Library resources and services in Indian Institutes of Technology

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Describes role of the Indian Institutes of Technology (IITs) in higher education and research in engineering, sciences and technology in the country. Each IIT has a well resourced Central Library to support their academic and research mission. This paper comprehensively studies the functioning, the resources and the services of these libraries. The level of automation, availability of ICT infrastructure, access to electronic resources and the digital library initiatives taken by these libraries are also discussed. These libraries are an integral part of the IIT System and are highly valued by their users for their services, highly skilled staff, and easy-to-use collections. It is suggested that these libraries need to move to the next level of technological up-gradation including application of cloud computing to improve their resources and services.

Introduction

IITs are apex institutions for engineering education and research, and owe their existence to the visionary leadership of India's first Prime Minister, late Pandit Jawaharlal Nehru. The main objective of IITs is to impart world-class training in engineering and technology, and to conduct research in the relevant fields for advancement of learning and dissemination of knowledge. At present, there are sixteen Indian Institutes of Technology (IITs) at Bombay, Delhi, Kanpur, Kharagpur, Madras, Guwahati, Roorkee, Hyderabad, Patna, Bhubaneshwar, Ropar, Jodhpur, Gandhinagar, Indore, Mandi, and BHU Varanasi. Out of these, first seven are governed by The Institutes of Technology Act, 1961 which has declared them as "Institutions of national importance", and lays down their powers, duties, framework for governance etc. The eight new IITs are registered as society under Society Act. However, an amendment to the "Institutes of Technology Act 1961" has been introduced in the Parliament to cover the new IITs and also declare them as the Institutes of National Importance. The new Institutes are in various stages of consolidation and development.

IITs offer undergraduate programmes in various branches of engineering and technology, postgraduate programmes with specialization, and Ph. D. programmes in various engineering and science disciplines and in interdisciplinary areas, and conduct basic, applied and sponsored research.

At present, IITs offer B. Tech., B. Arch, M. Sc., M. Design, M. Phil., M. Tech, MBA and Ph. D. Degrees. The quality of teaching and research in IITs is of international standards. The Institutes are continuously evaluating and modifying curricula as per the emerging trends in the industry. They also contribute to updating the knowledge of faculty of other Engineering Colleges through Quality Improvement Programmes. IITs have been effective in enhancing the country's techno-economic strength and technological self reliance, and have distinguished themselves for excellence in their academic and research activities. Sponsored research for different funding agencies in the public and private sectors, industrial consultancy and continuing education programmes are also areas in which the IITs have made significant contribution. As part of the national plan of science and technology, five Centers of Advanced Study and Research have been set up in the Indian Institutes of Technology in Energy Studies (Delhi), Material Science (Kanpur), Cryogenic Engineering (Kharagpur), Ocean Engineering (Madras) and Resource Engineering (Bombay)[1].

This study attempts to present a comprehensive and up to-date overview of library services and their resources including electronic resources, ICT applications, and other activities including developments related to digital libraries in 7 old IITs as the library services in new IITs are still under development.

Sl. no.	IITs	State	Year of Estt.	Web Site Addresses
1	IIT Kharagpur	West Bengal	1951	http://www.iitkgp.ac.in
2	IIT Bombay, Mumbai	Maharashtra	1958	http://www.iitb.ac.in
3	IIT Madras, Chennai	Tamil Nadu	1959	http://www.iitm.ac.in
4	IIT Kanpur	Uttar Pradesh	1960	http://www.iitk.ac.in
5	IIT Delhi	New Delhi	1961	http://www.iitd.ac.in
6	IIT Guwahati	Assam	1994	http://www.iitg.ac.in
7	IIT Roorkee	Uttarakhand	2001	http://www.iitr.ac.in
8	IIT Hyderabad	Andhra Pradesh	2008	http://www.iith.ac.in
9	IIT Patna	Bihar	2008	http://www.iitp.ac.in
10	IIT Gandhinagar	Gujarat	2008	http://www.iitgn.ac.in
11	IIT Bhubaneswar	Orissa	2008	http://www.iitbbs.ac.in
12	IIT Ropar	Punjab	2008	http://www.iitrpr.ac.in
13	IIT Jodhpur	Rajasthan	2008	http://www.iitj.ac.in
14	IIT Indore	Madhya Pradesh	2009	http://www.iiti.ac.in
15	IIT Mandi	Himachal Pradesh	2009	http://www.iitmandi.ac.in
16	IIT BHU	Uttar Pradesh	2012	http://www.iitbhu.ac.in/

