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- "Strategy to Develop the World Class Universities", Shroff Publishers
- "Technology-Storms Redefining World Class Universities", Shroff Publishers
- "113 Difficulties in Developing World Class Universities", Shroff Publishers
- "Washington Accord & Multi-Objective Integrated Model for Developing WCU", Shroff Publishers
- "Innovation - Growth Engine for Nation - Nice Buzzword but Often Misunderstood", Shroff Publishers

He has more than 330 research papers to his credit. He has guided 9 PhD scholars, 35 MTech scholars and more than 10 PhD research scholars are working on various subjects like Digital Forensics / Cyber Security, Software / Usability Engineering, HCI, Mobile Computing, E-Commerce, E-Learning etc. He has delivered numerous Keynote addresses at international conferences and serves on several International advisory boards. He is on editorial or review board of prestigious International Journals and worked as a Reviewer for dozens of International Conferences and journals. His details are available at <http://www.dharaskar.com>

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Secrets of Success of IIIT Model

Dr. Rajiv V. Dharaskar



Seventh Title in the Series of Books on World Class Universities or Institutes

## Secrets of Success of IIIT Model Can Rejuvenate & Ignite Engineering Education in India

IIIT is the Most Successful Self-Sustainable Research University Model with unique blend of Education, Research and Industry Partnerships. It matches perfectly with the concept of "University of 21st Century" in the Era of Knowledge-based-Society. The IIIT-B, IIIT-D and IIIT-H are the market leaders. They have developed this successful model after one and half decade long struggle. All the established engineering institutes have potential to become IIITs, which are fastest growing Top Ranking T-Schools in India.

### The salient features of Self-Sustainable Industry Supported IIIT Research University Model are

- Self-Sustainable Industry Supported IIIT Research University Must be located in Metros or in the middle of IT Industry Hub
- 40% Income Generation through industry oriented Research & Technology Transfer
- Government provides only Land and Buildings either directly or through PPP model
- Intensive Search for internationally renowned faculty by conducting interviews at USA
- 40% to 75% faculty with PhD from World Renowned Universities & remaining from IIT- / IISc
- Industry supported Research Centers, Labs, Chair Professors, Scholarships and Research Grants
- During Internship, opportunity to do research and project work at many foreign universities
- Controlled by BOG, which consists of renowned persons from academics and IT industry
- Not having departments, organizing structure around Research Groups / Centers / Labs
- Involving industry as partner, involving them in curriculum design and teaching too
- Building strong international linkage through internationally qualified faculty
- More weightage to coding and problem solving. Establish "Coding Culture"
- US University style salary structure and service conditions
- International Curriculum with high degree of flexibility
- Nurturing Innovative Minds through Innovation Culture
- Business Innovations through Incubation Center
- Strictly merit based admission process
- Fruitful international collaborations
- Active Alumni involvement
- Visionary Vice Chancellor

In this book, the major issues of IIIT Model have been highlighted, which need to be addressed for establishing best IIIT. In addition to this Hybrid Model for boosting Engineering Institutes in India has been suggested.

Compiled By  
Dr. Rajiv V. Dharaskar



## ***Secrets of Success of IIT Model*** **Can Rejuvenate & Ignite Engineering Education in India**

IIT is the Most Successful Self-Sustainable Research University Model with unique blend of Education, Research and Industry Partnerships. It matches perfectly with the concept of “University of 21st Century” in the Era of Knowledge-based-Society. The IIT-B, IIT-D and IIT-H are the market leaders. They have developed this successful model after one and half decade long struggle. All the established engineering institutes have potential to become IITs, which are fastest growing Top Ranking T-Schools in India.

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40% to 75% faculty with PhD from World Renowned Universities & remaining from IIT / IISc  
Industry supported Research Centers, Labs, Chair Professors, Scholarships and Research Grants  
During Internship, opportunity to do research and project work at many foreign universities  
Controlled by BOG, which consists of renowned persons from academics and IT industry  
Not having departments, organizing structure around Research Groups / Centers / Labs  
Involving industry as partner, involving them in curriculum design and teaching too  
Building strong international linkage through internationally qualified faculty  
More weightage to coding and problem solving. Establish “Coding Culture”  
US University style salary structure and service conditions  
International Curriculum with high degree of flexibility  
Nurturing Innovative Minds through Innovation Culture  
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Fruitful international collaborations  
Active Alumni involvement  
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**Dr. Rajiv Dharaskar**

# **Secrets of Success of IIT Model**

By Dr. Rajiv V. Dharaskar

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Founder Director, IIIT-Hyderabad



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1.	Hon. President of India, President's Secretariat, Rashtrapati Bhavan, New Delhi	Thanks for your mail and also for sharing inputs on a very important subject.
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30.	Maj Gen S C Jain, VSM, Director, Army Institute of Management, Kolkata	Our thanks and gratitude for writing such books which are the present need of our Nation. We all salute you.
31.	Dr. N. Sathyamurthy, Director, IISER Mohali (on deputation from IITK)	Thank you for your mail and letting me download a soft copy....I appreciate your efforts in putting such a document together.
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34.	Mr. Jagdish Shukla, President, Vadodara Innovation Council	..for writing this book on very important subject in today's context.
35.	Dr. S. S. Thipse, Deputy Director, Power Train Engineering, The Automotive Research Association of India, Pune	I am sure this new book of yours will benefit the research community as whole. I found the case studies really inspiring.
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46.	Mr. Yogesh Kumar, Joint Director, Institute of Applied Manpower, Research Planning Commission, Govt of India	Your endeavors would pave the way putting Developing World Academic Excellence to the fore page of World Academia :Thanks for sharing it with doyens of Indian Education Excellence
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52.	Mr. Bhupendra S Mandlia, Registrar, Geetanjali University, Udaipur Rajasthan	Thanks for sharing such a nice book....It is a very interesting compilation of the challenges faced by today's institutes of higher learning. Congratulations for the great response that you got for it.
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56.	Dr. Sasipalli VS Rao, Center for Excellence in Computer Technology, Hiroshima University, <b>Japan</b>	You have brought very important information in the form of a book. I went through the book and impressed with the contents.
57.	Dr. Durgesh Bailoor, Faculty of Dentistry, University of Taif, <b>Saudi Arabia</b>	I have just started reading your book 'Innovation' as usual your genius shows thorough. You are a wonderful and prolific writer. Keep the engine going, I sincerely hope that the policy makers in India are taking a deep interest in your writings. God bless you

