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Spearheading research in key areas



Research institute: At a regional centre of National Institute of Oceanography in Kochi.— File Photo

The Council of Scientific and Industrial Research has many achievement in the fields of science and engineering thanks to a number of laboratory facilities under the umbrella of the council.

Though the Council of Scientific and Industrial Research has numerous achievements in diverse fields of science, it often highlights certain specific areas, some of which are indicated below.

Aerospace

CSIR has many successes in the field of aerospace. It has been at the forefront in pushing the country's aerospace programme to new heights with path-breaking research at the National Aerospace Laboratories, Bangalore. NAL has spearheaded the effort to design and develop small and medium-sized aircraft for the civil sector. Other CSIR laboratories, such as the Central Scientific Instruments Organisation

(CSIO), National Physical Laboratory (NPL), and Structural Engineering Research Centre (SERC) have also made significant contributions to this hi-tech sector

Affordable health care

CSIR has set healthy benchmarks in making health care affordable for the common man.

It has achieved several landmarks in drugs and pharmaceuticals.

There are discoveries in the fields of biological science, cancer control, genetic diversity, and therapeutic strategies. Contributions in affordable life-saving drug development including anti-malarial drugs, oral insulin, hepatitis B vaccine, and anti-HIV cocktail are significant.

Sustainable energy

CSIR aims at utilising resources judiciously and working toward sustaining energy. It has taken several initiatives to optimise energy in a manner which is ecologically sound. Depleting reserve of crude oil leads to the quest for cleaner and alternative fuels. Adoption of Euro III and Euro IV equivalent emission norms and recycling of steel industry waste are some of the notable steps.

Chemistry and environment

There are several significant landmarks. In the field of chemical sciences and technology, such as studies in supramolecular chemistry, carbon microtubes developed using pyrolysis, development of speciality polymer for use in petroleum products, industrial metal finishing, and efficient waste water treatment.

The Reverse Osmosis Plant set up by CSIR generates million of litres of RO water per day ensuring a source of safe

drinking water to thousands of people.

The council has developed reverse osmosis (RO) membranes based on the state-of-the-art thin film composite (TFC) membrane technology for desalination of brackish water.

Smart and functional materials

Significant achievements in the areas of developing smart and functional materials span across the development of the biometric synthesis of inorganic nano-particles using microgravity, development of useful reinforced composites, and briquetting techniques for economical use of steel plant waste.

Engineering structure / design and electronics

The council spearheads research in engineering structure and design. The development of mechanised casting of reinforced concrete cored units for roof/ floor in the most cost-effective manner at Central Building Research Institute, Roorkee is a case in point.

What is mentioned above is only a list of some of the areas focused.

CSIR has schemes for providing a better life to our millions, bringing solutions in the area of health, agriculture, and energy. Innovations cover a varied range of technologies such as mechanised agriculture, low-cost housing, new cultivation techniques, water

purification techniques, and use of ceramic products.

AcSIR: The 'Academy of Scientific & Innovative Research' (AcSIR) is an initiative that focuses on research and training in areas not ordinarily covered by the existing universities in India.

There is an overlap of physical, chemical and biological sciences in nature and therefore there is a need to study the interfaces and possible synergies among the laws of physics, chemistry and life sciences, in order to make path-breaking contributions in science and engineering. AcSIR would focus on multidisciplinary research.

The Academy, an 'institution of national importance' will operate on the hub and spokes model with campuses in the CSIR laboratories spread across the country. The goals of AcSIR include efforts to increase science component in engineering promote engineering mindset to life sciences, and mimic life science in machines, as in bio-inspired devices.

It is believed that the future leadership in the area of science and engineering would much depend on its strength in integrated and interdisciplinary areas.

There is shortage of institutions that offer Ph.D. and other advanced courses in such areas. AcSIR that is conceived as a world-class institution will fill the gap to a large extent.

The five clusters that offer an array of courses are — engineering science, physical science, information science, life science and chemical science.

The CSIR labs

The main centres of research under the control of CSIR are listed below.

An awareness of the existence of such a large number of laboratory facilities under the umbrella of the council will certainly help us in identifying the best institution for research in science or engineering to be undertaken by each student. We shall take up these one by one and discuss briefly the facilities of research offered by each.

Central Building Research Institute (CBRI), Roorkee

Centre for Cellular and Molecular Biology (CCMB), Hyderabad

Central Drug Research Institute (CDRI), Lucknow

Central Electrochemical Research Institute (CECRI), Karaikudi

Central Electronics Engineering Research Institute (CEERI), Pilani

Central Institute of Mining and Fuel Research (CIMFR), Dhanbad

Central Food Technological Research Institute (CFTRI), Mysore

Central Glass and Ceramic Research Institute (CGCRI), Kolkata

Central Leather Research Institute (CLRI), Chennai

Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow

Central Mechanical Engineering Research Institute (CMERI), Durgapur
Central Road Research Institute (CRRRI), New Delhi
Central Scientific Instruments Organisation (CSIO), Chandigarh
Central Salt and Marine Chemicals Research Institute (CSMCRI), Bhavnagar
Institute of Genomics and Integrative Biology (IGIB), Delhi
Institute of Himalayan Bioresources Technology (IHBT), Palampur
Indian Institute of Chemical Biology (IICB), Kolkata
Indian Institute of Chemical Technology (IICT), Hyderabad
Indian Institute of Petroleum (IIP), Dehradun
Institute of Microbial Technology (IIMTECH), Chandigarh
Industrial Toxicology Research Centre (ITRC), Lucknow
National Aerospace Laboratories (NAL), Bangalore
National Botanical Research Institute (NBRI), Lucknow
National Chemical Laboratory (NCL), Pune
National Environmental Engineering Research Institute (NEERI), Nagpur
National Geophysical Research Institute (NGRI), Hyderabad
National Institute of Oceanography (NIO), Goa
National Institute of Science Communication and Information Resources (NISCAIR), New Delhi
National Institute of Science, Technology and Development Studies (NISTADS), New Delhi
National Metallurgical Laboratory (NML), Jamshedpur
National Physical Laboratory (NPL), New Delhi
Advanced Materials and Processes Research Institute (AMPRI), Bhopal
Institute of Minerals and Materials Technology (IIIMT), Bhubaneswar
North East Institute of Science & Technology (NEIST), Jorhat
Indian Institute of Integrative, Medicine (IIIM), Jammu
National Institute for Interdisciplinary Science & Technology (NIIST), Thiruvananthapuram
Structural Engineering Research Centre (SERC), Chennai

Besides, there are two other CSIR centres engaged in carrying out research in frontier areas of science and technology.

CSIR Center for Mathematical Modeling and Computer Simulation (CMMACS), Bangalore
CSIR Unit Research & Development of Information Research (URDIP), Pune