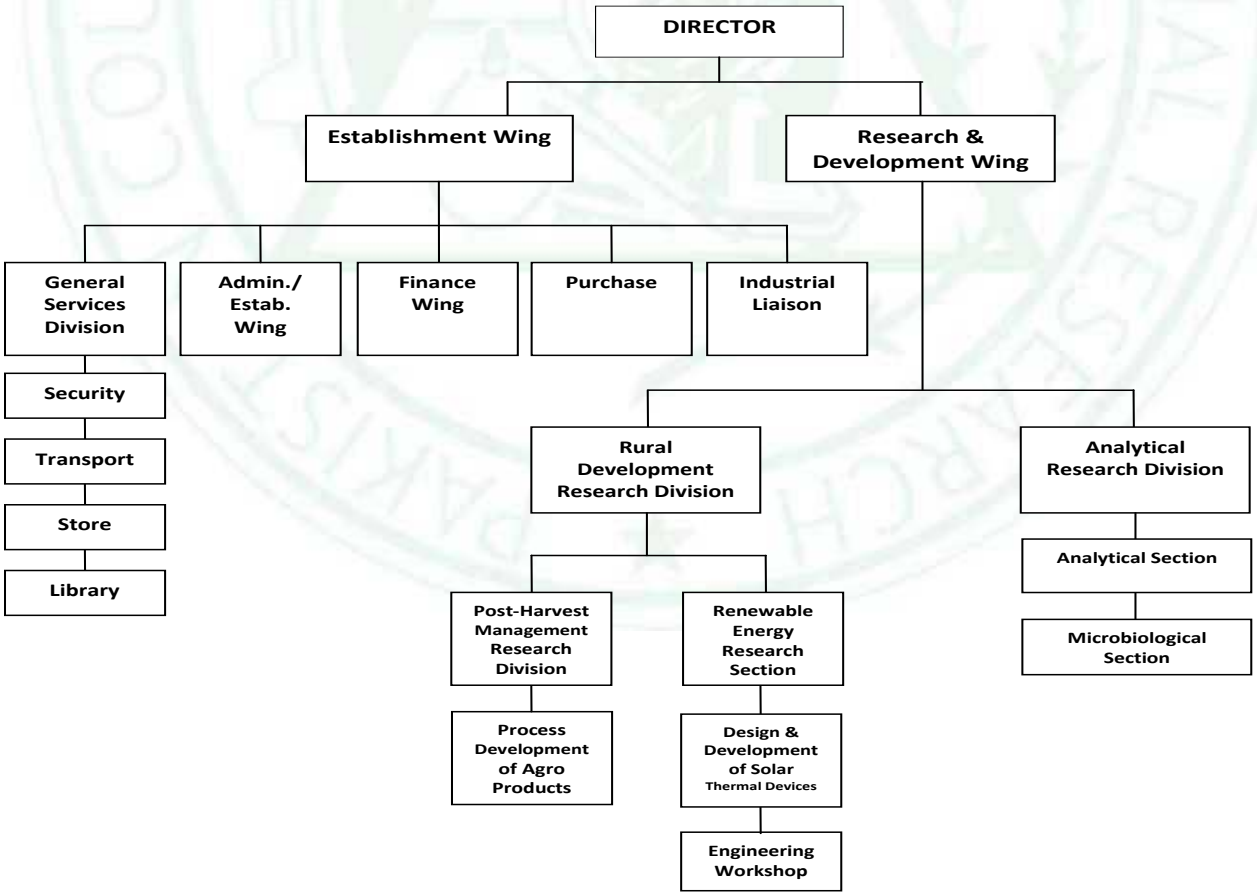
B) Technical services

PCSIR Laboratories, Quetta provided 2267 testing analysis services to 70 clients during 2021-22. The major clients served were:

1. Superintendent, Customs Dry Port (NLC), Model Custom Collectorate, Quetta.
2. Superintendant, Model Custom Collectorate, Customs House, Taftan.
3. Superintendant, Model Custom Collectorate (Appraisement), Custom House, Chaman.
4. Superintendant (Preventive), Model Custom Collectorate (Appraisement), Custom.
5. Superintendant, Customs Railway Dry Port, Model Custom Collectorate (Appraisement), Quetta Check Post, Sorab.
6. M/s Patel Ice Factory, Quetta.
7. QIMS, Quetta.
8. M/s PSQCA, Quetta.
9. M/s Military Farm Quetta Cantt, Quetta.
10. M/s Environmentalist, STEPS, Pakistan.
11. M/s National Logistic Cell, Senior Manager Project (NLC), Care of Signals Center, Chaman (Balochistan).
12. M/s Mratin Dow Marker Limited, Quetta.

PCSIR LABORATORIES, HYDERABAD

PCSIR Laboratories Hyderabad is a multi-disciplinary unit; located in the heart of three Industrial zones i.e.Nooriabad, Hyderabad and Kotri as well as Rural areas of Sindh and enjoys a pivotal position among the R&D institutions of this region. Therefore PCSIR Laboratories, Hyderabadis trying its level best to play vital role in sustainable growth of the region by focusing on various dimensions of Rural Development Technology like value addition in Agro Produces, Solar Oriented Techniques for Safe Drinking Water, Drying & Cooking of Food Stuff and Technical Support of Regional Cottage Industries as well as actively providing its Technical Services for Quality Assurance & Control in this Region.



