CHAPTER- 5

BRIEF PROFILE OF CSIR LABORATORIES OF NORTHEAST AND EASTERN INDIA AND THEIR KNOWLEDGE RESOURCE CENTERS: A THEORETICAL PERSPECTIVE

CONTENTS

Chapter- 5

BRIEF PROFILE OF CSIR LABORATORIES OF NORTHEAST AND EASTERN INDIA AND THEIR KNOWLEDGE RESOURCE CENTERS: A THEORETICAL PERSPECTIVE

5.0 INTRODUCTION

Information is a vital resource and has got a pragmatic value for any type of Research & Development (R&D) activities. Proper and adequate information is essential for scientific and economic progress of a nation. A scientist needs information for satisfying his/her desires for which he/she has to seek information. A scientist in the broadest sense refers to any person who is engaged in a systematic activity to acquire knowledge or an individual that is engaged in such practices and tradition that are linked to schools of thought or philosophy. In a more restricted sense, scientists refer to the individuals who use the scientific method in acquiring information and organize, analyze and implement the same in the area of his research or subject.

Scientists significantly depend on communication with fellow scientists / specialists / experts so as to keep abreast with current developments in the subject / research. Research workers almost always rely on the work of others scientists working the same field. Further, scientists are not actively involved in research but also frequently search for information pertaining to latest trends and developments in the subject including the area of research which facilitate with to up-date professional information. They also acquaint themselves with new innovations in their field. Thus, information helps the scientists to get well informed with the current developments in their subject.

The emerging information technologies have brought many changes in libraries. These technologies have facilitated LIS professionals to work together to acquire and share library collection and provide digital library services to the user community.

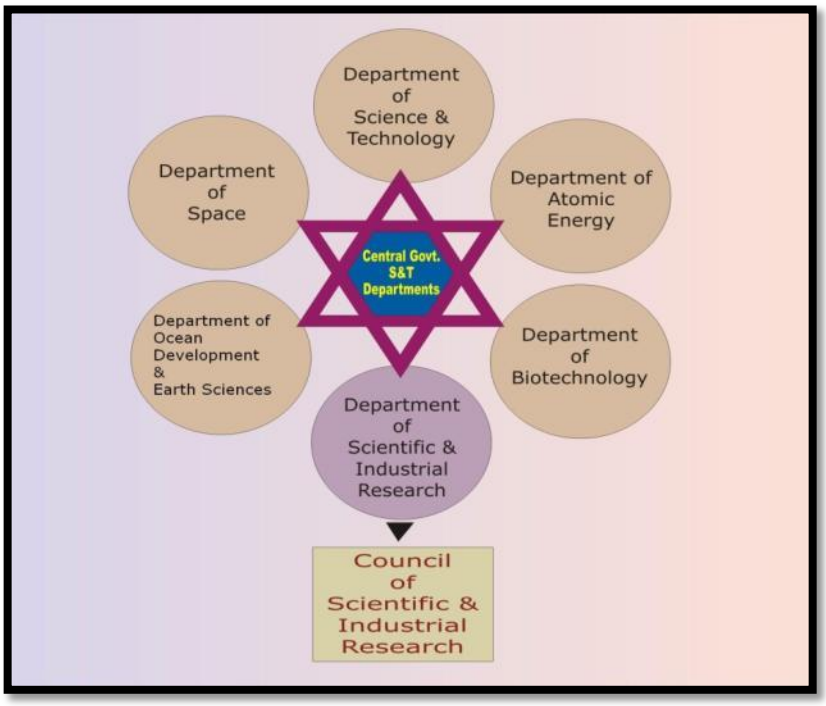
Increase of the literature in all subjects and shrinking of the library budget made the libraries depend upon each other. This leads to library cooperation, resource sharing and networking. The term Resource applied to a thing, person or action to which one resorts to in times of need and sharing indicates allotting, apportioning or contributing something that is owned, to benefit others. The sharing is a need-based activity framed around the age-old concept of give and take. In general, it is as old as the civilization. In the field of libraries we might trace the history of resource sharing since inception in various forms viz., sharing cataloguing, library cooperation, inter library loan and union catalogue, etc. The term library resources include any and all of the materials, functions and which constitute a modern library systems. It is amalgamation of people, processes, ideas, materials and money, which forms the substances of a library and can be described as its resources.

5.1 ESTABLISHMENT AND OVERVIEW OF COUNCIL OF SCIENTIFIC AND INDUSTRIAL RESEARCH (CSIR)

The Government of India constituted Council of Scientific and Industrial Research (CSIR) on 26th September 1942 as an autonomous body registered under Registration Act XXI of 1860. The establishment of the CSIR laboratories was the outcome of a resolution taken by Department of Commerce suggesting the creation of industrial research fund with an annual grant of Rs.10 Lakhs for a period of five years.

The first meeting of the Governing Body of Board of Scientific Industrial Research was held on 9th March 1942 and the By-law of the Society was adopted. The 12th meeting of GB of CSIR under the Chairmanship of C Rajagopalachari resolved for speedy establishment of national laboratories under CSIR. The next meeting of GB was held on 25th August 1947 and the Prime Minister of independent India, Pandit Jawaharlal Nehru presided over the meeting. The GB desired that the national laboratories be spread throughout the country. Eleven laboratories were established during 1950 to 1953. Thereafter, during the 1st Five Year Plan (FYP) period 19 more laboratories were established. Eight other laboratories were established during the 2nd

FYP. Twelve more national laboratories were established in different parts of the country during 5th, 6th and 7th FYP period. To become the prime custodian of all information resources on current and traditional knowledge systems in science and technology in the country, and to promote communication in science to diverse constituents at all levels, using the most appropriate technologies. Figure-5.1 below reflects the organizational chart of CSIR:



(Source: www.google.co.in)

Figure-5.1: Organizational Structure of CSIR

Council of Scientific and Industrial Research (CSIR) is a premier Research and Development (R&D) of India which is the world's largest publically funded organization under the Ministry of Science and Technology, Government of India. There are 38 national laboratories, 39 outstation centers, 3 innovation complexes and 5 units' works under its network. CSIR's R&D team consists of more than 4600 expert and experienced scientists which are supported by about 8000 S&T staff. CSIR laboratories cover a wide spectrum of R&D subject areas ranging from radio and space physics to environmental engineering and information technology. CSIR is basically a learning organization which puts much emphasis and focus on its R&D in broad area of S&T.

5.1.1 Five Year Plan Wise List of the CSIR Laboratories and the Year of Establishment

The list of CSIR Laboratories in India has established by the Govt. of India during different Five Year Plan been presented below in **Table-5.1** showing their year of establishment including the place where it is situated.

Table-5.1: List of CSIR Laboratories Formed During Different Five Year Plans in India *(As per Old Record)*

Sl. No.	Year of establishment	Organization	Place
1st Five Year Plan			
1.	1950	Central Food Technology Research Institute (CFTRI)	Mysore
2.		Central Fuel Research Institute (CFRI)	Dhanbad
3.		Central Glass & Ceramic Research Institute (CGCRI)	Kolkota
4.		National Chemical Laboratory (NCL)	Pune
5.		National Metallurgical Laboratory (NML)	Jamshedpur
6.		National Physical Laboratory (NPL)	New Delhi
7.	1951	Central Drug Research Institute (CDRI)	Lucknow
8.		National Institute of Scientific Communication (NISCOM) (Earlier known as Publication & Information Directorate (PID).	New Delhi
9.	1952	Central Road Research Institute (CRRI)	New Delhi
10.		Indian National Scientific Documentation Center (INSDOC)	New Delhi
11.	1953	Central Building Research Institute (CBRI)	Roorkee
12.		Central Electro Chemical Research Institute (CECRI)	Karikudi

13.		Central Electronic Engineering Research Institute (CEERI)	Pilani
14.		Central Leather Research Institute (CLRI)	Chennai
15.		National Botanical Research Institute (NBRI)	Lucknow
16.	1954	Central Soil & Marine Chemical Research Institute (CSMCRI)	Bhavanagar
17.	1955	Central Mining Research Institute (CMRI)	Durgapur
18.	1956	Indian Institute of Chemical Biology (IICB)	Kolkota
19.		Indian Institute of Chemical Technology (IICT) (Earlier known as Regional Research Laboratory (RRL).	Hyderabad
2nd Five Year Plan			
20.	1957	Regional Research Laboratory (RRL)	Jammu
21.	1958	Central Mechanical Engineering Research Institute (CMERI)	Durgapur
22.		National Environmental Engineering Research Institute (NEERI)	Nagpur
23.	1959	Central Institute of Medicinal & Aromatic Plants (CIMAP)	Lucknow
24.		Central Scientific Instrument Organization (CSIO)	Chandigarh
25.		National Aerospace Laboratory (NAL) (Earlier known as National Aeronautical Laboratory)	Bangalore
26.	1960	Indian Institute of Petroleum (IIP)	Dehradun
27.	1961	National Geophysical Research Institute (NGRI)	Hyderabad
28.		Regional Research Laboratory (RRL-J)	Jorhat