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62. Dr. M.C. Paul, Professor, School of Social Sciences, Jawaharlal Nehru University, New Delhi	I am sure it will catch the imagination of the new generation who believe in innovation and progress.
63. Dr. Partha S Mallick, Professor and Dean, School of Electrical Engineering, VIT University, Vellore	It is my pleasure to Congratulate You for your outstanding work and contributions. As the Coordinator of "World Ranking" Committee of our University, I have been working/studying on this area since the last 2-3 years. I ready many articles, reports of India and abroad, this is a wonderful compilation and creation.
64. Prof. Dr. P. K. Yadava, Former Dean School of Life Sciences, JNU, Delhi	I appreciate the effort put in by you in compiling the probable difficulties in creating world class University in India. The subject merits full blast discussion and policy formulation. Our students do so well in the world's best institutions. We need to change our attitudes of self-aggrandization and glorification at the cost of institution building.
65. Prof. Dr. H. S. Yathirajan, University of Mysore, Fellow of the Royal Society of Chemistry	We needed this very badly!! Expect many more from you!!
66. Souvik Banerjee, IIT, Bombay	It looks as great effort for academic research. Thanking you in appreciation.
67. Mr. Sanjay Mohapatra, Chairman, DIV-IV, Computer society of India	Congrats on this new publication. Wish you all the best.
68. Dr. M P Vithal, Indian Institute Of Plantation Management, Professor (Finance and Strategy), Delhi School of Economics, University of Delhi.	Thanks for Catching the CATS by their Whiskers. Every true academic should read. We only can follow our example.

*The IIITs are becoming top ranking T-Schools with the help of just 40+ faculty members. Normally the established engineering institutes have 150+ faculty members. Don't you think that these engineering institutes have potential to beat IIITs? It is possible, if they follow the path or model of IIIT.*

## Preface

In 33 IITs, only wrapper, i.e. the word “IIT”, is common and the internal stuff is quite different. The IIT and NIT are Central Government’s initiatives and have uniform pattern throughout India. But idea of IIT has been originated from different agencies, from different locations at different time. In 1996, the first successful IIT (ISquareIT Pune) was introduced by Padmashree Dr. Vijay Bhatkar (creator of India's PARAM series of supercomputers) supported by Finolex Group of Companies. After that many players have introduced different IITs with altogether different ways like IIT-Gwalior (1997), IIT-H (1998), IIT-B (1999), IIT-A (1999), IIT-K (2000), and then followed by many players including MHRD, which has introduced 20 IITs through PPP model. Everybody thinks that overall structure and working of all IITs are similar. But it is not so. It is very confusing for academicians as well as student community. I would like to highlight this issue and introduce the wonderful IIT Research University model through this book.

Every IIT is following different tactics and routes. Many things are altogether different. I have collected all the best practices at one place to build the Model of IIT. The IIT-B, IIT-D and IIT-H have invented and adopted most of the innovative processes and best practices mentioned in this IIT model.

To establish the Research University is the dream of every developing nation. But it is a costly affair and not affordable for developing world. Fortunately the industry supported Indian IIT Research University Model is financially viable and self-sustainable. It has become very popular. Today every state government is after this model. Within just 15 years the number of IITs has increased from 6 to 33.

The Indian Higher Education System is divided in to two categories namely, public and private institutes. The public institutes are over dependent upon government funding. This over scaffolding by government agencies resulted in academic paralysis. That is, the public institutes have lost the capability to develop the self-sustainable academic organizations. It’s a deadlock. First time the new model of IIT could break the ice.

Prof. Rajeev Sangal, Former Director IIT-H stated that *“We do not get government funds and after getting land and building from the government, we have to raise our own operational expenses and finances. Research contributes significantly to revenue generation, approximately **40 percent** of the total revenues generated and **60 percent** is through tuition fees... since we have to raise finances on our own there is an added pressure to perform, build industry interface and raise money.”*

The Revenue Generation is the key to success for this new model. It can be generated through

- The Endowment, Research Funding and financial support by industry
- Research project funding from different government agencies and
- Revenue generation through Technology Transfer

“Industry Compatible and Research Oriented Strong Academic Commandos (extremely good faculty)” along with capable administrative support systems are required for Revenue Generation

through above mentioned techniques. In addition to this there are many issues, which need to be addressed to establish Best IIT.

Prof. S. Sadagopan, founder director of IIT-B said that *“Attracting and retaining top-notch faculty, students and staff continue to remain our main challenge, though the high quality of our faculty & students in the past fifteen years, is helping us over the years. Attracting Research funding to keep our Laboratories at the cutting-edge is another challenge. Regulatory issues and infrastructure upkeep (and funding for that) is the third challenge.”*

In this, book, I have tried to identify these vital issues and pointed out few best practices adopted by existing IITs in India. In addition to this, I have mentioned the best practices of world renowned universities, which are included in my series of 7 books (2500 pages with 2800 references) on World Class Universities. In the last chapter, I have suggested new Hybrid Model for improving the T-Schools, which is based on IIT Model. I hope that other T-Schools will adopt these techniques for accelerated growth of their organizations.