Technical services

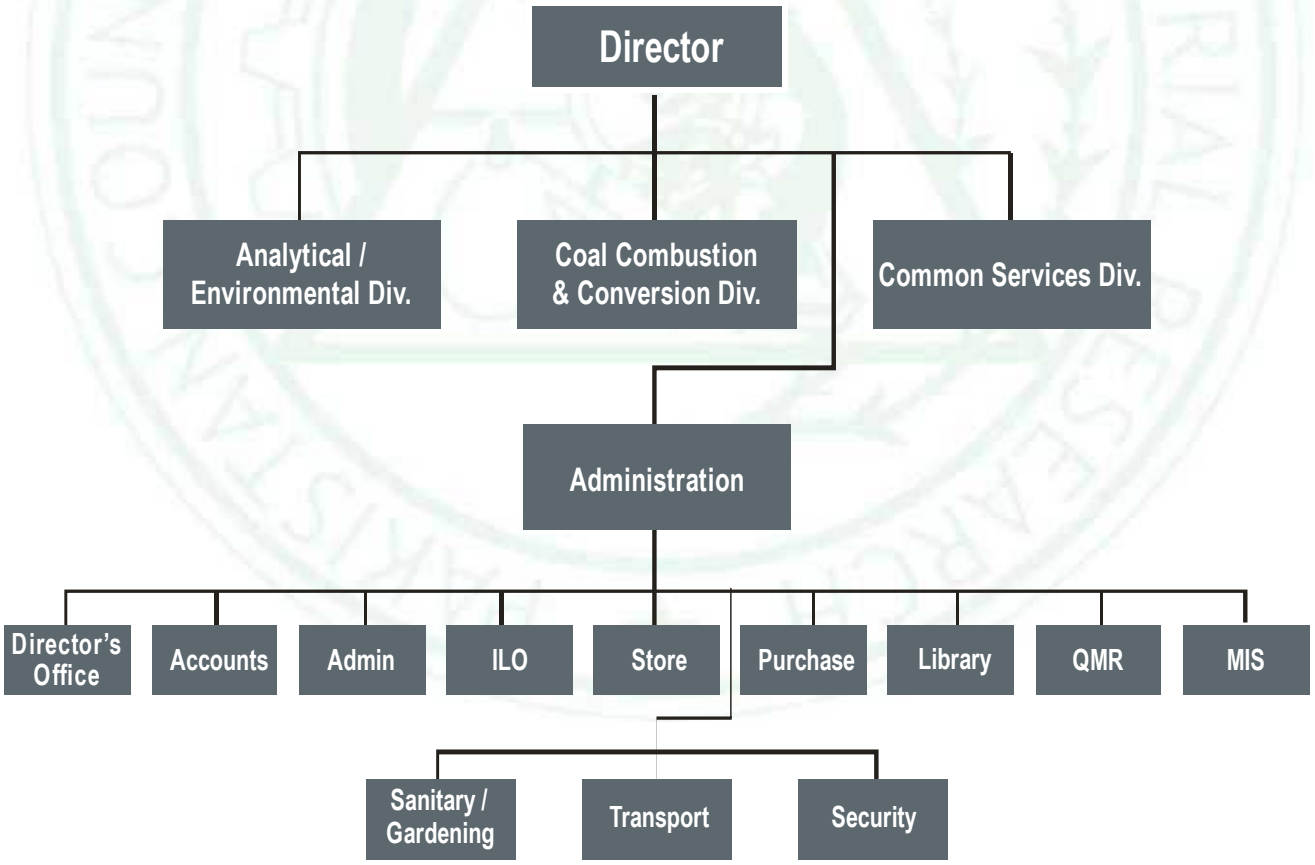
1. Sample test/ analysis of water.
2. Sample analysis of butter.
3. Sample analysis of black tea.
4. Sample analysis of chilli powder.
5. Sample analysis of iodized food grade salt.
6. Sample analysis of curry powder.
7. Sample analysis of turmeric powder.
8. Sample analysis of Water Crew 9501-A

FUEL RESEARCH CENTRE, KARACHI

Research Centre (FRC) Pakistan Council of Scientific and Industrial Research (PCSIR) is the premier Fuel Research Centre of Pakistan that is actively engaged in scientific and industrial research pertaining to Fuel such as production of clean fuel utilizing the indigenous materials, process development to generate feasible and effective heat, evaluate the quality of fuel qualitatively and quantitatively. This centre is engaged in indigenous technology development and also contributes to generate skilled manpower by imparting training and offer technical assistance to all Government departments, autonomous bodies and educational institutes.

During the period under report, the officials of this centre have improved the testing standard by employing the procedures as stated in ISO /IEC-17025:2017. The prime mission of this centre is to promote fuel related R & D activities, to provide reliable analytical testing reports, technical reports and consultancy services to clients / SMEs in order to improve fundamental understanding of solid and liquid fuel as well as address the critical issues and barriers for utilization of indigenous material (coal, coke and biomass etc.) as an alternate energy source.

ORGANIZATION CHART:



A) Processes Developed

- Low-cost pretreatment thermoplastic indigenous coal by catalytic chemisorptions reaction for its efficient utilization.
- Efficient extraction of humic acid from indigenous coal of different quality.
- To prepare zinc-based humic acid product in liquid state.
- To prepare boron-based humic acid product in liquid state.
- To prepare zinc and boron-based humic acid products in liquid state.

B) Products Ready for Commercialization

- Hybrid Fuel Briquettes
- Bio Coal Fuel – for Boilers and Power Plants
- Subzazar Humic Acid (Liquid and Granulated)

C) Technical Reports

- Operational Cost of Coal Briquette Pilot Plant (Production Capacity: One Ton/Day).
- Operational Cost of Humic Acid based products (Production Capacity: 200 L /Day).

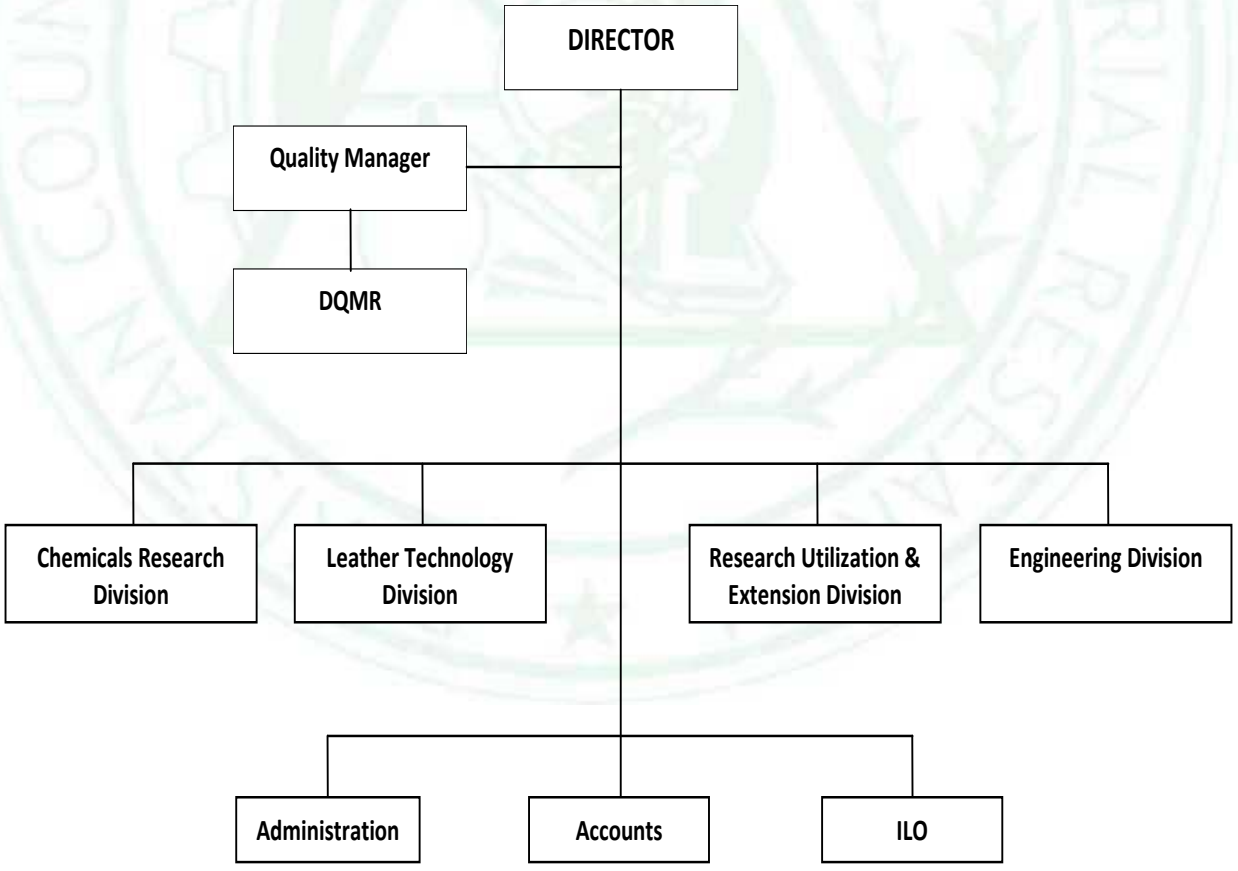
D) Workshops / Trainings Organized

In the year 2021-2022, several training sessions (duration of training two weeks and four weeks) on the topics as given below were organized at Coal Combustion and Conversion Division and Analytical and Environmental Division of Fuel Research Centre, Karachi.