3rd Five Year Plan			
29.	1964	Regional Research Laboratory (RRL-Bhub)	Bhubaneswar
30.	1965	Industrial Toxicology Research Center (ITRC)	Lucknow
31.		Structural Engineering Research Center, (SERC-M)	Chennai
32.	1966	Center for Biochemical Technology (CBT)	New Delhi
4th Five Year Plan			
33.	1977	Center for Cellular & Molecular Biology (CCMB)	Hyderabad
34.	1978	Regional Research Laboratory, (RRL-T)	Thiruvanathapuram
6th Five Year Plan			
35.	1981	National Institute of Science, Technology and Development Studies (NISTAD)	New Delhi
36.		Regional Research Laboratory (RRL-Bhup)	Bhopal
37.	1983	Institute of Himalayan Bioresource Technology (CBT) (Earlier CSIR Complex)	Palampur
38.	1984(End of the financial year on March)	Institute of Microbial Technology (IMT)	Chandigarh
7th Five Year Plan			
39.	1984(Beginning of the financial year on April)	Structural Engineering Research Center, (SERC-G)	Ghaziabad

5.1.2 Present CSIR Laboratories of India

Earlier, CSIR has a network of 40 laboratories including INSDOC and 80 field stations, extension centers and regional centers located all over the country carrying R&D in various areas and disciplines. Area wise CSIR laboratories are grouped into five broad categories, i.e., Chemical Science Group, Biological Science Group, Engineering Science Group, Physical Science Group and Information Science Group.

The newly formed national laboratory, the Central Institute of Mining and Fuel Research (CIMFR) Dhanbad is the integration of the Core Competencies of the two laboratories Central Fuel Research Institute, Dhanbad and Central Mining Research Institute, Durgapur (CFRI & CMRI). On 30th September 2002 National Institute of Science Communication and Information Resources (NISCAIR) came into existence with the merger of National Institute of Science Communication (NISCOM) and Indian National Scientific Documentation Centre (INSDOC). Both NISCOM and INSDOC, the two premier institutes of the Council of Scientific and Industrial Research (CSIR), were devoted to dissemination and documentation of S&T information. Presently there are 38 laboratories of CSIR in India dedicated for R & D for the nation. Most of the laboratories name has been changed. The List of the thirty eight CSIR laboratories established is listed below (www.csirhrdg.res.in>srf_anx_1, 2016):

- Advanced Materials and Processes Research Institute (AMPRI), Bhopal, Madhya Pradesh.
- Central Building Research Institute (CBRI), Roorkee, Uttarakhand
- Centre for Cellular and Molecular Biology (CCMB), Hyderabad, Andhra Pradesh
- Central Drug Research Institute (CDRI), Lucknow, Uttar Pradesh
- Central Electrochemical Research Institute (CECRI), Karaikudi, Tamil Nadu
- Central Electronics and Engineering Research Institute (CEERI), Pilani, Rajasthan
- Central Food and Technological Research Institute (CFTRI), Mysore, Karnataka
- Central Glass & Ceramics Research Institute (CGCRI), Kolkata, West Bengal
- Central Institute of Medicinal and Aromatic Plants (CIMAP), Lucknow, Uttar Pradesh
- Central Institute for Mining & Fuel Research (CIMFR), Dhanbad, Jharkhand
- Central Leather Research Institute (CLRI), Chennai, Tamil Nadu
- Central Mechanical Engineering Research Institute (CMERI), Durgapur, West Bengal

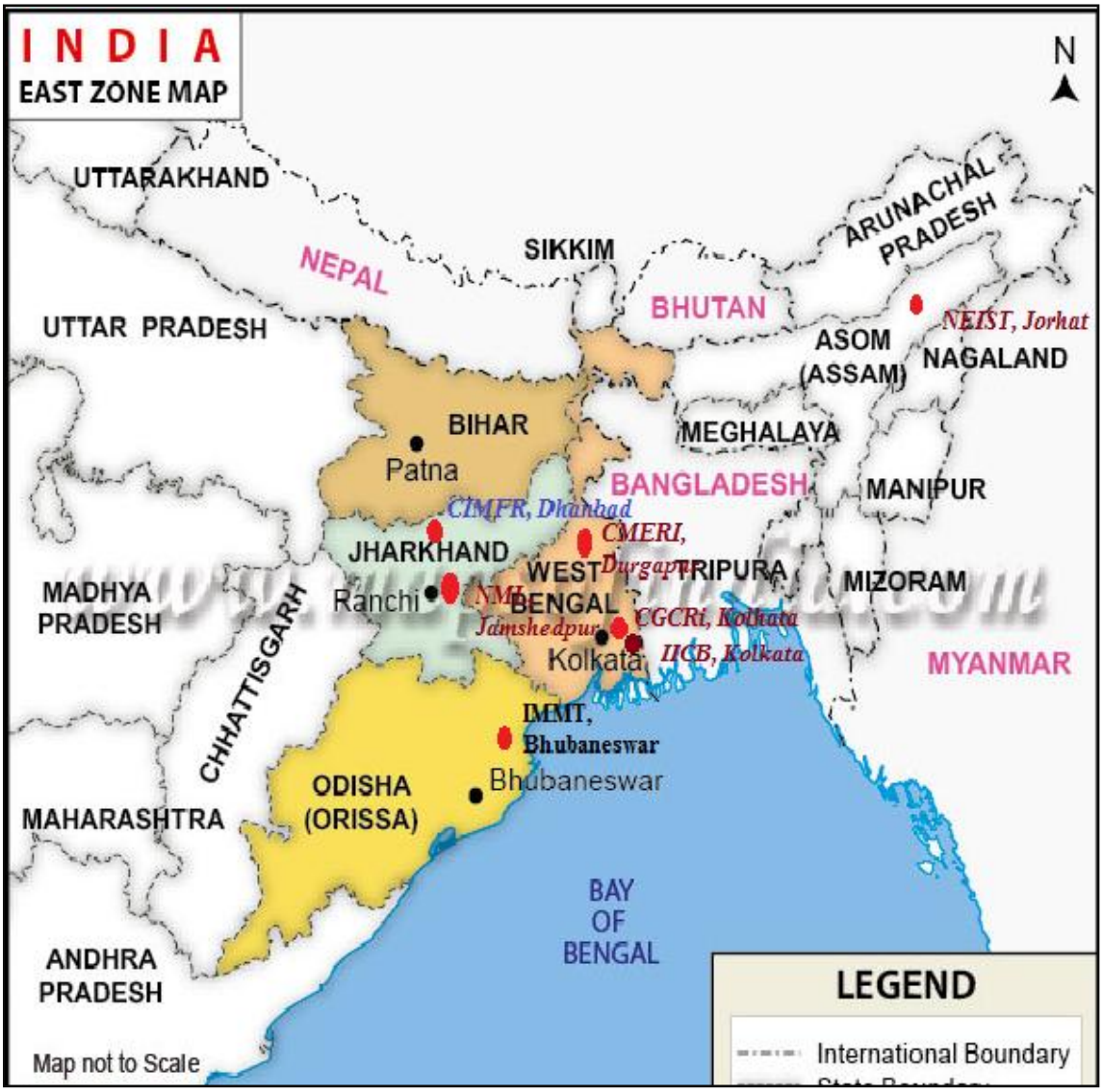
- Central Road Research Institute (CRRI), Delhi
- Central Scientific Instruments Organization (CSIO), Chandigarh
- Central Salt and Marine Chemical Research Institute (CSMCRI), Bhavnagar, Gujarat
- Institute of Genomics and Integrative Biology (IGIB), Delhi
- Institute of Himalayan Bioresources Technology (IHBT), Palampur, Himachal Pradesh
- Indian Institute of Chemical Biology (IICB), Kolkata, West Bengal
- Indian Institute of Chemical Technology (IICT), Hyderabad, Andhra Pradesh
- Indian Institute of Integrative Medicine (IIIM), Jammu, J&K
- Indian Institute of Petroleum (IIP), Dehradun, Uttarakhand
- Indian Institute of Toxicological Research (IITR), Lucknow, Uttar Pradesh
- Institute of Minerals & Materials Technology (IMMT), Bhubaneswar, Orissa
- Institute of Microbial Technology (IMTECH), Chandigarh
- National Aerospace Laboratory (NAL), Bangalore, Karnataka
- National Botanical Research Institute (NBRI), Lucknow, Uttar Pradesh
- National Chemical Laboratory (NCL), Pune, Maharashtra
- National Environmental Engineering Research Institute (NEERI), Nagpur, Maharashtra
- North-East Institute of Science and Technology (NEIST), Jorhat,
- National Geographical Research Institute (NGRI), Hyderabad, Andhra Pradesh
- National Institute of Interdisciplinary Science & Technology (NIIST), Thiruvanthapuram, Kerala.
- National Institute of Oceanography (NIO), Goa
- National Institute of Science Communication and Information Resources (NISCAIR), Delhi
- National Institute of Science and Technology Development Studies (NISTADS), Delhi
- National Metallurgical Laboratory (NML), Jamshedpur, Jharkhand
- National Physical Laboratory (NPL), Delhi
- Structural Engineering Research Centre (SERC), Chennai, Tamil Nadu
- CSIR Centre for Mathematical Modeling & Computer Simulation (CMMACS), Bangalore, Karnataka.