I have compiled this information in the form of book in national interest. How to improve the university or higher education institute is always a major challenge faced by all the academicians. For helping them to find this information at one place, I have put these efforts and published series of seven books. The credit of each point mentioned here goes to respective authors mentioned in the references. I am amazed to see their enormous contribution in the field of higher education. I could refer only few articles written by them and could include very few points in this book. For detailed information regarding any issue, please refer their original articles and if needed search their other articles on the Internet. This is not just 200 pages compiled work but pointers to articles of thousands of pages, contributed by authors, who have spent their lives for the cause of education of mankind. I am thankful to them.

I had introduced hundreds of problems, suggestions, remedies and best practices through my series of 7 books on World Class Universities and Innovation, with more than **2500** pages and **2800** references. I have referred thousands of documents from around 40 countries and gone through beyond **10 Lakh pages**. With GOD's grace, I could reach to more than 20 Lakh academicians across the world and could ignite the minds of young faculty, researchers and students across the nation. In this pretty long journey, I was not alone. Thousands of academicians were constantly encouraging me to compete this gigantic task. I am thankful to them. The valuable comments of high profile readers are available at my website.

I have taken maximum care to give the authentic information but in case at some place, if you find some discrepancies then forgive me and help me to correct it in the next edition of this book. I am sure; the readers will like and welcome my sincere efforts to enhance standards of higher education system of India. I hope this book will act as catalyst and will help in improving the overall Indian Engineering Higher Education System, which can compete with the rest of the world.

Jai Hind.

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# **Chapter 1: About Most Successful IIT Model and Major Issues**

### 1.1. IIIT: Building the Brand name Across the Nation

Along with IITs and NITs, for last 15 years, a new trend of Technical Institutes “IIITs” are building up its brand across the country. These Institutes have been set up to excel the Information & Communication Technology field in India. Though as a brand, IIITs are very new in comparison to IITs and NITs, many of them provide high quality and state of the art education, infrastructure and facilities. The education system of some of the IIITs are in some case similar or even better to many of the NITs and some of the new IITs also. [41]

### 1.2. Popular Model: Exported to Myanmar and Recommended by NSF USA

Prof.U.B. Desai, Mentor Director of IIIT Chittoor and Director of IIT Hyderabad in his brief speech said that this model was an improved version of IIIT Hyderabad model, which is India's first truly not-for-profit public institution supported by industry similar to the leading institutions in the US.

Fig. 1.1: Views of Prof. U. B. Desai, Director IIT-H about IIIT Model [177]

#### *Best Practices*

Now a days this IIIT Model is exported to other Nations. For example, **Myanmar Institute of Information Technology (MIIT)** is a National Centre of Excellence established by the Government of the Republic of Union of Myanmar to impart education and conduct research in the field of Information Technology. The Institute is being established with the help of the Government of India under a MOU entered into between the two Governments. The International Institute of Information Technology, Bangalore (IIIT-B) India is the mentor institution, which is providing technical and academic support to the project. [3]



Fig. 1.2: Myanmar Students at IIIT-B and Myanmar Institute of Information Technology (MIIT) [63] [134]

*Best Practices*

**IIIT-H has been recommended by the US based National Science Foundation (NSF)**  
 IIIT-H has been recommended by the US based National Science Foundation (NSF) as one of the premier research institutions in India for US graduate students to take up research fellowships and short-term research programs. (June 2009)

**1.3. IIIT: Most Successful Model as per 2015 DQ-CMR T-School Ranking**

As per 2015 DQ-CMR T-School Ranking IIIT-H (established in 1998), IIIT-Jabalpur (established in 2005) and IIIT-D (established in 2008) got 3<sup>rd</sup>, 18<sup>th</sup> and 7<sup>th</sup> Rank respectively. Within 7 years, **IIIT-D got 7<sup>th</sup> position** in Top Ranking Technical-Schools in India. The IIIT Research University Model is the magic behind this success. [1]

College Name	City	Composite Score (Out of 100)	Rank
Indian Institute of Technology, Bombay	Mumbai	81.52	1
Indian Institute of Technology, Kharagpur	Kharagpur	80.38	2
International Institute of Information Technology, Hyderabad	Hyderabad	77.69	3
Indian Institute of Technology, BHU	Varanasi	76.32	4
Indian Institute of Technology, Guwahati	Guwahati	70.52	5
Netaji Subhas Institute of Technology	New Delhi	70.18	6
Indraprastha Institute of Information Technology, Delhi	New Delhi	64.70	7
National Institute of Technology, Kamataka	Mangalore	64.16	8
National Institute of Technology, Rourkela	Rourkela	63.74	9
West Bengal University of Technology	Kolkata	61.82	10
College of Engineering, Pune	Pune	57.40	11
National Institute of Technology, Silchar	Silchar	56.91	12
Thiagarajar College of Engineering	Madurai	55.17	13
Ambedkar Institute of Advance Communication Technologies and Research	New Delhi	50.75	14
Madhav Institute of Technology and Science	Gwalior	48.70	15
National Institute of Technology	Patna	47.95	16
Govt College of Engineering, Amravati	Amravati	47.32	17
PDPM-Indian Institute of Information Technology, Design & Manufacturing	Jabalpur	45.27	18
National Institute of Technology, Agartala	Agartala	43.72	19

Fig. 1.3: IIIT-H, IIIT-D and IIIT-Jabalpur got 3<sup>rd</sup>, 7<sup>th</sup> and 18<sup>th</sup> positions in India as per 2015 DQ-CMR T-Schools Ranking [1] [189]

**IIIT-A**

This institute has consistently been ranked as among the top technical schools in the country.

- 109<sup>th</sup> position in University Rankings BRICS 2014
- 25<sup>th</sup> position in India Today Ranking (Previously 8<sup>th</sup> rank)
- 17<sup>th</sup> position in Outlook Ranking (Previously 18<sup>th</sup> rank)
- Previously Ranked 11<sup>th</sup> by Nasscom-Dataquest ranking and was ranked 4<sup>th</sup> by the same in Placements. [191] [185]



### 1.4. Ranking of IIITs by Ignite Engineers

The following Table shows the Ranking of IIITs in India by the Ignite Engineers team through internal surveys and opinions based on the data available on the Internet. No external surveys have been conducted to prepare the same [28].