- Clean Coal Technologies.
- Coal Combustion Technologies.
- Fuel Processing and Analysis of Fuel Related Products.
- The Development of Zero Waste Management.
- Detection and Quantification of Diesel Adulteration.
- Dispersing and Stabilizing Additives for Coal Water Slurry.

LEATHER RESEARCH CENTRE, KARACHI

In 1959 Leather Section was established in PCSIR Labs., Karachi to serve the tanning industry, under the purview of the ministry of Science and Technology. In 1981 this Leather Section was upgraded into Research Division. Later on in 1984 Leather Research Division was upgraded to Leather Research Centre at SITE, Karachi. Currently, manpower of Leather Research Centre includes Scientists, Engineers and Leather Technologists. The team of Technologists along with highly qualified chemists and engineers form a well experienced and trained research group.



A) Paper Published / Presented

1. Beena Zehra, H.R. Nawaz, B. A. Solangi and Uzma Nadeem. 2021. Preparation of heat resistant leather conditioner formulation for leather on *Research Journal of Textile and Leather*, 2(3): 111-113.
2. ShafiaSagheer, Abdul Jabbar, Muhammd Kashif Pervez, Kiran Rani, Ambreen Fatima and Saadia Riaz. 2022. Sulfonamide based antimicrobial reactive dyes; A study of their synthesis, fastness and antimicrobial activity. *Journal of Molecular Structure,* 1250: 1-8.
3. Rajkumar Dewani, Munawwer Rasheed, Farman Ahmed, Muhammad Zubair Asim, Muhammad Kashif Pervez and Mansoor Shaikh. 2022. Ultrasound assisted reduction of bis azo dye into aromatic amines on natural textile fibres: A greener approach. *Coloration Technology,* 138(3): 315-326.
4. Rajkumar Dewani. 2022. Global migration phenomenon with its security, economic, social, political and cultural dimensions. *2nd International Symposium, entitled Migration Privilege for International Social and Environmental Scientist", Ankara, Turkey.*
5. Sarwat J. Mahboob, Mohammad Kashif Pervez, Urooj Alam, Rajkumar Dewani, Sikandar Ali Soomro and Beena Zehra. Preparation of Resin Synthetic Tanning Agent, named as Retingan DCR for use in Leather Industry. *6th International Asian Congress on Contemporary Science, Van, Turkey, 349.*
6. Sarwat J. Mahboob, Mohammad Kashif Pervez, Urooj Alam, Rajkumar Dewani, Sikandar Ali Soomro and Beena Zehra. Synthesis and application of a Dual Functioning Polymer Retanning Agent for Making Eco-Friendly, Non-Dyed, Finished Gray Leather. *CUKUROVA, 8th International Scientific Researches Conference, ADANA,* 2: 1275-1288.

B) Patent Obtained

- A Technology for the preparation of Animal Protein Meal from various Waste Part of Flesh Industry, by Beena Zehra, Hafiz Rub Nawaz, Barkat Ali Solangi, Uzma Nadeem & Muhammad Zeeshan S. I No. 143829 to Pakistan Patent Office on October, 2021.

C) Consultancies Provided

- A consultancy has been provided for the impact effect on motorcycle gloves for motorbike riders for CE marking to M/s. Shark Motorcycle LeatherD/142, Siganto Dr. Helensvale, QLD 4212, Australia.

- A Consultancy has been provided for leather testing lab proposal covering from chromium (VI), azo and formaldehyde with list of lab equipment, chemicals, etc. to M/s. Shahbaz Garment (Pvt) Ltd.

D) Products Ready for Commercialization

- A dual function syntan "acrylan" for the preparation of Formaldehyde free gray leather.
- Dual characteristics syntan "catechan" produces brown Shade leathers without the use of dye & pigments and its Valuable products
- Technology for stone embossed leather
- Sulfated fatliquor for leather making
- Retanning agent "retingan DCR"
- Industrial leather and technology for the preparation of Gasket for high pressure jack, oil & water seals, machine belt etc
- Lizard look leathers from chicken-paw skins and their valuable Products
- Technology for exotic leatherfrom ostrich skins
- Stingray fish leather for decorative, protective & other various articles
- Recovery of protein and chromium from leather solid waste

E) Technical Reports

1. Preparation of organic flocculent for industrial waste treatment.
2. A process developed for the synthesis of anthranilic acid derivative reactive dye for leather and textile.
3. Preparation of heat resistant leather conditioner formulation for leather.
4. Synthesis of sulfanilamide based cationic Dye for Leather and Textile.
5. Application of anthranilic acid based cationic dye for suede leather.
6. Synthesis of orange burst color for textile and leather.
7. Synthesis of sulfanilamide hydroquinone dye for leather and textile.
8. Production of protective exotic leather from the stingray fish skins.
9. Application of sulfanilamide hydroquinone based cationic dyes on leather.
10. Preparation of acrylic binder using economical acrylic source.
11. Making of fatliquor from hemp oil provided by PCSIR, Head Office, Islamabad.
12. Making of dyed leather from lab synthesized cationic nano dyes.

13. Polymeric ceramic binder from leather waste protein.
14. Preparation of organic fertilizer from leather solid waste for herbs and shrubs.
15. Application of sulphur dye along with glucose as a reducing agent to fix the sulphur dye on cotton fabric.
16. Preparation of environmental friendly humectant for leather.
17. Purification of leather wastes protein through charcoal.
18. Detection/ evaluation for removal of fat spew on leather garments.
19. Synthesis of Formazine iron complex dye for the leather & textile.
20. Composite leather binder from percarpiummusae for opaque finish.
21. Synthesis and application of a dual functioning polymer retanning agent for making eco-friendly, non-dyed, finished gray leather.

F) MoUs / Agreement Signed

- A MoU has been signed on "Co-operation and Collaboration in Academic and Research Development" with Department of Bio Sciences, Muhammad Ali Jinnah University (MAJU), Karachi.