Table 1—IITs in India: Basic facts

IIT Libraries

The library system in IITs revolve around a large, well maintained and modernized Central Library in every institute. The main thrust at these libraries is to facilitate creation of knowledge through acquisition, organization, and dissemination of their information and knowledge resources, and provision of user responsive services. In addition to the print and digital resources accessible via library website and supported by competent and committed staff, these libraries offer an ambiance which makes them the most lively place on the campus providing a safe, comfortable and friendly environment. Although some of the IITs like Delhi, Kharagpur, Madras, and Roorkee also have small departmental libraries, Central Libraries remain at the centre of all the academic and research programmes of these institutes.

These libraries have been the focus of several research studies in India because of their superior infrastructure, excellent collection, better quality of services, and highly motivated staff. In 1992, Saibaba conducted a study on cooperation and networking among engineering and technological libraries with special reference to IIT libraries[2]. Rao (1993) studied the resources, services and uses of IIT libraries and suggested to set up a library and information network[3]. Singh (1994; 1999) made an evaluative study of growth, development and services of IIT libraries[4-5]. Some of the other important studies covering aspects like infrastructure, resources and services[6], collection development and access to serials[7], computer applications[8], use of e-resources/ e-journals[9-10], digital repositories[11-12], digital library initiatives[13], web portals[14-15], and web OPACs[15] have also been conducted.

Resources

Central Libraries in IITs have adequate, well furnished and multi-purpose spaces, better infrastructure, and facilities to accommodate their collections, services areas, reading areas, digital library area, staff area and other utilities. IIT Bombay, Delhi, Kanpur, Madras, and Roorkee have independent buildings for their libraries. It is housed in Computer and Communication Centre in IIT Guwahati, while it is a part of the big administrative building in IIT Kharagpur.

These libraries have document collections in print ranging from 118000 to 434000 volumes comprising of books, reports, theses, standards, atlases, patents and journal back volumes. The non-book collections include material like microfiche/microfilm, audio, audiovisual, and CDs/DVDs. They also maintain a Book Bank containing textbooks which are loaned for a semester to the students belonging to socially and economically weaker sections of the society. The print collections of these libraries are one of the best and largest resources of information in engineering, sciences and technology in that part of the country. In fact, these libraries serve as regional information centres as they extend their services to corporates, industrial houses, academic and research institutions, and professionals.

Table 2—IIT libraries : Basic facts

Sl. no	Institution	Name of the library	No. of books	No. of students	No. of faculty	URL
1	IIT Kharagpur	Central Library	380 000	8000	530	http://www.library.iitkgp.ernet.in
2	IIT Bombay	Central Library	434 000	7129	535	www.library.iitb.ac.in
3	IIT Kanpur	P K Kelkar Library	300 000	7551	492	http://library.iitk.ac.in/
4	IIT Madras	Central Library	400 000	7200	489	http://www.cenlib.iitm.ac.in
5	IIT Delhi	Central Library	338 000	6893	519	http://library.iitd.ac.in
6	IIT Guwahati	Central Library	118 000	3307	264	http://iitg.ernet.in/lib/
7	IIT Roorkee	Mahatma Gandhi Central Library	320 000	6143	373	http://mgcl.iitr.ac.in/