5.3 PROFILE OF THE CSIR LABORATORIES OF NORTHEAST AND EASTERN INDIA

Research and development institutions are the place where knowledge is being generated as a result of research activities undertaken by them. Creating and using scientific knowledge are imperative components of the activities of scientists. Scientists significantly depend on communication with fellow scientists/specialists so as to keep abreast with current development in the respective subject/research. Research workers almost always rely on the work of others scientists working in the same field. For any R&D activities, information is a vital resource. Proper and adequate information is essential for scientific and economic advancement of a nation. A scientist needs information for satisfying his/her desires for which he/she has to seek information. Information use pattern is the path pursued by the individuals in the attempt to resolve a need. The library scientists like Marquis & Allen have suggested that information use is behavior and data are collected on any behavior by asking people about it, by observing its occurrence or by examining its artifacts. To create information and to promote use of information, it is necessary to know the needs of users. The present study basically aims to find out the information need and use pattern by scientists working at few CSIR laboratories of North East India and Eastern India by using user study and also by using bibliometrics study of their research publications.

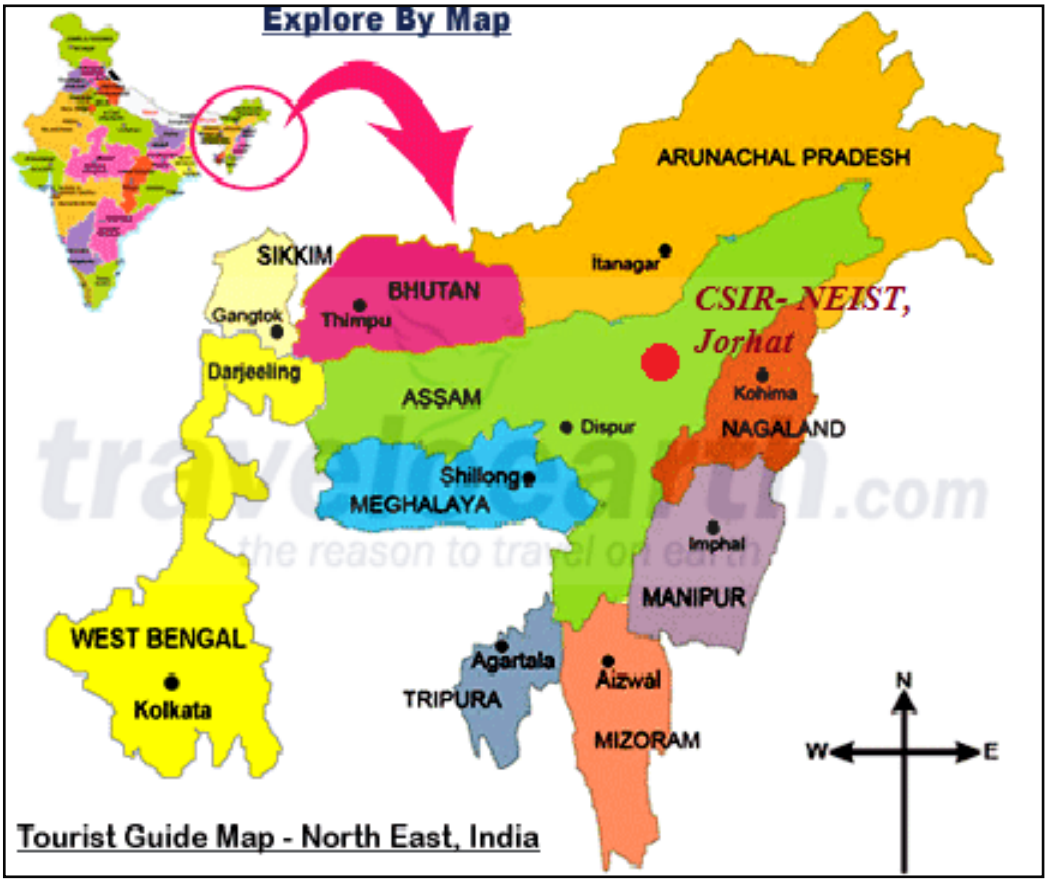
5.3.1 Location of CSIR Laboratories of Northeast and Eastern India

The CSIR- North East Institute of Science and Technology is located at Jorhat District of Assam. The Central Glass and Ceramic Research Institute (CGCRI) and Indian Institute of Chemical Biology (IICB) are located in Kolkata, West Bengal and Central Mechanical Engineering Research Institute (CMERI) is located at Durgapur, West Bengal. The Institute of Minerals and Materials Technology (IMMT) is located at Bhubaneswar, Odisha. The National Metallurgical Laboratory (NML) is located at Jamshedpur, Jharkhand and Central Institute of Mining and Fuel Research (CIMFR) is located at Dhanbad, Jharkhand. The **Map- 5.1** shows the area of location of CSIR Laboratories of Eastern India and **Map- 5.2** shows the area of location area of NEIST, Jorhat.



(Source: www.mapsofindia.com, Accessed on 25-06-2016)

Map- 5.1 Location Map of CSIR- Laboratories of Eastern India



(Source: www.traveloearth.com, Accessed on 25-06-2016)

Map-5.2: Location Map of CSIR- North East Institute of Science and Technology (CSIR- NEIST)

5.3.2 CSIR-North East Institute of Science and Technology (CSIR-NEIST), Jorhat

In Assam the industrial sector has mainly grown around tea, timber, mining, mills and plywood factories. The economy of the region is still primarily agrarian but its full potential is yet to be exploited. Sericulture in North Eastern Region comprises the culture of four varieties of Silk worms viz, Eri, Muga, Oak Tassar and Mulberry. There is rich potential for R&D work on natural resources and NEIST is the leading R&D Institution in this region who plans to continue to tap the untapped resources for the benefit of the people of the region. There were special problems of Industry and raw materials in Assam, which required investigation. The inadequacy of communication between Assam and other parts of India made it necessary to put a separate laboratory in Assam. The Special Committee of the Governing Body of Council of Scientific and

Industrial Research, New Delhi recorded this on September 01, 1954 and consequently the committee discussed on a proposal for setting up of the third RRL in the country and the first in Assam. To give a brief outline about the genesis, North East Institute of Science & Technology (NEIST) at Jorhat in the state of Assam was established in the year 1961 as one of the multi-disciplinary concern of Council of Scientific and Industrial Research (CSIR) laboratories. Prof. Humayun Kabir laid the foundation stone of NEIST. NEIST became an ISO 9002:2001 Laboratory from September 2005. The Governing Body of CSIR in its 168 meeting held on December 08, 2006 renamed of five Regional Research Laboratories (RRL's) of CSIR located at five different regions including the one at Jorhat commensurations with their direction orientation of expertise and excellence developed over the years. Accordingly, the RRL's name was formally changed to North East Institute of Science and Technology (NEIST) with effect from 18 March 2007, the 46th Foundation Day of the Institute.