G) Important events organized

- **Pakistan Mega Leather Show 2022**

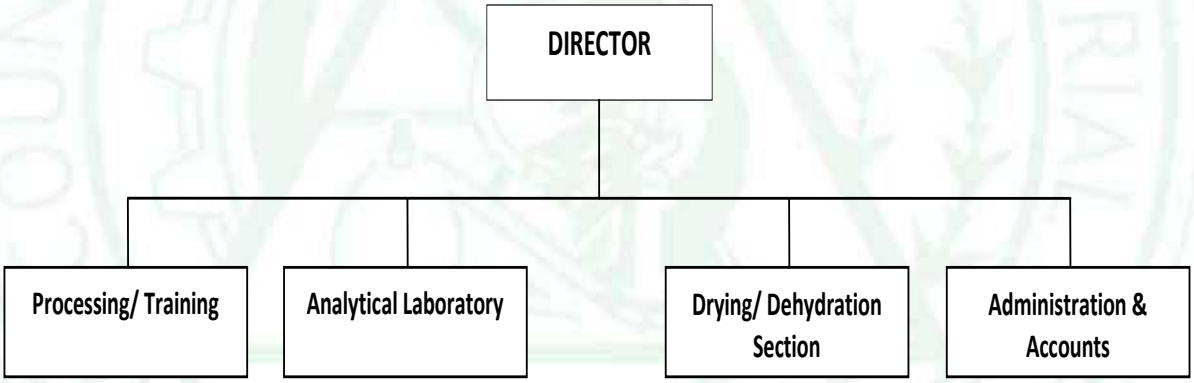
Leather Research Centre, PCSIR setup a stall in international exhibition at Expo Centre, Lahore from 28th January to 30th January 2022. Mrs. Tahira Ayaz *SSO*, Mr. Shakil Ahmad, *J.T.O* participated "PAKISTAN MEGA LEATHER SHOW 2022, Lahore". PFMA Chairman, Zahid Hussain was honored to inaugurate the Pakistan Mega Leather Show 2022 at Expo Centre, Lahore. In the exhibition, the visitors showed the keen interest in the product & services of LRC. 55 feedback forms were received from major industry showing interest mainly Ostrich Leather, Tannery Solid Wastes Management, Nano-Material Applied Leather, without Dye Leather, Fatliquors and Dyes etc. Some major visitors are following:

- **Mr. Muneer ahmed,** *CEO* at DGX International Islamabad, Pakistan,
- **Mr.Jabbar Ahmad** Owner at Custom Apparel Sialkot, Pakistan,
- **Mr. Naeem Ahmed,** *CEO* at Ziona Fashion Sialkot, Pakistan,
- **Mr. Touseef Javed,** *Director General* at Tj Brothers Lahore Cantt etc.

The visitors visited the stall of LRC, PCSIR and interested in Tannery Solid Wastes Management System. They also showed interest in exotic leather from Ostrich Skin and interested in testing facilities of LRC. They suggested enhancing the testing capabilities of LRC especially for REACH Compliance.

PCSIR LABORATORIES, SKARDU

The center started working in 1998 under the administrative control of PCSIR Laboratories Complex, Peshawar to impart technical training on processing, preservation, value addition, packaging, transportation and storage of fruits and vegetables. Center is helping rural population of the region in their socio-economic development by imparting training and offering technical help in minimizing the post-harvest losses. Provision of technical assistance in establishment of small cottage industries of processing and preservation of fruit/vegetables. Center is also providing testing facilities to the farmers/students in the field of agricultural raw materials and its value-added products



A) Consultancy Provided

- Fruit processer on reprocessing of dry fruits and pulping
- Cherry Pulping Akber Foods Skardu
- Reprocessing of Dry Cherry Bagh-e- Jinnah fruit orchard Fida Ali
- GB Alpine Foods Skardu on dry apricot reprocessing.
- GB T.J Foods Skardu on 400 kg dry apricot reprocessing.
- GB Alpine Foods on 40 kg dry black current reprocessing.

B) Products Ready for Commercialization

- Quince fruit nectar
- Quince fruit leather/candy
- Quince fruit powder drink
- Quince fruit jam
- Pebbles candle stand

C) Technical Reports

- Development of Russian olive beverage powder.
- Development of Russian olive nutritional supplement.
- Development of Russian olive beverage powder.
- Development of quince instant energy fruit leather.

D) MoU/ ToR/ signed

- MoU singed between PCSIR Skardu and District Administration Skardu for "Testing of market snacks on payment basis using PCSIR Facilities".
- MoU singed between PCSIR Skardu and AKRSP Skardu for "Three Months Training on Gems and Mineral cutting and polishing" at PCSIR Gem Stone Cutting Polishing Center Skardu".
- MoU singed between NAVTTC Islamabad and PCSIR Skardu to execute six months' short course on food processing and preservation under Prime Minister Skill for All Kamyab Jawan Programme.
- MoU singed between PCSIR Skardu and Chief Minister GB Skill Program to execute Six-month short course on fruit processing at PCSIR Skardu under Chief Minister GB Skill Program.
- ToR singed between Head of Department, Department of Botany University of Baltistan and PCSIR Skardu for collaborated activity training on Biosafety.
- ToR singed with President LSO Ghamba for mutual arrangement of two days Fruit processing, preservation and dehydration training for one group at GambaSkardu under UEGCPC Project.

E) Workshops/Trainings Organized

Trainings were conducted on fruit processing, Gem stone cutting polishing and Biosafety during 2021-22.

F) Important Events Organized

- Gems & Minerals Cutting and Polishing Training inaugurated by Minister for Tourism.
- UoB Presented Shield to PCSIR Skardu.

G) Analytical/Testing Services

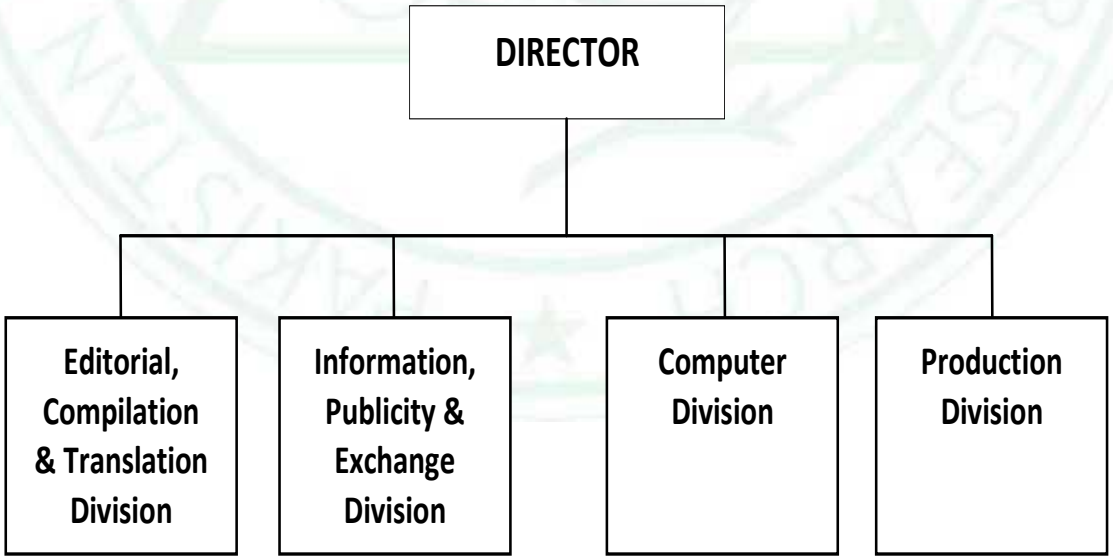
Skardu Laboratories provided 199 analytical/testing services during year 2021-22.