Table 3—Working hours of IIT Libraries

Sl. No.	Library Hours	IITKG	IITB	IITK	IITM	IITD	IITG	IITR
1	Week days (Mon-Fri)	0800–2400 hrs	0900–2300 hrs	0800–2400 hrs	0900–2400 hrs	0900–2100 hrs	0800–2300 hrs	0830–2200 hrs
2	Holidays Sat, Sunday & Other holidays	0800–2400 hrs	1000–1700 hrs	0900–2400 hrs (Sat) 0900–1730 hrs	0900–1730 hrs	1000–1800 hrs	0930–1730 hrs	0945–1830 hrs
3	During Exams	0800–2400	0900–0100 hrs	Open Round the clock	0900–2400 hrs	0900–2400 hrs	0800–2300 hrs	0830–2200 hrs
4	Circulation facility	0900–2000 hrs	0900–2000 hrs	0900–2100 hrs.	0830–2030 hrs	0900–1715 hrs	0930–1730 hrs	1030–1900 hrs
5	Circulation facility on holidays	1000–1200 & 1630–1830 hrs	1100–1300 hrs	0900–1600 hrs on Sat. only	0900–1700 hrs	closed	closed	Closed
6	Closed holidays	Institute holidays (19 days)	5 days in a year	National holidays	7 days in a year	6 days in a year	Institute holidays	Institute holidays (11 days)

IIT libraries are among the first few in the country to automate their functioning using tools and techniques of Information and Communication Technologies. They are part of the institute-wide networks and have adequate computing infrastructure to cater to the needs of the users. The library buildings are WI-FI-enabled which facilitates users to bring in their laptops to have seamless access to print and electronic resources. The OPAC (On-line Public Access Catalogue) is one of the most heavily used databases in IITs and is also accessible 24x7. All resources and services are accessible through library home pages.

Services

Although all e-resources are accessible across the campus on institute-wide network, IIT libraries still remain open for fairly long hours on week days and limited hours on holidays for reference, consultation and loan transactions. IIT Kanpur library remains open round the clock during the examinations (Table 3). They also observe a minimum number of holidays in a year so that the users have access to uninterrupted library services.

These libraries offer a range of services including reference and consultation, membership and circulation, document delivery, resource sharing, information alert service, book bank for needy students, user awareness programmes, and ICT-enabled web-based services. In addition to their students, faculty, and staff, these libraries extend their services to professionals, industrial and corporate houses, academic and research organizations in their regions either free of charges or on the payment of a nominal fee. A detailed list of services offered by these libraries has been given in the Table 4.

IIT libraries place greater emphasis on user education to inform, alert, educate and train users about various resources and services. In addition to orientation programmes organized for new students, the libraries conduct short duration training programmes on "How to Use" various databases for the faculty and students so that they are able to use these resources more effectively. These libraries also organize interactive sessions on "Enhancing User Awareness" for new faculty and research scholars to familiarize them with various resources and services.

Table 4—Services offered by IIT libraries

Sl. no.	Library Service	IITKg	IITB	IITK	IITM	IITD	IITG	IITR
1	Reference Service	√	√	√	√	√	√	√
2	Circulation	√	√	√	√	√	√	√
3	Membership	√	√	√	√	√	√	√
4	Photocopying service	√	√	√	√	√	√	√
5	Inter-library loan	√	√	√	√	√	√	√
6	Book Bank	√	√	√	√	√	√	√
7	Video information service	√	√	√	√	√	√	√
8	Database search / Internet access	√	√	√	√	√	√	√
9	OPAC / Web OPAC	√	√	√	√	√	√	√
10	ETD	√	√	√	X	√	X	X
11	Institutional Repository	√	√	X	X	√	X	X
12	User education / awareness	√	√	√	√	√	√	√
13	Consultancy service	X	√	X	X	√	X	√
14	Conferences / Workshops	√	√	X	√	√	X	√
15	Membership to Industrial & Corporate houses	√	√	X	√	√	X	√
18	Membership to Engineering colleges	√	√	X	√	X	X	X
19	Membership to Alumni, Retired faculty/Officers	√	√	X	X	√	X	√
20	Membership to individuals	√	X	X	X	√	X	√
21	Departmental libraries	√	X	X	√	√	X	√

IIT libraries also organize training workshops, seminars and conferences on currents topics of interest for library and information professionals to help them upgrade their knowledge and skills. IIT Bombay, Delhi, Kharagpur and Madras also conduct one to two years of internship programme for fresh graduates / postgraduates in library and information science to offer them on-the-job training.