The North East Institute of Science and Technology (NEIST) at Jorhat are basically aimed at studies and research related to all science streams such as Physical Science, Chemical Science, Biological Science, and Engineering Science etc. The constituent laboratories of CSIR have been grouped into five broad areas such as Physical Science, Chemical Science, Biological Science, Engineering Science and Information Science depending upon the type of work, objectives and the nature of responsibilities vested in these laboratories. Basically, NEIST is one among the seven other laboratories under the Chemical Science group. The major thrust of Research and Development (R&D) activities of NEIST has been to develop indigenous technologies and knowledge by utilizing immense natural wealth of the North Eastern Regions of India. The annual turnover of the products produced with RRL technologies within the country is estimated to be Rs. 110 crores. North East Institute of Science and Technology, Jorhat, Assam, a constituent establishment of Council of Scientific and Industrial Research (CSIR), New Delhi, has been engaged in multidisciplinary R&D work relevant to the country in general and North Eastern Region in particular. Besides the NEIST main laboratory at Jorhat, there are another two branch laboratories and two field stations, which are located at Arunachal Pradesh, Nagaland and Manipur respectively.

5.3.2.1 Profile of the Knowledge Resource Center of NEIST (KRC-NEIST)

Library and Documentation Division, the earlier name of NEIST, Jorhat was established in the year 1961 to cater to the needs of Research & Development (R&D) staff. Presently it is renamed as Knowledge Resource Center (KRC). The KRC of NEIST, Jorhat has rich and outstanding collections of national and international journals, books, Indian and foreign patents, standards, reports, etc.

Plate- 5.1: Image of the CSIR-NEIST Building and its Knowledge Resource Center (KRC)

(*Source: http://www.rrljorhat.res.in*)

Establishment Year	:	1961
Address	:	NH 37, Pulibor, Jorhat-785006, Assam
Website	:	http://www.rrljorhat.res.in
Library Name	:	Knowledge Resource Center
Library Link	:	http://www.neist.res.in/krc.php
Library Hours	:	Monday to Friday (8:30 am to 5:00 pm)

Library Collections : The KRC have a collection of 18568 books, 23158 bound volumes, 167 theses, 103 current journals, 86 reference tools and 3135 standards for its users.

Library Staff : There is total number of five professional and non-professional staff working at NEIST-KRC.

Library Services :

The KRC- NEIST have Provided the services like Library reading materials, Referral and references service, R&D alert service to the library users, Literature search (both electronic & print), Selective Dissemination of information service, Document delivery service, Inter-library Loan services, Expert service in preparation & production of scientific & technical publications and Reprographic service.

Electronic Resources :

The NEIST- KRC provides access to electronic resources through National Knowledge Resource Consortium. The KRC mainly subscribe electronic resources of the publishers like Elsevier Science, SPRINGER, American Chemical Society, and Cambridge University Press, Royal Society of Chemistry, Wiley Interscience, Blackwell Synergy, Oxford University Press and IEEE. It also subscribe databases namely Web of Science, SCOPUS. The other subscriptions are Indian Standard, ASTM Standard, Bulletin Seismological Society of America AND Seismological Research Letters and DelCON E-library Consortium, Department of Biotechnology (DBT), Ministry of Science and Technology, Government of India

5.3.3 CSIR-Institute of Minerals and Materials Technology (CSIR - IMMT), Bhubaneswar

The Institute of Minerals and Materials Technology-IMMT, (formerly Regional Research Laboratory, Bhubaneswar) was setup as a premier establishment of the Council of Scientific & Industrial Research (CSIR), New Delhi in 1964 in the State of

Odisha, in eastern India. The laboratory was renamed in the year 2007 with a renewed research focus in the areas of minerals engineering and materials technology. The laboratory specializes in providing R&D support for process and product development with special emphasis on conservation and sustainable utilization of natural resources. Over the years, IMMT has developed S&T capabilities in a wide range of areas from mineralogy to materials engineering. The laboratory has expertise in conducting technology oriented programmes in mining and mineral/bio-mineral processing, metal extraction and materials characterization, process engineering, industrial waste management, pollution monitoring and control, marine and forest products development, utilization of medicinal and aromatic plants and appropriate technologies for societal development. Initially the institute has expertise in conducting basic research and technology oriented programs related to mining, minerals and metals industries. Now CSIR-IMMT giving emphasis on providing advanced and zero waste process and consultancy services for commercial exploitation of natural resources through the public-private-partnership (PPP) approach and CSIR-IMMT becomes the first choice of the many mineral based industries. At present total number of 140 scientists are working towards nation building programme in CSIR-IMMT.

5.3.3.1 Profile of the IMMT- Knowledge Resource Center (IMMT-KRC)

Library & Documentation Cell of IMMT is well known as KRC. It procures selected books and journals of interest to the ongoing projects of the Laboratory. It also meets the needs and requirements of scientists by providing various information services using different full-text journals, CDROM databases and Internet based resources. This cell is equipped with required computer infrastructure and trained manpower.

Plate- 5.2: Building of the CSIR-IMMT and Knowledge Resource Center (KRC) View

(Source: http://www.immt.res.in/)

Establishment Year	:	1964
Address	:	Acharya Vihar, Bhubaneswar-751013, Odisha
Website	:	http://www.immt.res.in/
Research Area	:	Minerals Engineering and Materials Technology
Library Name	:	Knowledge Resource Center
Library Link	:	http://www.immt.res.in/Knowledge.aspx?id=23
Library Hours	:	Monday to Friday (9:30 - 17:30 hrs)
Library Resource	:	Web OPAC: http://krc.immt.res.in/ IR@IMMT: Link: http://eprints.immt.res.in/ Current Journals: 150 (Online Only)
Library Staff	:	The KRC has only two staff working for their library development.
Library Collection	:	

The IMMT-KRC has the collection of 14023 books, 17,628 numbers of bound volumes of periodicals, 5324 micro-documents, 90 current Indian journals and 60 current foreign journals.

Electronic Resources :

The institute have purchase CDROM databases like AGRICOLA, ISA, EiTeck, MEDLINE, ESPACE, METADEX, IBDI, PATESTATE, INPAT, CABSAC. The IMMT-KRC provides access to e-journals, e-books databases, standards, patents, through National Knowledge Resource Consortium. It also subscribe online indexing database Web of Science.

Library services :

The KRC have mainly provided the services like recent arrivals of book, recent arrivals of journals, document delivery service, literature search service (in anticipation/ on demand), CDROM service, online service, translation service providing through NISCAIR, New Delhi and internet-based service like daily alert about a site of interest. The KRC have also provided services like active reference service, documentation service, bibliographic/current content service and Web OPAC.

5.3.4 CSIR-Indian Institute of Chemical Biology (CSIR-IICB), Kolkata

The Indian Institute of Chemical Biology was established in 1935 as the first non official centre in India for biomedical research and was included under the umbrella of CSIR in 1956. The institute is presently engaged in research on the diseases of national importance and biological problems of global interest. It has employed sophisticated state-of-the-art technology in keeping with the rapid and unprecedented momentum that life science research has gained globally over the last 50 years. The scientific staff of the institute has expertise and experienced in different areas including chemistry, biochemistry, cell biology, molecular biology, neurobiology and immunology which promotes productive interdisciplinary interaction.

CSIR -IICB have developed many technologies with high sciences. Some of them are microbicidal contraceptive to prevent HIV, Visceral leishmaniasis detection candidates, DNA Vaccine against Kala-Azar, Anti-Cancer drug candidates, etc. The CSIR-IICB industry has partnership tie-ups with many national and international companies across the world.

Since its inception the institute have promote multidisciplinary conducted efforts for conducting basic research on infectious diseases, specifically leishmaniasis and cholera, along with the development of technologies for the diagnosis, immunoprophylaxis, and chemotherapy of the diseases. Other areas of research in the institute are gastric hyperacidity and ulcer, muscular dystrophy and related disorders, macromolecular structure function analysis, development of targeted drug delivery systems, sperm biology and protein chemistry and enzymology. The institute has developed many vaccines and medicinal products which has always been basic biomedical research and now emphasis is being given on research directed to commercial exploitability.

5.3.4.1 Profile of the IICB- Knowledge Resource Center (IICB-KRC)

With the establishment of Indian Institute of medical Research on January 01, 1935, the Library & Documentation Division started its Journey as one of the prestigious departments. Since its Inception, it has been playing a pivotal role of the research & Development programmes of the institute. The division has marked rapid growth with the development of institute and modernization of Library and Information science- growth in collection, systems, facilities and services till now. The KRC have good number of Books, journals both print and online, bound volumes, ADONIS (CD-ROM database), Annual reports, Theses both CDs and online and newspapers. It has providing access to full text for thousands of exceptional journals and online database through CSIR-NISCAIR's network project NKRC (National Knowledge Resource Consortium). The library management software used by the IICB, Kolkata is LIBSYS. IICB maintaining Open Access Repository in E-print for archiving peer reviewed journals articles, conference papers, Theses and other research documents produced by IICB researchers.