SCIENTIFIC INFORMATION CENTRE, KARACHI

Scientific Information Centre (SIC) is information Unit of PCSIR (Pakistan Council of Scientific and Industrial Research) situated in Karachi. It is a publication Centre which works along with the Head Office since 1958. This centre is actively engaged in dissemination of R&D results through regular and occasional publications for the scientific community, and publishes on regular basis research journal i-e Pakistan Journal of Scientific & Industrial Research (PJSIR), which deals in different fields of Physical Sciences and Biological Sciences. Other regular publications of PCSIR published by SIC are: PCSIR News Bulletin, PCSIR Annual Report, PCSIR R&D Programme.

Beside the regular PCSIR publications, the SIC also published miscellaneous publications of PCSIR units i.e. Test Reports (Accredited and Non-Accredited) log registers, file covers, prospectus guide books of admission forms, technical books, stickers, pension forms, election leaflets, TR forms, visiting cards, service history books etc.

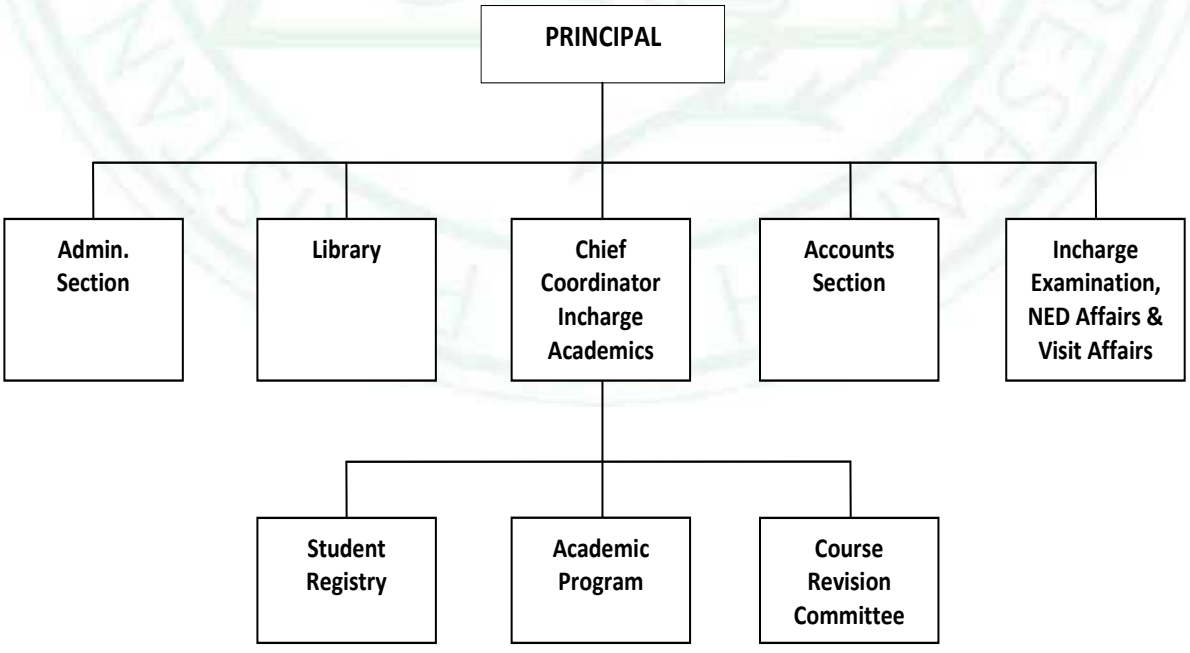
SIC has five divisions i.e. (a) Editorial and complation division (b) Information, publicity and exchange division (c) Computer division (d) Production division (e) Accounts and administration division.



INSTITUTE OF INDUSTRIAL ELECTRONICS ENINEERING, KARACHI

Trained and Skilled manpower is a bloodline of Industries and Institutions of any country. Keeping in view the needs of the nation, PCSIR founded Institute of Industrial Electronics Engineering (IIEE) in 1989 in collaboration with SWISS CONTACT Government of Switzerland. The institute was established with aim to prepare trained and skilled manpower for the local Industry in the form of Industrial Electronics Engineering Graduates. IIEE is affiliated with N.E.D. University, Karachi.

IIEE with its unique laboratory, workshops and computer facility, is inducting a batch of 47 undergraduates in 1st Year Engineering every year. Graduate Engineers of IIEE are very much sought by the industries/ organizations and those who have so far graduated are gainfully employed throughout the country and abroad.



Institute of Industrial Electronics Engineering

A) Publications

- Jafri, Syed Riaz un Nabi, Sheraz Shamim, Sadia MunizaFaraz, Asif Ahmed, Syed Muhammad Yasir and Jamshed Iqbal. 2022. Characterization and calibration of multiple 2D laser scanners. *PLOS one*, 17(7): e0272063
- Abdullah, Minhal, Syed Hasany, Muhammad Amir Qureshi and Sajid Hussain. 2022. Cost-effective synthesis of cobalt ferrite nanoparticles by sol-gel technique. In *Materials Science Forum*, 1067: 213-219.
- Asif A Memon, Riaz un Nabi Jafrim and Usman Ali Shah. 2021. A Rover Team based 3D Map Building using Low Cost 2D Laser Scanners (Submitted in IEEE).
- Rabeea khan, Muhammad ZeeshanYousaf, Asif Ahmed Memon, Sajid Hussain and Abdul Muttalib. 2021. Algorithm and implementation of human following co-bot using 2D LiDAR. *Pakistan Journal of Engineering and Technology*, 4(2).

B) Workshops/ Trainings Organized

- A training program on "Basic Fire Safety & First Aid Awareness Session and Practical Demonstration" by Federal Civil Defense Training School, was arranged by EHS Committee IIEE.
- An Interactive Workshop on the exposure of "Complex Engineering Problems (CEP)" was organized at IIEE.