Ranking	Institute	Age	Faculty	Infrastructure	Placement	Research	Location	Brand	Overall
1	IIIT Hyderabad (1998)	A+	A+	A+	A+	A+	A+	A	9.86
2	IIIT Allahabad (1999)	A+	A+	A+	A+	A+	A	A+	9.86
3	IIIT Bangalore (1999)	A+	A+	A+	A+	A+	A+	A	9.86
4	IIIT Gwalior (1997)	A+	A	A+	A	A	B	A+	9.29
5	IIIT Delhi (2008)	A	A+	A	A	A+	A+	B	9.29
6	IIIT Kerala (Trivandrum) (2000)	A+	A	A	A	B	A	A+	9.14
7	IIIT Kancheepuram (2007)	A	A	A	A	A	B	A+	9
8	IIIT Jabalpur (2005)	A+	A	A	A	B	C	A+	8.86
9	IIIT Bhubaneswar (2006)	A	B	A	B	B	A	A	8.57
10	IIIT Guwahati (2013)	B	B	B	D	C	A	A+	8
11	IIIT Sri City (2013)	B	B	B	D	C	B	A+	7.86
12	IIIT Vadodara (2013)	B	B	C	D	C	B	A+	7.71
13	IIIT Amethi (2005)	A+	C	D	B	D	D	A+	7.57
14	IIIT Kota (2013)	B	B	D	D	C	B	A+	7.57
15	IIIT Lucknow (2015)	C	B	C	D	D	A	A+	7.57
16	IIIT Kalyani (2014)	B	C	C	D	D	B	A+	7.43
17	IIIT Una (2014)	B	B	C	D	D	C	A+	7.43
18	IIIT Kurnool (2015)	C	B	C	D	D	B	A+	7.43
19	IIIT Srirangam (2013)	B	C	D	D	D	B	A+	7.29
20	IIIT Naya Raipur (2015)	C	C	C	D	D	A	A	7.29
21	IIIT Kilohrad (2014)	B	D	D	D	D	C	A+	7
22	IIIT Manipur (2015)	C	D	D	D	D	C	A+	6.86

Table 1.1: Ranking of IIITs in India by the Ignite Engineers [28]

My observations about this Ranking:

- **Age and Brand:** IIIT-D is at 5<sup>th</sup> position because of Age and Brand factors. Age is not so important factor. Thus without considering Age and Brand, IIIT-D can be placed in first 3 position in Ranking.
- **Faculty and Research:** IIIT-Gwalior couldn't score grade A+ in Faculty and Research, which are most important factors.
- **Location:** It is the most important factor, which can't be neglected. IIIT- Allahabad and Gwalior ranking is affected because of location.
- IIIT – Allahabad is not having faculty with PhD qualifications from Top Ranking World Renowned Universities like IIIT-D, IIIT-H and IIIT-B. In spite of this with the help of faculty with qualifications from IIT and IISc, they have scored A+ marks for “Faculty” factor.

## 1.5. IIIT Model: Competing With the Best Institutes of the World

## Is IIIT-H better than IITs in computer science?

"Is IIIT-H better than IITs in computer science?" is the most debated question in discussions whether online and off-line, especially when IIIT-H is in the news for some recognition or its students winning any national/ international coding contest. The answer, however, eludes those seeking for one desperately.

Before we try to compare IIIT-Hyd with other institutes, let's first note some of the highlights of IIIT-Hyd which is not matched by its competitors in the field:

- **Autonomous university** set up as a not-for-profit Public Private Partnership (N-PPP) model
- **Experienced faculty**– Most number of PhD faculty in India in a CSE institute (total of 60+ faculty with PhDs)
- **Research oriented academics:** Offers research-led curricula even for undergraduate programs. As a result, students get to do a large number of projects and acquire *deep research orientation* and *innovative mindset*. If interested in doing MS or PhD in CSE field, best place to be.
- **Very Strong Coding Culture:** IIIT-Hyd students regularly shine in coding contests. The dominating portion of the most courses are coding assignments + lab tests as well as a few of them being totally based on programming & programming workshops (even for 1st year)

Only institute to have appeared four times in ACM-ICPC World Contest and securing highest ranking by any India institute. Almost every year there is a team from IIIT Hyderabad that qualifies for the ACM ICPC World Finals. Once there were two teams which qualified in a single year! IIIT Hyderabad won ACM ICPC South Asia regionals in consecutive years (Two other IIIT teams ranked 6th and 7<sup>th</sup>)

- **Highly Ranked on Programming sites:** There are many high ranked students solving problems on SPOJ and TopCoder programming sites. For many years, IIIT-Hyd was ranked no. 1 globally on SPOJ programming site
- Google Summer of Code. A total of 29 IIIT-Hyd students were selected in 2013 (second highest globally, top in India) to contribute towards open source assignments by Google.
- **DataQuest Ranks IIIT-Hyd at 1<sup>st</sup> for Placement.** 100% Placement. Av. salary for CSE: Rs 9.5 LPA. Off-shore: in Excess of \$120K. Every year there are some 8-10 people hired by Google and Facebook.
- World class infrastructure
- Tech-Hub/Incubator: Houses India's biggest Tech start-up Incubator
- Situated in the metro city of Hyderabad in a posh locality amongst IT biggies. Hyderabad is an emerging hub for IT start-ups and home for IT biggies (latest entrant Amazon, Facebook, TCS) because it offers 3 times of Bangalore's infrastructure at one third cost. Hyderabad already is home for all major IT biggies like TCS, Wipro, Tech Mahindra, Accenture, Infosys, IBM, Google, Yahoo, IGate.
- Recommended as a **premier research institution in India** by the US National Science Foundation (NSF) for US graduate students to take up research fellowships and short-term research programs.