E-Resources at IIT Libraries

As stated earlier, IITs have some of the most modernized libraries in the country and are pioneers in adopting latest tools and techniques of Information and Communication Technologies (ICT) to provide quality services to their users. They have been using E-Resources since early-1990s' in the form of CD-ROMs. With the expansion of Internet, and the availability of all important information sources in electronic form in mid-1990s, IIT Libraries have been acquiring a large number of web-based E-Resources for their users[8]. Thanks to the formation of a national consortium – INDEST-AICTE Consortium[16] with the support of the Ministry of Human Resource Development, Government of India, IIT Libraries now have access to over 15000 full-text e-journals, e-books, and databases which can be accessed through library home page both on and off-the-campus to all users.

Table 5—E-Resources subscribed through INDEST-AICTE Consortium

Sl. no.	E-Resource
1	ABI/Inform Complete
2	ACM Digital Library
3	Annual Reviews
4	American Society of Civil Engineering Journals
5	American Society of Mechanical Engineering Journals (+ A M R)
6	Capitaline
7	CRIS INFAC Industrial Information
8	EBSCO Database
9	Elsevier's Science Direct
10	Emerald Full-text
11	Euromonitor (GMID)
12	IEC Standards
13	IEEE/IEE Electronic Library Online (IEL)
14	INSPEC on EI Village
15	MathSciNet
16	Nature publications group
17	Optical Society of America(Optics Infobase)
18	Project Muse
19	SciFinder Scholar
20	SCOPUS Database
21	Springer Link
22	Web of Science

In addition to above, IIT Libraries are subscribing to various other sources individually or in cross-sharing mode. Complete listing of all E-Resources subscribed to by individual IIT Libraries can also be seen on their respective web pages.

Table 6—E-Resources subscribed by IITs from their own resources

Sl. no.	E-Resources Publisher / Package	IITB	IITD	IITG	IITK	IIT Kg	IITM	IITR
1	ACS Journals	√	√	√	√	√	√	√
2	AIAA Journals	√	X	X	X	X	√	X
3	AIP/APS/AVS	√	√	√	X	√	X	X
4	AJP Package	X	X	X	√	X	X	X
5	American Waste Management Association	√	X	X	X	√	X	X
6	American Ceramic Society	√	X	X	X	√	X	X
7	American Economic Association Journals	√	√	X	X	√	X	X
8	American Geophysical Union	√	√	X	X	√	X	X
9	American Mathematical Society	√	√	√	X	√	√	√
10	AMS Books Online	X	X	√	X	X	X	X
11	American Meteorological Society	√	√	X	X	X	X	X
12	American Society for Microbiology	X	X	X	X	√	X	X
13	American Society Of Agronomy	X	X	X	X	√	X	X
14	American Society Of Plant Biologists	X	X	X	X	√	X	X
15	ASBMB journals	√	X	X	X	X	X	X
16	ASCE Proceedings	√	X	X	X	X	X	X
17	ASTM Standards & Digital Library	√	√	√	X	X	√	X
18	Biological Abstract	X	X	X	√	X	X	X
19	BioMed Central (Free in Biology & Medicine	X	X	X	X	X	X	√
20	BioOne Journals	√	X	X	X	X	X	X
21	Biotechnology & World Textiles Abstract	X	√	X	X	X	X	X
22	Bowker's Global Books in Print	X	X	X	√	X	X	X
23	Cambridge University Press Journals	√	√	√	X	√	√	X
24	Cell Package	√	X	X	√	X	X	X
25	CMIE Database	√	√	X	√	X	X	X
26	Company Law Publishers	X	X	X	X	√	X	X
27	Crisil Research	√	X	X	X	X	X	X
28	Cumulative Book Index	X	X	X	√	X	X	X
29	Ebrary e-Book collection	X	√	X	X	X	X	X
30	EBSCO Textile & Technology Complete	X	√	X	X	X	X	X
31	EBSCO– SOC, Humanities, Psychology.	X	X	√	√	X	X	X
32	EdITLib: Education and Information Technology Digital Library	√	X	X	X	X	X	X
33	EJ Website	X	X	X	X	X	X	√
34	Encyclopedia of science & technology	X	X	X	√	X	X	X
35	Geological Society Journals	√	X	X	X	X	X	X
36	Geological society of America journals	√	X	X	X	X	X	X
37	Hindwai Publications Under Institutional Membership	√	X	X	X	X	√	X
38	ICE/ Thomas Telford Journals	√	√	√	√	√	√	√
39	IAHR Hydrolink Package	√	X	X	√	X	X	X
40	IATUL Package	√	X	X	√	X	X	X
41	ICSD : Inorganic Crystal Structure Database	√	X	X	X	X	X	X
42	IEICE Transaction	X	X	X	X	√	X	X
43	Imech E Publications current and Archives (PEP)	√	√	X	√	√	√	√
44	InderScience publisher	√	X	X	X	√	√	X
45	Indian Journals.com	X	X	X	X	X	X	√
46	INFORMS	√	√	X	X	√	X	X
47	INSIGHT	√	√	√	√	√	√	√
48	Institute of Mathematical Statistics Journals	√	X	X	X	X	X	X
49	Institute of Physics	√	√	X	√	√	X	√
50	ISI Emerging Markets.	X	√	X	X	X	X	X
51	J-Gate (Informatics)	X	X	X	X	X	X	√
52	Japan Inst. Of Metals	X	X	X	X	√	X	X
53	Japan Publication Trading Co	X	X	X	X	√	X	X