Plate- 5.3: Building of the CSIR-IICB and Knowledge Resource Center's View

(*Source: http://www.iicb.res.in*)

Establishment Year	:	1935
Address	:	4, Raja S.C. Mullick Road, Kolkata – 700 032, West Bengal
Website	:	http://www.iicb.res.in/
Library Name	:	Knowledge Resource Center
Library Link	:	http://www.iicb.res.in/library.html
Library Hours	:	Monday to Friday (9:30 - 18.00 hrs)
Library Staff	:	Librarian -1, Technical Officer (III)-2, and Technician (I)-1
Electronic Sources	:	

The IICB-KRC has good number of electronic collections. They have 109 numbers of online journals, 202 journals full text up to 1994, Science-Direct (Back files), 279 Theses (CDs/online. The institute can access more than 4500 S & T journals from Oxford University Press, Wiley, Taylor & Francis, Royal Society of Chemistry, Emerald, etc. through National Knowledge Consortium (NKRC). The institute has access Science citation indexing database: Web of Science. The KRC is using plagiarism detection tool iThenticate.

Open Access Institutional Repository:

The KRC-IICB has their institutional repository named as IR@IICB. This repository is the official open access institutional repository of IICB which provides single point access to all research outputs produced locally. The repository mainly archived peer-reviewed journal articles, conference papers, theses and reports produced by IICB researchers. The KRC try to include post-print versions of the journal articles in the repository. In cases where post print versions are not available, the published version is archived and its access is restricted to IICB researchers. Other can use "Request copy" form to request copies of articles directly to authors.

Library Services:

The KRC extends the information and technical services & facilities to the users irrespective of this institute and various outside educational, research and industrial organizations. The KRC mainly provided services and facilities like reading-room facility, literature search, information services through CD-ROM and online databases, printouts from CD-ROM databases and online journals, lending facility, reference and referral services, photocopying services, resource sharing and Web OPAC. Besides these, the KRC have also provide services like electronic method of issue, active reference service, dissemination service through electronic form, dissemination service and bibliographic/current content service.

Source: www.eprints.iicb.res.in (Accessed on 11-12-2016)

Photo- 5.1: Web Page of the Open access repository of Indian Institute of Chemical Biology (IR@IICB)

Source: http://14.139.223.107:8080/webopac/html/SearchForm (Accessed on 11-12-2016)

Photo- 5.2: Web OPAC Search form of KRC-IICB

5.3.5 CSIR-Central Glass & Ceramic Research Institute (CSIR-CGCRI), Kolkata

Central Glass and Ceramic Research Institute (CGCRI) is one of the first four laboratories decided to be set up under the Council of Scientific & Industrial Research, the other three being National Chemical Laboratory, Pune; National Physical Laboratory, New Delhi and Central Fuel Research Institute, Dhanbad. Originally it was proposed to be named as Central Glass & Silicate Research Institute. It was started functioning in the year 1944 but the Institute was formally inaugurated on August 26, 1950 during the First five year plan.

At the initial stages most of the work was directed towards identifying suitable mineral resources within the country and their suitability for specific product development. A special assignment given by the Planning Commission to CGCRI was to work out the process technology for production of various types of optical glasses with a view to making the country independent of import optical. It brought CGCRI into limelight in the international arena glasses as it was produced in only a few countries of the world and its production technology was kept as secret. Optical glass is a strategic material used as lenses and prisms for making periscopes, binoculars, range-finders, gun-sights, fire directors, and scientific, photographic and survey instruments like microscopes, telescopes, cameras, projectors, theodolites etc. The Institute's pilot plant with an annual capacity of 10 tones went into production in 1961.

During sixties, besides the development of optical glass the institute work on introduction of modern techniques in glass and ceramic, basic studies on generation of colour in glasses, evaluation of different minerals of the country such as clay and mica for their suitability in specific uses, development of high temperature combustion boats are some of the important activities. After the development of optical glass in early sixties, in the seventies the institute have initiated the development of laser glass, infra-red transmitting filters, synthetic quartz single crystal, high temperature protective enamels, high alumina ceramic seals and spacers. The institute were also started research work on foam glass, glass bonded mica; steel plant refractories keeping in mind the need of Indian industries. Stepping into eighties was an important landmark in the history of CGCRI. In this decade CGCRI started work on a number of fields, some

of which were even in nascent stage in international arena. The eighties include the work in the field of optical fibre for telecommunications, sol-gel processing of glass and ceramic materials, production of glass fibre based composites and application of ceramic materials in electronics were initiated during this period. Some of these activities have placed CGCRI in the global map in their respective areas.

The Institute was established two extension centres at Naroda (Gujarat) and Khurja (Uttar Pradesh) with the partial financial assistance from the respective state Governments. CGCRI have generated the production technique of potteries based on locally available clays in Bankura district of West Bengal and also CGCRI scientists were involved in technology development, providing training to the artisans, up gradation of quality of products and help the local villagers to participate in the commercial production of the potteries. In nineties, the institute started R&D work by giving priority in the three major sectors namely National security or strategic, Industrial development (primarily small & medium scale industries) and societal activities covering some of the well defined problems of national importance such as Energy, Water, Health Care, Communication and Instrumentation. Recently, CGCRI concentrated in formulating several major programmes under the 11th Five Year Plan of CSIR. Some of the programmes covered under this plan are: Supra Institutional Project on Ceramic Materials for liquid and gas separation technology, Network project on Nano materials, photonics for Communications, High power microwave tubes etc.

5.3.5.1 Profile of the CGCRI Knowledge Resource Center (KRC)

The Knowledge Resource Centre (KRC) of CGCRI is a pioneer resource centre in the field of glass, ceramic and allied areas. It was established in August, 1950. The CGCRI KRC is well equipped with collection of textual books, journals, patents and standards, state-of-the art services, technology infrastructure, professional manpower and internet connectivity. The followings are some important information about CGCRI KRC:

Plate- 5.4: Building of the CSIR-CGCRI and Knowledge Resource Center's View

(*Source: http://www.cgcri.res.in*)

Establishment Year	:	1950
Address	:	196, Raja S.C. Mullick Road, Kolkata – 700 032, West Bengal
Website	:	http://www.cgcri.res.in
Research Area	:	Glass and Ceramic items
Library Name	:	Knowledge Resource Centre
Library Link	:	http://www.cgcri.res.in/page.php?id=58
Library Hours	:	Monday to Friday (9:30 - 18.00 hrs)
Library Staff	:	Principal Technical Officer & Head -1, Principal Technical Officer-1, Senior Technical Officer (II) - 1, Technical Officer-1 and Senior Technician (II)-2.
Library Collection	:	

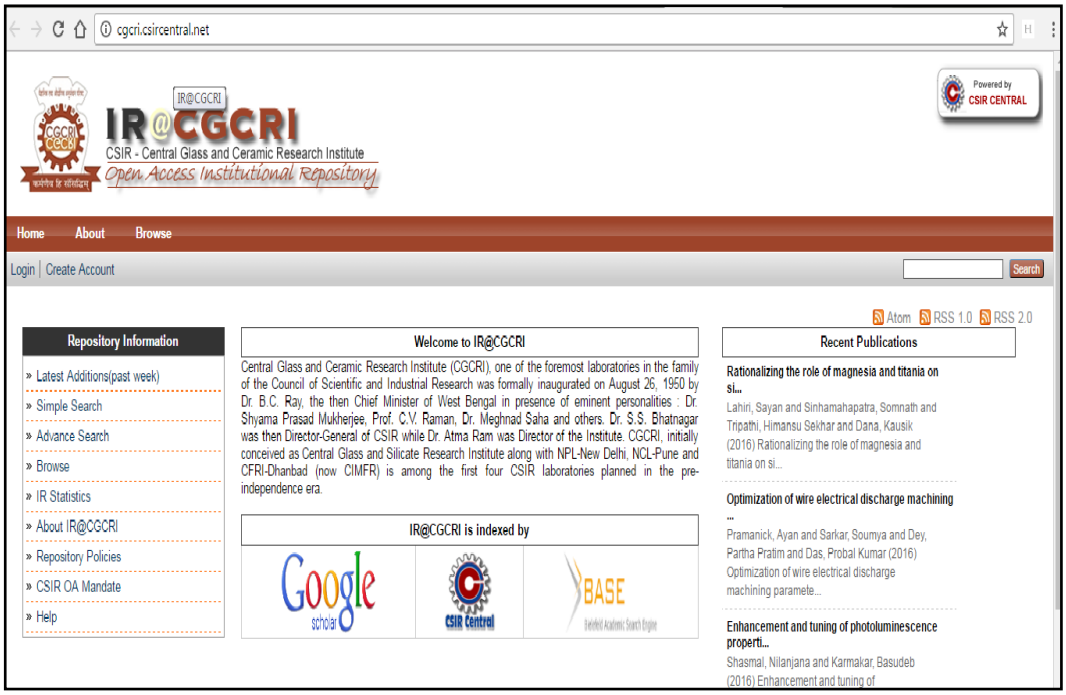
The CGCRI KRC has good collection of books, journals, standards, patents, etc. It comprises 49,056 collections books including bound volumes of periodicals. It has a collection Foreign journals-57, Indian journals-34 both in printed form.