International Institute of Information Technology-Hyderabad, or IIIT-H, was in news recently for charging IT companies planning to hire candidates from the campus. IT firms had to shell out 8 % of the total annual package received by the candidate. And despite a few exemptions of Indian firms, 28 top IT firms from across the globe not only paid the fee, but also hired 105 best candidates from the campus. This shows growing prominence of IIIT-H in India.

Fig. 1.4: IIIT-H: Competing with the best institutes of the world [198]

### *Best Practices*

For the sake of completeness, please browse through more information related to IIIT-Hyd so that you can form your own personal opinion about it.

#### 1) Achievements

##### a. India's Biggest Tech Incubator being set-up at IIIT-Hyd

The incubator aims to provide an environment and an ecosystem for technology commercialization and entrepreneurial action.

#### **Hyderabad Bids to Build India's Biggest Tech Incubator**

#### **Telangana plans mother of all incubation centres**

#### **IIIT Hyderabad's incubator gets a booster shot: increases intake**

b. **CanSat World Ranking First in 2010 and Third in 2011.** CanSat is a NASA sponsored and American Astronautical Society organized annual international competition. The contest allows student teams, from colleges and Universities around the world, to design, fabricate, and launch an aerospace system (CanSat). IIIT-H has been the only team from India to qualify for World Finals, each time, since 2009.

[http://www.iiit.ac.in/files/iiit/al\\_Aerospace\\_Contest\\_CanSat\\_2011\\_-\\_June\\_2011.pdf](http://www.iiit.ac.in/files/iiit/al_Aerospace_Contest_CanSat_2011_-_June_2011.pdf)

c. **ACM-ICPC World 18th position in 2012.** **ACM ICPC** is the *world's oldest, largest, and most prestigious programming contest*. The 2012 edition drew for its first stage over 30,000 participants on more than 7,000 teams, representing around 2,200 universities, in over 85 countries. **Only Indian college to qualify for World Finals, for fourth time in a row.** Best performance by an Indian team in ICPC history.

d. **Text Analysis Conference (TAC) World Rank 1** in 2006/07/08/09. US Department of Commerce' agency National Institute of Standards and Technology (NIST) holds *Text Analysis Conference (TAC)* every year.

e. **RoboCup:** IIIT-H's Team Kshitji was the only team from India to have qualified for the finals of the RoboCup events, each year, for five years, since the inception of the international contest in 2004.

##### f. **Programming Sites SPOJ and CodeChef:**

**SPOJ: Number #1 globally** at the *Sphere Online Judge (SPOJ)*, a highly popular programming site, with over 30, 000 users from 120 countries for many months and years since April 2009 (ranked No. 3 currently).

**CodeChef:** At least **five** of the top 20 winners at the *Codechef's* national-level monthly programming contests, since Jan 2008, have been IIIT-H students.

Achievements of IIIT-H [198] [199]

**2. Views of India's Reputed CSE Educationist Dr.D Sanghi (Prof. IIT-Kanpur)**

<http://dsanghi.blogspot.com/2011/05/my-2011-list-of-recommended-csit.html>

I consider **IIIT, Hyderabad** as the best alternative to IITs (from amongst the institutes I know or I have been told of). This Institute is already competing with IITs on attracting faculty, and every year it does attract some students who have got a good enough rank in JEE to get admission to IITs. They also get top students from AIEEE, and I believe that these students are as good as those in IITs. Basically, if you made a small mistake on the day of JEE, and did not do that mistake in AIEEE, you join IIIT Hyderabad. They have tremendous focus on research and human values. I have visited IIIT Hyderabad umpteen number of times, and I come back more impressed every time I go there.

Fig. 1.5: Views of Dr. Dheeraj Sanghi, Former Director, LNMIIT Jaipur, Professor IIT Kharagpur [198]

**3. Views of IIIT-Hyd Director on Why to Join IIIT-Hyd**

A letter by P J Narayanan , Director IIIT Hyderabad

We are a different institution; I want to briefly explain our core philosophy

**3.1) Objective: A World-View**

The primary objective of education at IIIT, Hyderabad is imparting a mature world-view and a long-term vision to the students. The vision and world view should be about themselves, about their subject of study, about the society they live in, and about the world. We do not merely transmit technical skills or scientific knowledge. Enabling a student to obtain a high-profile first job after the course of study is definitely not our objective.

Let me use an example to explain what I mean. Driving a car is a skill. Efficient driving (spending less fuel, reducing wear-and-tear, etc.) needs a deep understanding of the scientific and engineering principles that govern automobiles. While the skill and the knowledge are important, neither will help you choose the right destination for your drive. We want you to develop a world-view, in addition to the skills, that help you choose the destination that is most fulfilling to you.

**3.2) Research Orientation**

IIIT, Hyderabad is a research university. It has been rated among top technology schools of the country by different sources. However, we measure our success in terms of the research done at the institute and take pride in the impact we have on the society. Faculty and students at the institute work on several innovative technologies with large potential. These include language translation, speech recognition and synthesis, robotics, data mining, computer vision, VLSI, communications, information security, structural safety, energy-efficient building, computer-aided drug-design, etc. We have the research groups with the most impact in the country in several of these areas. You will have the opportunity to be part of their research during your time here.

**3.3) Research and UG Students:**

IIIT-H provides a research option to the UG or B.Tech students from the very beginning. Those opting for research get a B.Tech (Honours) degree in 4 years, and can opt for an MS by Research degrees in 5 years. We have a flexible and unique curriculum to enable UG research. Our students engage with the subject from the very start in a deep way through courses and projects. Text book knowledge provides you the skills and the scientific knowledge. Research goes beyond the known and gives you a world-view on the subject. UG research is, thus, an integral element of our design.