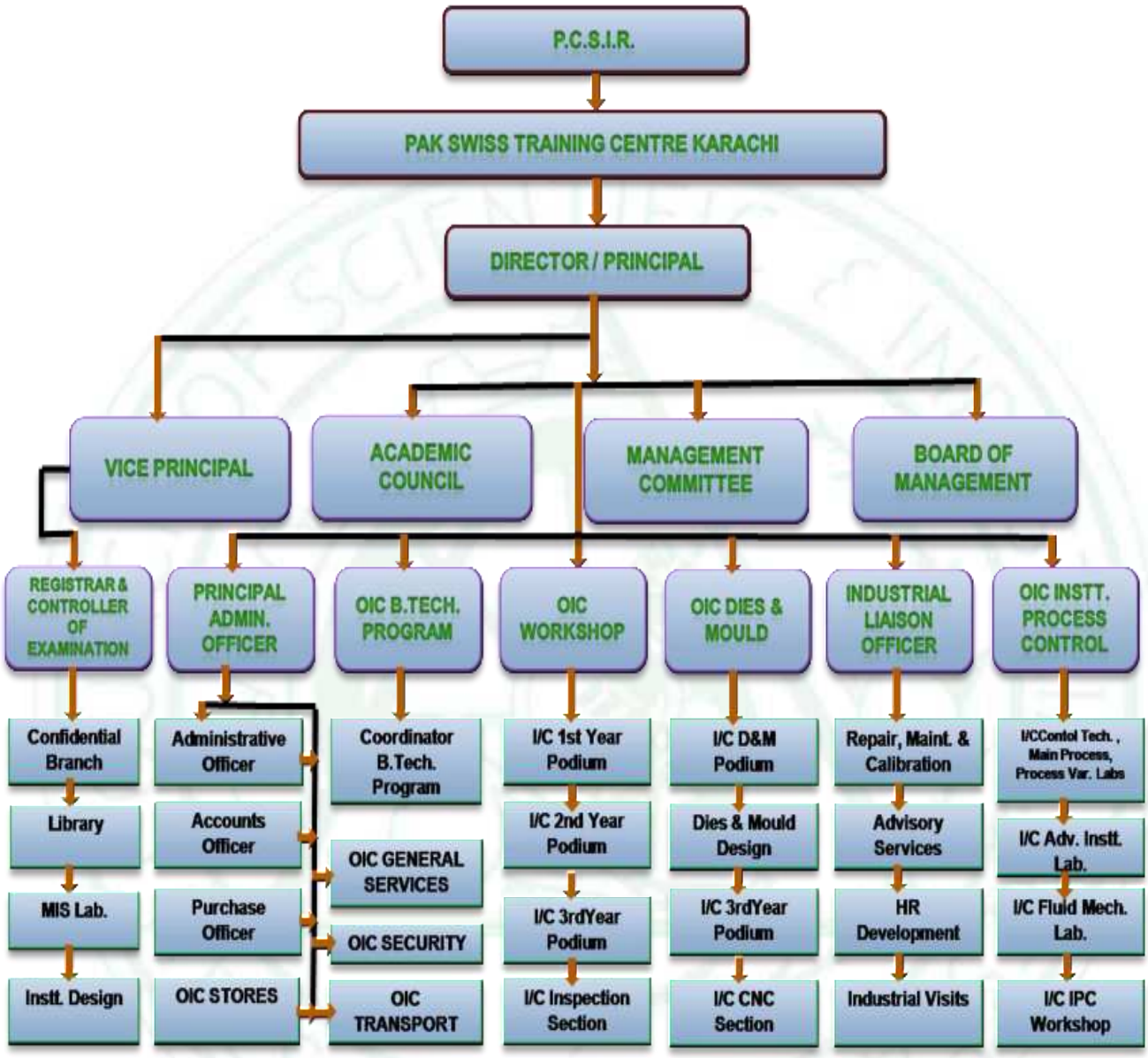
PAK SWISS TRAINING CENTER, KARACHI

Pak Swiss Training Centre (PSTC), Karachi provides technical training related to the emerging industrial sector in the Country. PSTC is conducting a Degree Program B.Tech. (Pass) in Mechanical Technology for the passed-out DAE students with the affiliation of NED University of Engineering & Technology. A Batch of 30 students is being admitted every year.

Three Years Diploma Course of Associate Engineer in Mechanical Technology with Specialization in Precision Machining & Instrument Technology for 48 students per year and 04 Years Diploma of Associate Engineer in Mechanical Technology with Specialization in Dies &Mould Technology for 18 students per year and in the Evening 66 students are conducted according to the methods of training followed in Switzerland. The Course is affiliated with the Sindh Board of Technical Education, Karachi. Three years Diploma Course of Associate Engineer in Instrumentation and Process Control Technology also initiated in the year 2005 for a Batch of 30 students from all over Pakistan, now, the seats have been increased up to 40.

In addition to the regular Diploma courses, PSTC is also organizing and conducting the evening short courses (CAD/CAM, PLC, CNC & Dies &Mould) of 06 months duration through NAVTTC under Kamyab Jawan Program Scheme of Prime Minister of Pakistan, since 2020.

Organizational Chart



PRECISION SYSTEMS TRAINING CENTER, LAHORE

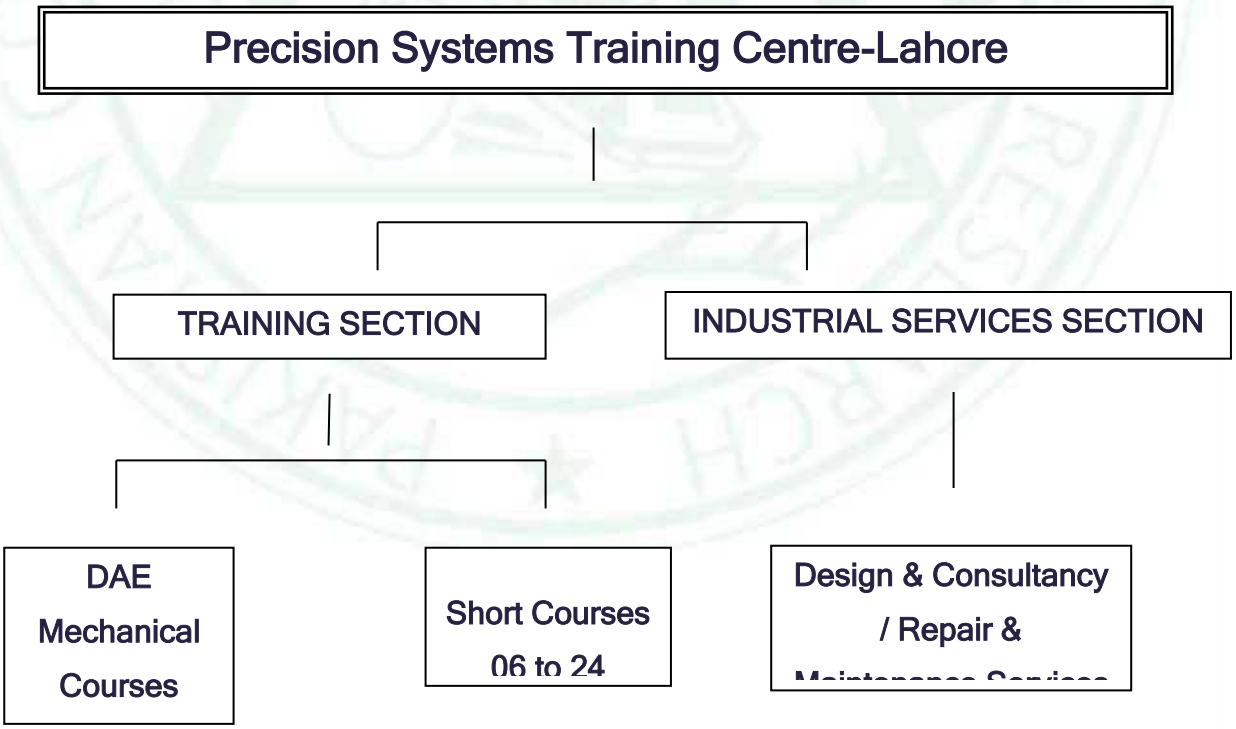
Precision Systems Training Centre – Lahore (PSTC – Lahore) was established in 2007 considering the requirement of the local industry for introducing training programme in Mechanical and Instrument Technology.