Electronic Resources :

Under the National Knowledge Resource consortium the GCCRI KRC can access to more than 4200 e-journals of 16 publishers, including Web of Science (Bibliographic Database), Thomson Innovation (Patent Databases), Derwent Innovation Index, Delphion (Patent Databases), ASTM Standards, Indian Standards and Indian journals. It endeavors to provide the latest information to the scientists, technologists, research scholars, research interns and project assistants of the institute in their R&D work and also to extend its facilities to the users of various academic, research and industrial organizations of this region including those from other Institutes of CSIR, ICAR, ICMR, IITs, BARC, in the country. The KRC CGCRI has its Institutional Repository named as IR@CGCRI shown in the **Photo- 5.3**.

Library Services :

CGCRI KRC provides services like bibliographic/current content service, dissemination services both through documents and through electronic form. It provides active reference services to the users, electronic issue system and RFID technology for charging and discharging. The main services of the CGCRI KRC are Internet Access, Resource Sharing, Literature Searching, Documentation Service, Current Awareness Service, Document Delivery, Photocopying Service, News Clippings and User Awareness & Education. The KRC have rendered library policy and services to outsiders also.



Source: http://cgcri.csircentral.net/ (Access on 11-12-2016)

Photo- 5.3: Home Page of the CGCRI KRC's Institutional Repository IR@CGCRI

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

CSIR-Central Institute of Mining and Fuel Research (CIMFR) Dhanbad, a constituent laboratory under the aegis of Council of Scientific and Industrial Research (CSIR), New Delhi aims to provide R&D inputs for the entire coal-energy chain encompassing exploration, mining and utilization. The laboratory also strives to develop mineral based industries to reach the targeted production for country's energy security and growth with high standards of safety, economy and cleaner environment. View of the National Missions recently declared by the Government of India, CIMFR has re-aligned its vision, missions and policies and also redefined targets for short and long terms. This would promote rapid sustainable national techno-economic growth with equal emphasis on self-sustenance. CSIR-CIMFR is located in the town of Dhanbad, known as coal capital of India of Jharkhand state of India. It is strategically situated in the Damodar

basin of Eastern part of the country which is endowed with rich coal deposits and hosts several large mineral based industries.

The newly formed national laboratory, the Central Institute of Mining and Fuel Research (CIMFR) Dhanbad, is a constituent laboratory of Council of Scientific & Industrial Research (CSIR) was aimed to provide R&D inputs for the entire coal-energy chain from mining to Consumption through integration of the Core Competencies of the two laboratories Central Fuel Research Institute, Dhanbad and Central Mining Research Institute, Durgapur (CFRI & CMRI) premier Coal institution of the country.

5.3.6.1 Profile of the Knowledge Resource Centre of CIMFR

The Knowledge Resource Centre supports CIMFR staff with up to date R&D information backup through well organized library and on-line access to global database, documentation, photography, reprographic and printing facilities. It organizes customized information services through membership. The centre contributes to the promotion of the Laboratory's R&D business. The mission of the KRC is to facilitate creation of new knowledge through acquisition, organization and dissemination of knowledge resources and providing for value added services. The CIMFR-KRC is one of the central support services of the institute. The KRC is the ISO 9001:2000 certified for the development of quality library systems and procedures.

Source: Photo taken by Camera during Visit

Plate- 5.5: Building of the CSIR-CIMFR and Knowledge Resource Center's View

Establishment Year	:	1958
Address	:	Brwa Road, Dhanbad-826015, Jharkhand
Website	:	http://cimfr.nic.in/
Research Area	:	Coal-energy chain encompassing exploration, mining and utilization
Library Name	:	Knowledge Resource Center
Library Link	:	http://www.cimfrlibrary.org/index.html
Library Hours	:	Monday to Friday (8:00 am to 8:00 pm) and Saturday, Sunday & holiday 10:00 am to 5:00 pm.
Library Staff	:	The CIMFR-KRC consists of total numbers of seven professional and non-professional staff.
Library Collection	:	

The collection of the CIMFR-KRC comprises printed books, reports, theses, standards, atlases and journal back volumes. The CIMFR-KRC consists of 13000 books, 12000 bound periodicals, 900 CD-ROMS and 500 other documents. The non-book collections include material like micro fiche/film, and CDROM discs and currently subscribes to more than 71 scholarly journals in sciences and engineering. CIMFR- KRC has the following Standards & Reports Information Resources:

- Bureau of Indian Standard
- Austrailian Coal Association (Research) Ltd
- Bureau of Mines Technical Progress Report
- British Standards and Specification
- CMRI Research Paper
- National Coal Board Central & Mining Research Establishment
- National Coal Board Information Bulletin
- Safety in Mines Research Board Papers
- Safety in Mines Research Establishment Research Report

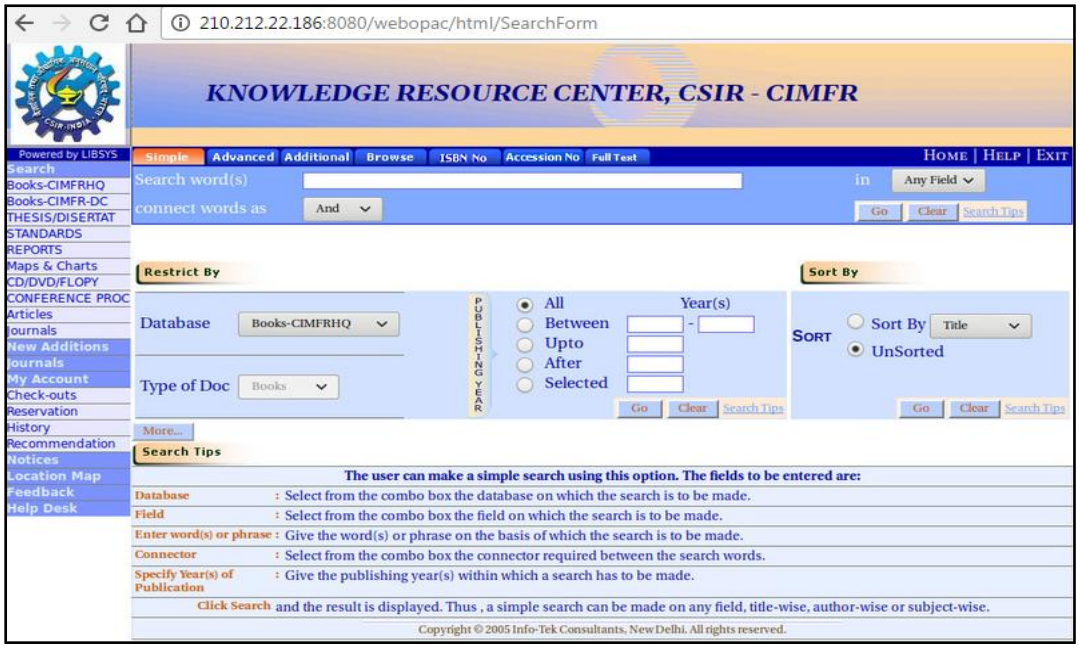
- US Bureau of Mines Report of Investigation
- US Bureau of Mines Information Circle.

Electronic Resources :

Under the CSIR-NISCAIR NKRC scheme, the KRC provides on-line access to a large number of full-text journals from various publishers. Databases are also accessible on intranet to campus users only. It provides CD-ROM databases Standalone version, ASTM standards on CD-ROM and BIS & BSI standards catalogue on CD-ROM. It also facilitates Web OPAC to their user which is shown in the **Photo- 5.4**. The CIMFR-KRC has its institutional repository IR@CIMFR shown in the **Photo- 5.5**.