It is no longer sufficient today to have the necessary subject knowledge. An ability to solve unstructured and unseen problems is essential to do well in a fast-changing world. Research exposure gives you the ability to approach problems beyond the "syllabus" in a systematic way. Future researchers, product designers, and entrepreneurs, need this to go beyond being mere workers. An analogy can help here. Doctors with an MBBS are legally qualified to treat you. However, those without MD find very few options today. The engineering areas are moving in that direction and those without advanced degrees and research skills will have fewer options in the future. Students keen to be researchers and product designers should consider our premium, Dual-Degree programmes. You will get a B.Tech (Honours) and an MS by Research in about 5 years. They can take part in high-end research, present papers at top conferences around the world, and rub shoulders with the best in their field, all in the next 5 years! IIIT-H also has an exciting incubation programme with several promising companies started by our students and alumni. We actively encourage students and faculty taking their technology to the world in the form of products through the IIIT-H Foundation.

We have dual degree programmes that link Computer Science with domains like Natural Sciences, Linguistics, and Humanities. Computing is an enabling discipline and can produce great impact when combined with other areas. Facebook is not just a computer program that allows certain functionalities. It is successful because computer programs are combined strongly with psychology, sociology, and other disciplines to understand how people interact with each other. The new dual-degree programme on Building Science and Engineering comes at an exciting time as only half of the houses and buildings that India needs 20 years from now are already built today. This simultaneously presents a great opportunity and a massive challenge as current construction methods and materials are not sustainable. This programme looks at a building as an integrated entity in which human activity takes place. They should be designed with its whole lifecycle and its inhabitants in mind from the start.

### 3.4) Friendly Environment and Larger Concerns

We have an atmosphere at the Institute that promotes different extra-curricular activities and deep thinking about values. We have a course on Human Values to tempt students to think about their roles in life broadly. It is important to introspect frequently on why we are doing what we are doing. It is important to set high life-goals that are compatible with one's aptitude and attitude. Our true goal is often to impact the society deeply; the immediate concerns about comforts are very minor in comparison. Each of you will have your own ideas about what your own impact should be. We want you to find your own way, without any pressure from outside.

Fig. 1.6: Views of Dr. P. J. Narayanan, Director of IIIT-H [198]

### *Best Practices*

Organized as a cluster of **24** laboratories and research centers, and not as departments - unlike conventional Universities - to facilitate cross disciplinary research.

Has over **100 PhD students** pursuing research in various areas of computing and IT – *the largest number in CSE in India*.

Has the largest academic research groups in the country in *Natural Language Processing (NLP), Speech, and Computer Vision*.

*Best Practices*

Close to half of the annual revenues come from research for the corporate and government sectors – *the largest in India, among all engineering schools.*

*Best Practices*

**Media Recognitions & Rankings**

- **India Today, July 27, 2009**  
Featured among the **25 Extraordinary Individuals and Institutions** that have transformed education in India.
- **Dataquest-IDC's Overall Ranks for IIIT-H** (these cover all schools in India, including the IITs)
  - 2009 – **Top 7** – ahead of all NITs, BHU-IT, BITS-Pilani, and the other IIITs
  - 2008 – **Top 7**
  - 2007 – **Top 9**
  - 2006 – **Top 10**
- **An incredible recognition for a young institute in the twelfth year !**

*Best Practices*

Ranked among the **Best 6** Universities in South Asia, in terms of "*scholarly papers*" on the Internet, by *Cybermetric Lab*, Spain's largest public research institution (Oct 2009). Rankings are done once in every three years.  
Check - [http://www.webometrics.info/top100\\_continent.asp?cont=S\\_Asia](http://www.webometrics.info/top100_continent.asp?cont=S_Asia)

Few more interesting features of IIIT-H [199]

1.6. Followed Different Routes: Very Complex and Confusing Phenomenon

During 1996-2000, the concept of IIIT is floated by ISquareIT Pune (1996), IIIT-Gwalior (1997), IIIT-H (1998), IIIT-B (1999), IIIT-A (1999) and IIIT-K (2000). They have adopted altogether different route to establish IIIT. After that, MHRD has promoted this concept throughout India.

Any institute can't use the word "India" in the "Name of the Institute". It is legally restricted. There is no such legal restriction for using the word "International". Thus many institutes use "IIIT" word, while naming the institute, but never follow the IIIT Model, which I am discussing in this book. The complete list of all IIIT is given at Wikipedia. The tables 1.2-A and 1.3-B shows the classification of IIITs. [143-144].

**Note:** International Institute of Information Technology, Pune (I<sup>2</sup>IT) does not come under IIIT group. It is purely a Privately owned college

International Institute Information of Technology,  
Kottayam (iiitktm) does not come under IIIT group. It is a Computer Training and Software Development centre whereas India govt. has approved an Indian Institute of Information Technology at Kottayam under PPP model.

Fig. 1.7: IIITs in India by Ignite Engineers [41]

**IIIT-H Is Distinct & Has Nothing In Common with the Rest of the 15 IIITs**

- There are currently **15 IIITs** in India. **20 more** are on the cards. Except the name "IIIT," the institute shares absolutely nothing in common with the other IIITs.
- Whether in terms of *curricular focus, faculty quality, admissions criteria, management, or academic standards*, each IIIT is different, and has distinct goals, standards, and ownership pattern. Some of the IIITs are federally or state government owned, some privately owned, while a few, like IIIT-H, are in the PPP model.
- **IIIT, Hyderabad** is a nonprofit Research University, founded in 1998, under the Public Private Partnership model, and is the first IIIT to be set up in India.