Contd.

Table 6—E-Resources subscribed by IITs from their own resources (Contd.)

Sl. no.	E-Resources Publisher / Package	IITB	IITD	IITG	IITK	IIT Kg	IITM	IITR
54	JCR : Journal Citation Reports	√	√	X	X	X	√	X
55	JoVE : Journal of Visualized Experiments	√	X	X	X	X	X	X
56	JSTOR	√	√	√	√	X	√	√
57	Lecture Notes - Springer Book Series	√	√	√	X	X	X	X
58	Lippincott Williams Wilkins	X	X	X	X	X	√	X
59	Library and Information Science Abstracts	X	X	X	√	X	X	X
60	Maney Publishers	√	X	X	X	√	X	X
61	Materials Sci & Engg (Trans-Tech Publications)	√	X	X	X	√	X	X
62	Mathematics Backfiles	X	X	√	X	X	X	X
63	MIT Press	√	X	X	X	√	X	X
64	Multi-Science Publishing Journals	√	X	X	X	X	X	X
65	MyiLibrary (26 Titles),	X	√	X	X	X	X	X
66	National Geographic	X	X	X	√	X	X	X
67	Nature Archives 1980-1996	X	√	X	X	X	X	X
68	New Scientist	√	X	X	X	X	X	X
69	NISCAIR Publications	√	X	X	X	X	X	√
70	NOW Publishers package	X	X	X	√	X	X	X
71	NRC Press Journal	√	X	X	X	X	X	X
72	NTRL Database	X	X	X	√	X	X	X
73	OnePetro	X	X	X	X	X	√	X
74	Oxford Dictionary	X	X	√	√	X	X	X
75	Oxford University Press Journals	√	√	X	X	X	√	X
76	Palgrave - Macmillan Journals	√	X	X	X	√	X	X
77	Pion Ltd	X	X	X	X	√	X	X
78	PNAS: Proceedings of the National Academy of Sciences	√	√	√	√	√	√	√
79	POIESIS : Philosophy Online Journals	√	X	X	X	X	X	X
80	Project EUCLID Journals	√	X	X	X	X	X	X
81	Proquest Dissertations & Theses A+ B	X	X	X	√	X	X	√
82	Proquest Science (Earlier ASTP) 1994 onwards	X	X	√	X	X	X	√
83	PsycARTICLES	√	X	X	X	X	X	X
84	PV-Tech	√	X	X	X	X	X	X
85	Royal Institute Of Naval Architecture	X	X	X	X	√	X	X
86	Royal Society London	√	X	X	X	√	√	√
87	Royal Society of Chemistry	√	√	X	X	√	√	√
88	Sage Journals	√	√	X	√	√	√	√
89	Science Online	√	√	X	X	√	X	√
90	Seismological Society of America	√	X	X	X	X	X	X
91	SIAM - Locus(Archives) Journals	√	√	X	√	√	√	√
92	Society For Sedimentary Geo	X	X	X	X	√	X	X
93	SPIE : Optical Engineering	√	X	X	X	X	X	X
94	Springer Journal Archives	√	X	√	X	X	X	X
95	Steel and Composite Structures	X	X	X	√	X	X	X
96	Tata McGraw Hill Books	X	X	X	X	X	X	√
97	Taylor & Francis Journals	√	√	√	√	√	√	√
98	Thieme - Chemistry journals	√	X	X	X	X	X	X
99	Thieme Med & Sc Publication	X	X	X	X	√	X	X
100	Thieme – Science of synthesis	√	X	X	X	X	X	X
101	Tissue Engineering A+B+C	X	X	X	√	X	X	X
102	Transportation Research Board	√	X	X	X	X	√	X
103	Ulrich on Disk	X	X	X	√	X	X	X
104	University Of California Press	X	X	X	X	√	X	X
105	University Of Chicago Press	√	X	X	X	√	X	X
106	University Of Illinois Press	X	X	X	X	√	X	X
107	Wichtig Editore	X	X	X	X	√	X	X
108	Wiley / Blackwell Journals	√	√	X	√	√	√	√
109	World Scientific Journals	√	√	X	X	√	X	X
110	World Textiles	X	√	X	X	X	X	X