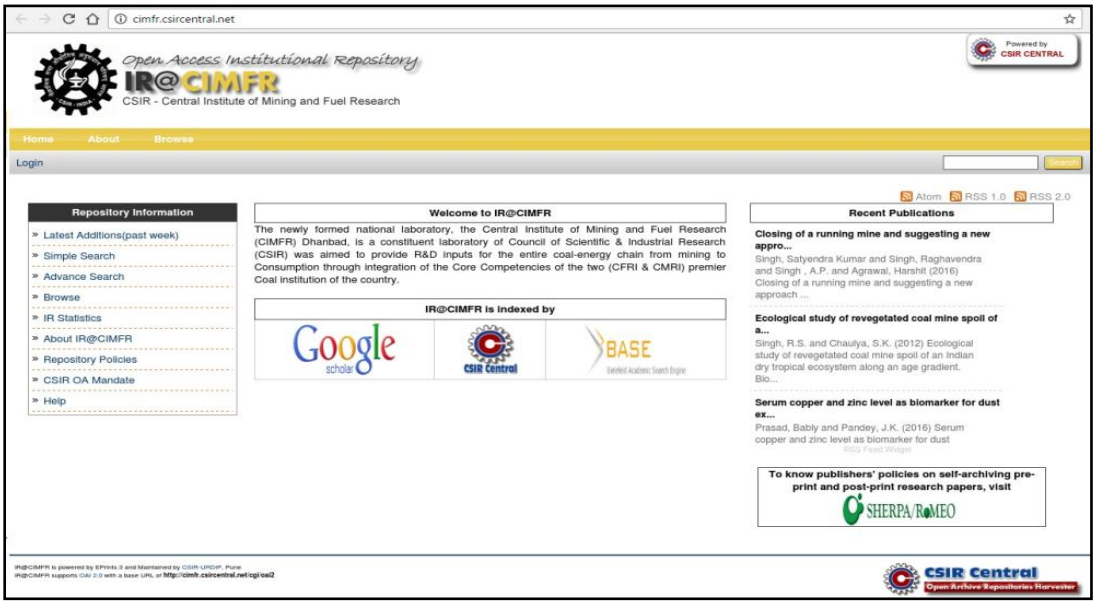
Library Services:

The library provides various services for its members such as - Lending of books and journal back volumes, reservation of books, inter-library loan, document delivery, photocopying, CDROM and Internet services. All the library activities are computerized, including searching of books in the library through a web OPAC using Libsys. It also provides active reference service, provide current content page of journals, national/international conference alert service, retrospective literature search, computerized circulation using barcode scanner, documentation service, Online Public Access Catalogue. The KRC have disseminating services through document form and electronic form. The Web OPAC of CIMFR- KRC was shown in the **Photo- 5.4**.



Source: http://210.212.22.186:8080/webopac/html/SearchForm (Accessed on 13-12-2016)

Photo- 5.4: Web OPAC of the CIMFR-KRC



Source: http://cimfr.csircentral.net/ (Accessed on 13-12-2016)

Photo- 5.5: Web Page of the Institutional Repository of CIMFR-KRC, IR@CIMFR

5.3.7 CSIR-National Metallurgical Laboratory (CSIR-NML), Jamshedpur

The National Metallurgical Laboratory (NML), Jamshedpur is third among the Council of Scientific & Industrial Research (CSIR) laboratories. The NML formed as a part of the great plan that Sir Shanti Swarup Bhatnagar visualised in 1940, for making a network of research institutions that taking India advance in science and Technology. The foundation stone of NML was laid on 21.11.1946 by the first and only Governor General of independent India, Shri C. Rajagopalachari. The laboratory was formally inaugurated and dedicated to the nation by Pandit Jawaharlal on the 26th of November, 1950. Dr. Bal Raj Nijhawan was the first Director of the laboratory. The laboratory has been established its field stations at Howrah, Batala and Ahmedabad for addressing the problems of local foundry industry. It also initiated research on marine corrosion through the establishment of a Marine Corrosion Research station at Digha and extends another laboratories centre at Chennai.

5.3.7.1 Profile of NML- Knowledge Resource Centre (CMERI-NML)

The Knowledge Resource Centre of the NML is well known as Information Management & Dissemination Centre (IMDC). It supports NML Scientists with up to date R & D information backup by providing well organized library and knowledge resources, institutional repositories/archives, on-line access to global database, documentation, photography, reprographic and printing facilities. It also organizes sale of library information services and information products of the laboratory.

(Source: http://www.nmlindia.org and taken by camera)

Plate-5.6: Building of the CSIR-NML and Knowledge Resource Center's View

Establishment Year	:	1950
Address	:	Near Tata Steel gate No.1, Burma Mines, Jamshedpur- 831007, Jharkhand
Website	:	http://www.nmlindia.org/
Research Area	:	minerals, metals and materials
Library Name	:	Knowledge Resource Center and well known as IMDC
Library Link	:	http://library.nmlindia.org/index.htm
Library Hours	:	Monday to Friday (9:30 am to 6:00 pm)
Library Resource	:	WebOPAC: http://krc.nmlindia.org/ IR@CGCRI: http://eprints.nmlindia.org/ Current Journals: 100
Library Staff	:	There are total numbers of 14 staff working at NML-KRC.
Library Collection	:	

The NML-KRC has a collection of 50,000 books, 35,000 bound volumes, 80,000 current journals, 200 theses, 5000 reference tools, 500 CD-ROM, 10,000 newspaper clippings, 10,000 R& D reports, in- house publications 5,000 and standards/ patents 5,000.

Electronic Resources :

The NML-KRC provides access to Electronic resources through National Knowledge Resource Consortium (NKRC). NML-KRC has subscribed databases like Metal Abstract, Web of Science, SCOPUS and NUCSSI. The patent/standard available at NML-KRC is Delphion, ASTM and Derwent. The

institution has built digital library named as Knowledge Reference Library and also develop one Institutional Repository through Eprint gateway.

Institutional Repository:

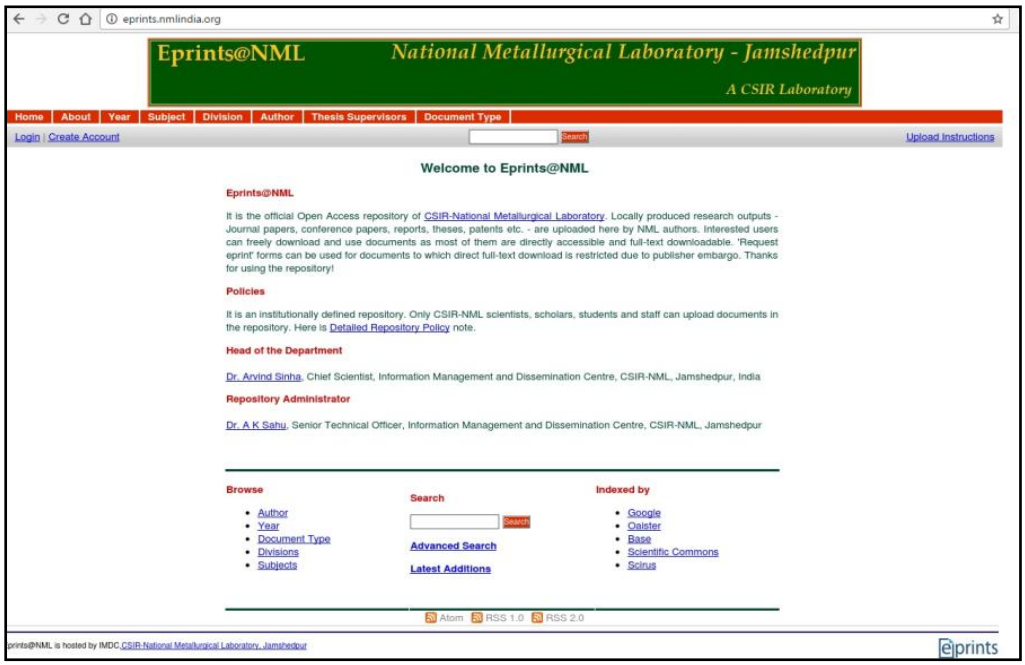
Eprints@NML is the Open Access Institutional Repository of National Metallurgical Laboratory, Jamshedpur. This repository encourages scientists of NML to submit self-archive post-prints of the journal papers as soon as it is accepted by the journal publishers and the scientists or publisher can also submit published version of the papers in case of non-availability of post-prints. Mediated archiving service is also provided by the repository administration team. The repository also facilitates self-archiving/mediated archiving of conference papers, theses and patents. As it an institutions own repository, so permission to upload document and create account facility are restricted to NML scientists and research scholars.

Knowledge Reference Library:

The NML-KRC or Information Management & Dissemination Centre (IMDC) have established Knowledge Reference Library which provide library knowledge resources, Institutional Repositories / Archives (both Print and Online), documentation, photography and printing facilities.