Fig. 1.8: IIIT-H is **Distinct** and **Nothing in Common** with the rest of the IIITs [199]

Category 1 (Total 3)			Category 2 (Total 4)	Category 3 (Total 18)
<b>Most Successful IIIT Research Universities</b> (all are following different policies and University Acts)			<b>IIIT University by MHRD</b>	<b>IIIT University by MHRD</b>
IIIT-H	IIIT-B	IIIT-D	IIIT Gwalior, Allahabad, Jabalpur, Kancheepuram	18 IIIT (through PPP)
Established in 1998	Established in 1999	Established in 2008	Established in 1997, 1999, 2005, 2007	Recently Declared by MHRD
<b>International</b>	<b>International</b>	<b>Inderprastha</b>	<b>Indian</b>	<b>Indian</b>
	<b>Institutes of National Importance</b>		<b>Institutes of National Importance</b>	<b>Started</b> 1. Guwahati (2013, AS) 2. Vadodara (2013, GJ) 3. Sri City (2013, AP) 4. Lucknow (2015, UP) 5. Kurnool (2015, AP) 6. Manipur (2015, MN) 7. Kota (2015, RJ) 8. Una (2015, HP) 9. Sonapat (2015, HR) 10. Trichy (2013, TN) 11. Kalyani (2015, WB) 12. Kottayam (2014, KL) 13. Dharwad (2015, KA) 14. Amthi (2005, UP)
Deemed University status in 2001  (Previously institute launched by Andhra Government)	Deemed University status in 2005  (Previously institute launched by Karnataka Government with the support of industry)	State University of Delhi Government	IIIT Allahabad, Gwalior and Jabalpur became Deemed University in 2000, 2001, 2009 respectively	<b>Not Yet Started</b> 15. Pune (MS) 16. Nagpur (MS) 17. Tripura (TR) 18. Bhopal (MP)

Table 1.2-A: IIIT Classification (on the basis of websites and reports available of respective IIITs) [41] [143-144] [154-168]

10 to 15 year old IIITs Need Accelerated Growth		Recently Started	Not Considering under IIIT Model			
Category 4 (Total 01)	Category 5 (Total 01)	Category 6 (Total 01)	Category 7 (Total 01)	Category 8 (Total 3)		
Autonomous Institute	IIIT State University	IIIT State University	Affiliated College	University Campuses	University Campuses	University Campuses
IIIT-K	IIIT-BH	IIIT-NR (through PPP)	ISquareIT Pune Concept of <b>Dr. Vijay Bhatkar supported by Finolex</b>	IIIT-Basar	IIIT- Idupulapaya (RK Valley Campus)	IIIT- Nuzvid
Established in 2000	Established in 2006	Established in 2015	Established in 1996			
Indian	International	International	International	International	International	International
An autonomous institute established by Govt. of Kerala at Trivandrum  Remark: Not organized around research labs. They have 4 different schools	State University of Odisha Government  Remark: Not organized around research labs. They have 5 different departments	State University  Joint initiative by CG State Government and NTPC through PPP	AICTE Recognize Engineering College affiliated to Pune University	Institutes setup by Andhra Pradesh State Government under affiliation of Rajiv Gandhi University of Knowledge Technologies (RGUKT)	Institutes setup by Andhra Pradesh State Government under affiliation of Rajiv Gandhi University of Knowledge Technologies (RGUKT)	Institutes setup by Andhra Pradesh State Government under affiliation of Rajiv Gandhi University of Knowledge Technologies (RGUKT)

Table 1.2-B: IIIT Classification (on the basis of websites and reports available of respective IIITs) [41] [143-144] [154-168]

Analysis of Table 1.2-A and 1.2-B:

1. **Category 1:** All 3 IIITs are top ranking T-Schools and adopted very innovative policies.
2. **Category 2:** All the 4 IIITs under this category are main players and backed by MHRD. They have capacity to lead but unable to do so because:
  - Not having Eye-catching service conditions like IIIT-D for attracting international faculty members.
  - Not located in Metro Cities or in the middle of Innovation Clusters, which facilitate strong linkage with industry.
  - IIITs under category 1 are having more academic freedom
3. **Category 3:** The IIITs under category 3 are backed by MHRD and thus they will maintain certain standards
4. **Category 4:** The IIIT-K is included under this category
  - Only IIIT, which is not a University. It's autonomous institute. In spite of this they have done a good job.
  - It is not organized around research laboratories. It has 4 different schools.



- It is one of the oldest IIIT. It is the only IIIT, who is using the word “Indian” but not opened through MHRD channel and not getting any funding from Central Government.
  - Expected more accelerated growth.
5. **Category 5:** IIIT-BH is included under this category
    - IIIT-BH is not organized around research labs. They have 5 different departments.
    - The website stated that they are following IIT pattern of education
    - It’s a 10 year old IIIT. Like IIIT-B, IIIT-D and IIIT-H, the website of IIIT-BH is not reveling the strengths and contributions of the institute.
  6. **Category 6:** IIIT-NR is recently started State University (2015).
  7. **Categories 7 and 8:** Under this category affiliated college and university campuses are included, which I am excluding from IIIT Model Category.
    - ISquareIT Pune is the concept of Padmashree Dr. Vijay Bhatkar supported by Finolex Group of Companies. Its venture like ISB Hyderabad. Unfortunately, because of some technical problems, later on, it has been converted into AICTE recognized affiliated engineering institute. **It’s a first successful IIIT in India. Its contribution can’t be overlooked.**
  8. The names of many institutes are having “IIT” string. Through Google Search Engine, I have search the names of institute or organization with “IIT” string (alphabetically) and instantly found many names.

SN	Name of Institute or Organization with string “IIT”
1.	<b>BIIT</b> (3 organizations)
2.	<b>GIIT</b> (2 organizations)
3.	<b>IITRAM</b>
4.	<b>JIT</b>
5.	<b>KIIT</b>
6.	<b>LIIT</b>
7.	<b>MIIT</b>

Table 1.3: Names of institute with “IIT” string (searched alphabetically)

The similarity in names doesn’t mean that, they are inferior / equivalent / better than Indian Institute of Technology (IIT). It’s just a phonic similarity. Please note that, I am not criticizing any institute or organization. I am just giving examples for “similarity in names”.