Objectives are to provide the foundation for development and generation of technical know – how and to organize and conduct training in the following fields:

i. DAE in Mechanical Technology with specialization in Precision Mechanical & Instrument Technology (3 years)

ii. DAE in Mechanical Technology with specialization in Dies &Moulds Technology (4 years)

iii. Short term courses of 06 to 24 weeks duration for Engineer & Technicians employed in the industries.

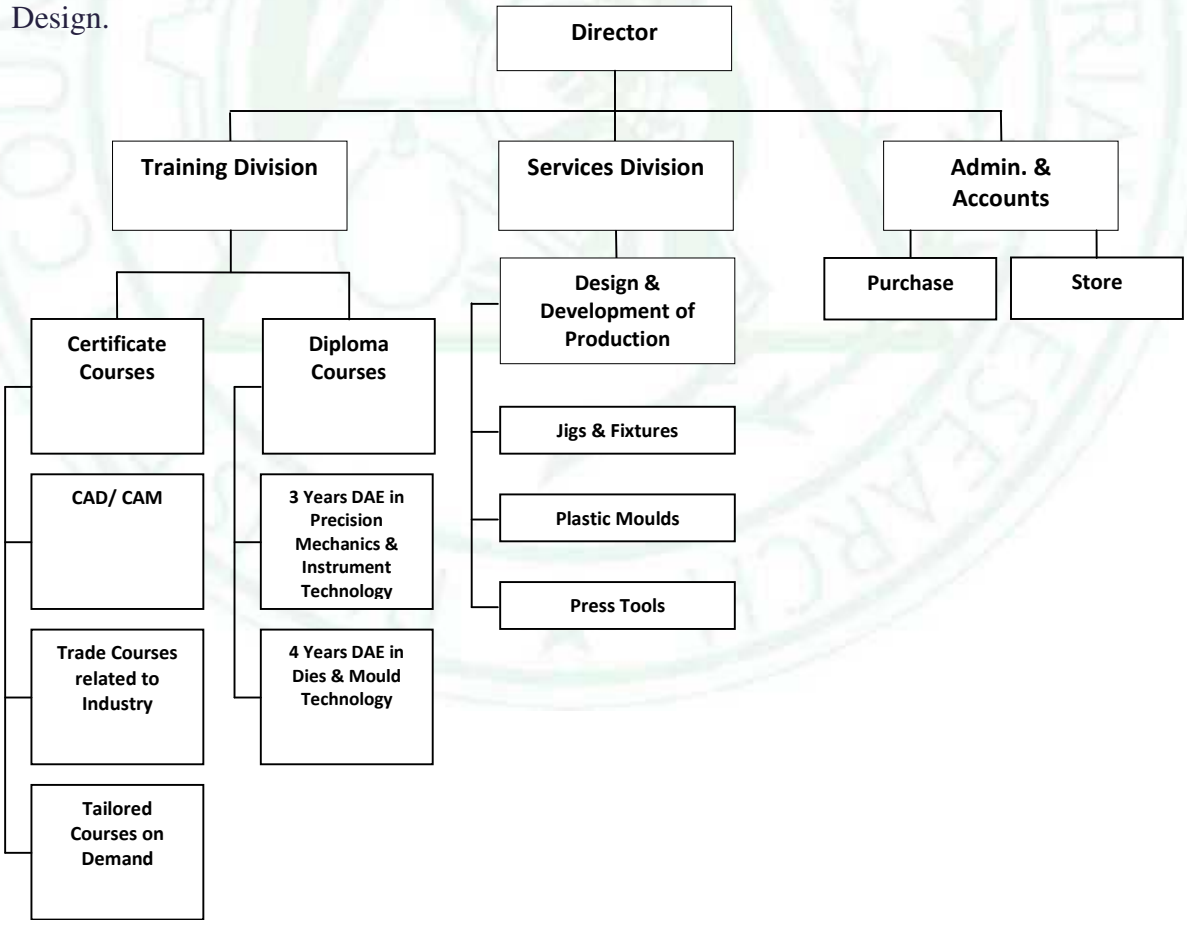


PRECISION SYSTEMS TRAINING CENTER, PESHAWAR

Precision Systems Training Centre (PSTC), Peshawar was established in 2004 with the aim to ensure rapid development in the industrial sector of K.P.K by introducing new training programme in the emerging trades with modern-age techniques of teaching and as per requirement of the industries through;

i. Organizing and conducting three years Diploma course of Associate Engineer in Precision Mechanical & Instrument Technology and Four Years Diploma course of Associate Engineer in Dies &Mould Technology.

ii. Organizing & conducting short term courses of 4 to 24 weeks duration in the field of Machine Tool Operations, CAD/CAM, Process Control, Dies &Mould, Engineering, Drawing & Design.