Library Services :

The NML-KRC mainly providing library reading materials, referral and reference service, R& D Alert services to the library users, Literature Search (both electronic and print), Selective Dissemination of Information service, Document Delivery service, Translation service on demand, Inter Library Loan, Current press clipping services, Reprints of articles and RR material. It also provides expert services in preparation & production of scientific and technical publications, providing photo coverage of NML R & D experiments and events, reprographic and binding document services.



Source: http://eprints.nmlindia.org/ (Retrieved on 13-12-2016)

Photo- 5.7: Web page of the NML-KRC's Institutional Repository Eprint@NML

5.3.8 CSIR-Central Mechanical Engineering Research Institute (CSIR-CMERI), Durgapur

In India, mechanical engineering technology has accounted for nearly half of the total technology imported. In terms of products, nearly one third of the value of total imports is for mechanical engineering equipment. In order to develop indigenously mechanical engineering technology for the industries so that R&D can play a key role in self-reliance, the Central Mechanical Engineering Research Institute at Durgapur, West Bengal was established in February 1958 with the specific task of development of mechanical engineering technology.

The Central Mechanical Engineering Research Institute (CMERI) is the apex R&D institute for mechanical engineering under the aegis of the Council of Scientific and Industrial Research (CSIR). Being the only national level research institute in this field, CMERI's mandate is to serve industry and develop mechanical engineering technology so that India dependence on foreign collaboration is substantially reduced in strategic and economy sectors. Besides, the institute is facilitating innovations and

inventions for establishing the claims of Indian talent in international fields where Indian products shall ultimately compete.

In the new millennium, CMERI is poised to expand its horizon of research activities so as to steer the country forward in cutting-edge and sunrise fields.

In India, mechanical engineering technology has accounted for nearly half of the total technology imported. In terms of products, nearly one third of the value of total imports is for mechanical engineering equipment. In order to develop indigenously mechanical engineering technology for the industries so that R&D can play a key role in self-reliance, the Central Mechanical Engineering Research Institute at Durgapur, West Bengal was established in February 1958 with the specific task of development of The Central Mechanical Engineering Research Institute (CMERI) is the apex R&D institute for mechanical engineering under the aegis of the Council of Scientific and Industrial Research (CSIR). It has a Knowledge Resource Centre with comprehensive collection of literatures predominantly related to mechanical engineering and its allied areas for meeting the present and future information needs of its users. Some of the major services rendered by the library are reference, reprographic, database search services, audio-visual facility, articles supply on request, documentation services like CAS, bibliographic and such other services. The automated library system greatly facilitates searching for books, journals, articles etc. The Knowledge Resource Center of CMERI is a two storied separate building with a well furnished air-conditioned reading room, an electronic library, bound journals, standards and other documents. The library holdings are accessed by a computerized Online Public Access Catalog (OPAC).

5.3.8.1 Profile of the CMERI- Knowledge Resource Centre (CMERI-KRC)

The Knowledge Resource Center of CMERI facilities are housed in a two storied separate building comprising an area over 15000 sqft (1350 sqm) with a well furnished air-conditioned reading hall. An Electronic Library built on the most modern lines in the ground floor of the building. The bound journals, standards and other documents are stored in the first floor.

Source: http://www.cmeri.res.in and taken by the camera

Plate- 5.7: Building of the CSIR- CMERI and View of Knowledge Resource Center

Establishment Year	:	1958
Address	:	Durgapur, West Bengal
Website	:	http://www.cmeri.res.in/
Research Area	:	Mechanical Engineering Technology
Library Name	:	Knowledge Resource Center
Library Link	:	http://www.cmeri.res.in/abt/library1.html
Library Hours	:	Monday to Friday (9:30 am to 5:30pm)
Library Staff	:	Librarian -1, Technical Officer (III)-2, and Technician (I) - 1.
Library Collection	:	

The CMERI-KRC has a good collection of literature related to mechanical engineering and its allied areas to meet the information needs of its users. The KRC have collection of more than 65,000 documents including books, bound journals, standards, CD-ROMs etc. The total numbers of current journals are 103.

Electronic Sources :

The KRC have a collection of CD-ROM databases namely EI-COMPENDEX (Engineering index from 1990-2004), Current Contents- ECT (Engineering, Computing & Technology), Full-Images of US Patents on CD-ROM (1988-1999) & now it is available free in public domain, INPAT (Bibliographic database on Indian Patents from 1972-1997), ASTM standards on CD-ROM, BIS & BSI standards catalogue on CD-ROM, Failure Analysis on CD-ROM and NUCSSI (National Union Catalogues of Scientific Serials in India) on CD-ROM. CMERI-KRC provides access to electronic resources through CIR-NISCAIR's National Knowledge Resource Consortium (NKRC). The KRC have access 1800 Elsevier journals, ASME journals, American Chemical Society, Springer, Blackwell publishers, Royal Society of Chemistry, Cambridge University Press, American Institute of Physics and Oxford University Publications. The other full text journals that KRC have access are Journal of Robotic systems, Journal of Structural Engineering, Rapid Prototyping Journal, Interfaces Journal and Journal of Advanced Manufacturing Systems (JAMS). CMERI OPAC can be access at http://opac.cmeri.res.in. The institutional repository of CMERI is IR@CMERI shown in the **Photo- 5.6**.

Library Services :

The major services rendered by the CMERI-KRC are reference service, reprographic service, database search services, and audio-visual facility, articles supply on request, documentation services like CAS, bibliographic/current content service, and computerized issue/return services. The automated library system greatly facilitates searching for books, journals, articles etc. The other services provided by the KRC are Online Public Access Catalogue (OPAC) and Inter-library loan service.

Source: http://cmeri.csircentral.net/ (Accessed on 13-12-2016)

Photo- 5.6: Image of the Institutional Repository of CMERI, IR@CMERI

5.4 ABOUT NATIONAL KNOWLEDGE RESOURCE CONSORTIUM (NKRC)

The National Knowledge Resource Consortium (NKRC), established in year 2009, is a network of libraries and information centers of 39 CSIR and 24 DST institutes. NKRC's origin goes back to the year 2001, when the CSIR set up the Electronic Journals Consortium to provide access to 1200 odd journals of Elsevier Science to all its users. Over a period of time, the Consortium not only grew in terms of the number of resources but also in terms of the number of users as more like-minded institutes evinced interest to join the Consortium.

Today, NKRC facilitates access to 5,000+ e-journals of all major publishers, patents, standards, citation and bibliographic databases. Apart from licensed resources, NKRC is also a single point entity that provides its users with access to a multitude of open access resources. The Consortium envisions emerging as a leader to serve the R&D sector with much needed information to strengthen the research and development system in the country. It is maintained by CSIR-NISCAIR (CSIR- National Institute of Science Communication and Information Resources). The web page of the NKRC is shown in the **Photo- 5.7**.

Source: http://nkrc.niscair.res.in/indexpage.php (Accessed on 15-12-2016)

Photo-5.7: Home Page of the National Knowledge Resource Consortium

In 2001, the CSIR E-journal Consortium was started with its 40 laboratories and this was the first milestone of the national level consortium. In 2009, with the inclusion of other 23 DST laboratories the CSIR E-journal Consortium was renamed as National Knowledge Resource Consortium (NKRC). Today NKRC is one of the biggest national consortia in terms of investment and its nodal partners in the global map. From the above discussion it is seen that electronic resources through NKRC excellent service to all the CSIR & DST laboratories mainly the laboratories of Eastern India under study. All the five CSIR laboratories are very important laboratories of our country. The research outputs of all the five laboratories are excellent over the years. Scientists of these laboratories are required up-to-date and pinpointed scholarly information for the Research and Development activities which can be possible through NKRC. But the only problem is that some of the major publishers of S & T like ACS, Springer, and Elsevier etc. are not showing keen interest in consortia model of pricing and it's quite demoralizing that they are more interested towards subscription model of individual laboratories. The consortia approach is more cost effective for all the laboratories, where with minimum cost the respective laboratories may access more e-resources.

5.5 CONCLUSION

The Science and Technological institutions are the place where knowledge is generated as a result of the research and developmental activities undertaken by their scientific staff. The Laboratories/ institutions of Council of Scientific and Industrial Research (CSIR) along with their field stations are dedicated to research and development works in well- defined areas. CSIR is the major organization comes under the Department of Scientific and Industrial Research (DSIR). CSIR plays an important role for the national development. The above chapter briefly discusses about the CSIR, organizational structures, CSIR Laboratories in India, CSIR laboratories of North East and Eastern India, brief profile of the Knowledge Resource Centers of the selected laboratories and about National Knowledge Resource Consortium (NKRC). The further chapter provided detail analysis and interpretations of the data collected during survey (**Chapter- 6**).