Digital Library initiatives at IIT Libraries

IIT Libraries were also among the first few to move towards creation of digital libraries of research publications including research articles (preprint/post print), technical reports, administrative documents, course notes, learning objects, theses, dissertations and other education and research material (free from copyright restrictions) either by digitization of items from their collections or using digitally born material.

IIT Bombay library has been the first in the country to support online submission of theses and dissertations using software developed in-house since 1998 and has a database of over 5000 full text e-theses and dissertations (http://etd.library.iitb.ac.in/etd/index.jsp). Further, out of 7 IITs under this study, IIT Bombay, Kharagpur, Kanpur, and Roorkee are using DSpace Software for creating institutional repositories (IRs). IIT Kharagpur, Kanpur and Roorkee also uses DSpace for electronic submission of theses and dissertations[11,13]. IIT Delhi uses Eprint software for both. IIT Bombay, IIT Delhi, IIT Kanpur and IIT Roorkee IRs are listed in the Open DOAR (http://www.opendoar.org/countrylist.php?cContinent =Asia). IIT Bombay's IR has one of the largest number of records (over 14000).

Conclusion

IIT Libraries are examples of superior infrastructure, efficient services and customer-responsive organizations. In addition to housing excellent print collections, these libraries have acquired access for their users to a large number of electronic resources in engineering, sciences and technology. These resources have helped the students, faculty and research scholars in their academic and research pursuits. These libraries are valued by the users for their support in academic and research mission through user-focused services, highly skilled staff, and easy-to-use collections. However, these libraries need to invest more in order to move to the next level or modernization so that they retain their position of eminence. Some of the areas needing attention urgently are given below:

a) Most of the library buildings are quite old and require major renovation not only to improve the facilities and ambiance but also be able to create a variety of spaces for different types of user requirements including Information Commons, Interactive and Group Study Areas etc.

b) IIT libraries shall adopt some of the web 2.0 techniques to make their home pages and web OPACs more interactive where users can communicate with and contribute to the library.

c) These libraries have acquired access to several thousand e-resources for their users who have to shift from one platform to another in search of relevant information. It is high time they decide and subscribe to a good federated search engine or a discovery service which can help users search the needed information across databases/platforms.

d) On technology front, IIT libraries must plan to use application of cloud computing which will free them from hassles of managing technology and focus on resource building, improved services and innovation.

e) INDEST-AICTE Consortium shall be used as a good platform for increasing collaboration, technology development and application, and sharing of resources and expertise among the IIT libraries and beyond.

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