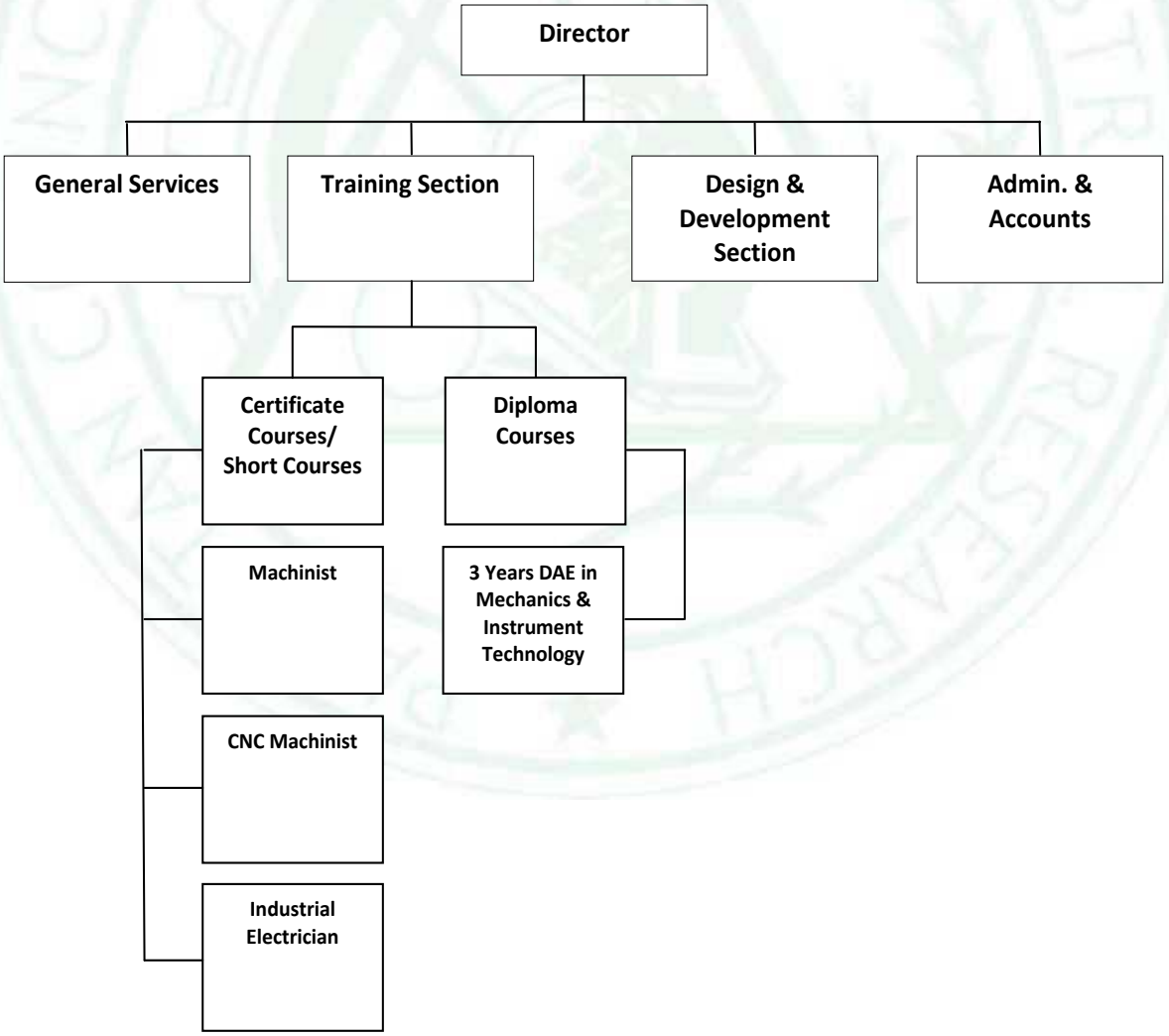


Technical Reports

1. Developed three numbers of hand knurling tools of Swiss design for use within the workshop for improved training of students.
2. Developed energy efficient gyseralongt with improved burner assembly.
3. Movable stair stand of 25 feet height for use within the workshop.
4. Developed overhead cable to counter the frequent short circuits in PSTC hostel building.
5. Developed broken plastic stands of wall fans with the new metallic ones which enhance the life of these workshop fans.

PRECISION SYSTEMS TRAINING CENTER QUETTA

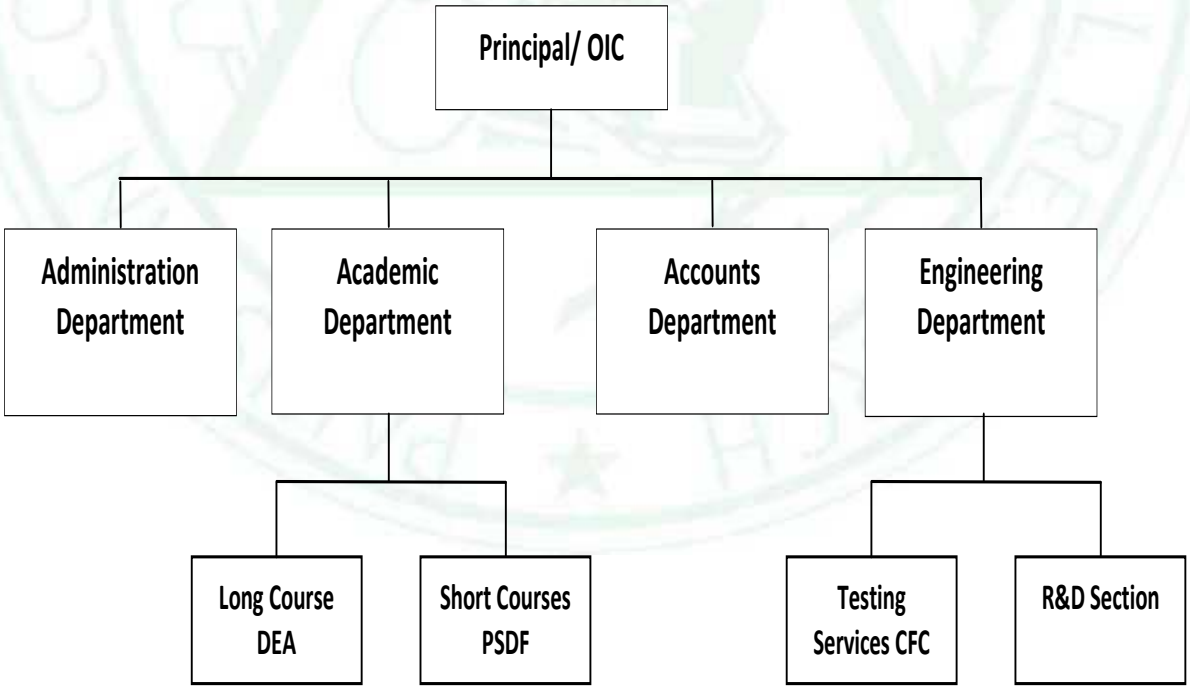
Precision Systems Training Centre (PSTC) Quetta was established in 1987, PSTC Quetta is the only training centre in Balochistan, providing quality training in line with requirement of industrial development in the region. The Centre is actively involved in development of specialized skilled manpower and presently conducting 03 years course of DAE in the field of Mechanical Technology with Specialization in Precision Machining and Instrument Technology.



CAST METALS & FOUNDRY TECHNOLOGY CENTRE, DASKA

The Cast Metals & Foundry Technology Centre, Daska, established in 2013, is providing multi-pronged and multi-dimensional services to all engineering industries especially the Cast & Metal Industry.Cast Metals & Foundry Technology Centre conducts and promotes industrial projects and help research scholars, institutes and industries in the following ways:

i. Provision of trained human resource to all relevant institutes and concerned industries.
ii. Sharing of information, literature and technical knowhow regarding Cast Metals & Foundry Technology.
iii. Provide customized training for employees in the metal Casting Industry



Linkages/Collaboration with Organizations/Universities

- Linkages with 24 Mega Universities of Pakistan
- Linkages with 12 Chambers/Associations
- Linkages with 09 classified Organizations

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