Similarly the names of many organizations may have “IIIT” string. It doesn’t mean that they are following IIIT Model and Guidelines. For example:

SN	Name of Institute or Organization with string “IIIT”
1.	<b>CIIT</b>
2.	<b>RIIT</b>
3.	<b>VIIT</b>

Table 1.4: Names of institute with “IIIT” string (searched alphabetically)

There are 8 different ways to start IIIT. Anybody can use the word “International” for naming the institute. Thus there is no guarantee that the institute with name IIIT, will follow the actually IIIT Model. If the institute is started under the banner of MHRD (Like IIT, NIT etc.) then, we can reasonably assume that, it will maintain the particular standards. If it is started

through State University or Autonomous Institute or Affiliated Institute route, then, I feel that, nobody can give any guarantee that they will maintain the specific standards. It all depends upon authenticity of the authorities or proprietors.

### 1.6. Remarks

Every IIIT is following different tactics and routes. Many things are altogether different. I have collected all the best practices at one place to build the Model of IIIT. The IIIT-B, IIIT-D and IIIT-H have invented and adopted most of the innovative processes and best practices mentioned in this model.

### 1.7. IIIT Offers UG and PG in CSE and ECE Plus Few More Specializations

All the IIITs offer UG and PG programs in CSE and ECE. In addition to this they offer few more specializations depending upon their objectives. The list of courses offered by 7 IIIT are given following Table.

SN	IIIT	Courses Offered
1.	IIIT-H	B.Tech. Programme <ul style="list-style-type: none"> <li>• CSE</li> <li>• ECE</li> </ul> M.Tech. <ul style="list-style-type: none"> <li>• Computer Science and Engineering</li> <li>• Computer Science and Information Security</li> <li>• VLSI and Computer Engineering</li> <li>• Computer Aided Structural Engineering</li> <li>• Bioinformatics</li> <li>• Computational Linguistics</li> </ul> Ph.D. M.S. by Research M.Phil. in Computational Linguistics (CL) for MA students in languages Dual Degree programme (B.Tech. and M.S. by Research) Part-time Programmes and PGSSP Outreach Programmes
2.	IIIT-B	<ul style="list-style-type: none"> <li>• Integrated M.Tech. (5 years) (M.Tech. and B.Tech. degrees in IT)</li> <li>• M.Tech Information Technology</li> <li>• M.Tech. Electronic Systems Design</li> <li>• Master of Science (Digital Society)</li> <li>• PhD</li> <li>• Executive Education</li> </ul>
3.	IIIT-D	M.Tech (Computer Science and Engineering) with specialization in <ul style="list-style-type: none"> <li>• Data Engineering</li> <li>• Information Security</li> <li>• Mobile Computing</li> <li>• M.Tech in CSE (without specialization) General</li> </ul> M.Tech (Electronics and Communications Engineering) with specialization in <ul style="list-style-type: none"> <li>• VLSI &amp; Embedded Systems</li> <li>• Communication and Signal Processing</li> </ul> M.Tech (Computational Biology) <ul style="list-style-type: none"> <li>• M.Tech in Computational Biology</li> </ul>
4.	IIIT-Gwalior	Integrated M.Tech. (5 years) (M.Tech. and B.Tech. degrees in IT) <ul style="list-style-type: none"> <li>• Digital Communication</li> <li>• Advance Networks</li> </ul>

		<ul style="list-style-type: none"> <li>• VLSI (Very large scale integration)</li> <li>• Information security</li> </ul> MBA PhD
5.	IIIT-Allahabad	<ul style="list-style-type: none"> <li>• B. Tech (Information Technology)</li> <li>• B. Tech (Electronic &amp; Communication)</li> <li>• M. Tech (Information Technology)</li> <li>• M. Tech (Electronics Engineering)</li> <li>• Integrated M. Tech (Robotics)</li> <li>• Integrated M. Tech (Stem Cell Engineering)</li> <li>• MBA (Information Technology)</li> <li>• Ph.D. (Information Technology &amp; Management)</li> </ul>
6.	IIIT-Jabalpur	B.Tech. <ul style="list-style-type: none"> <li>• Computer Science &amp; Engineering</li> <li>• Design</li> <li>• Electronics &amp; Communication Engineering</li> <li>• Mechanical Engineering</li> </ul> M.Tech. in Computer Science & Engineering (CSE) M.Tech. in Electronics & Communication Engineering (ECE) <ul style="list-style-type: none"> <li>• Microwave and Communication Engineering</li> <li>• Power and Control</li> </ul> M.Tech. in Mechanical Engineering (ME) <ul style="list-style-type: none"> <li>• CAD/CAM</li> <li>• Design</li> <li>• Manufacturing</li> </ul> M.Tech. in Mechatronics Master of Design (MDS) PhD
7.	IIIT Kancheepuram	B.Tech <ul style="list-style-type: none"> <li>• Computer Engineering (COE)</li> <li>• Electronics Engineering Design and Manufacturing (EDM)</li> <li>• Mechanical Engineering Design and Manufacturing (MDM)</li> </ul> 5-year Dual Degree programmes (B.Tech+M.Tech) <ul style="list-style-type: none"> <li>• B. Tech - Computer Engineering + M. Tech - Computer Engineering</li> <li>• B. Tech - Electronics Engineering (D &amp; M) + M. Tech - VLSI &amp; Electronic System Design</li> <li>• B. Tech - Electronics Engineering (D &amp; M) + M. Tech - Signal Processing &amp; Communication System Design</li> <li>• B. Tech - Mechanical Engineering (D &amp; M) + M. Tech - Product Design</li> <li>• B. Tech - Mechanical Engineering (D &amp; M) + M. Tech - Advanced Manufacturing</li> </ul> M.Des programmes <ul style="list-style-type: none"> <li>• Communication System</li> <li>• Electronics System</li> <li>• Mechanical Systems</li> </ul> PhD

Table 1.5: Courses offered by 7 IIIT

### 1.8. IIIT Model: Best Practices and Guidelines

The IIIT-B, IIIT-D and IIIT-H have built up most successful models. They have adopted altogether innovative policies and techniques (policies are not same in these 3 IIITs). This IIIT Model consists many best practices and guidelines as follows.

### *Best Practices*

1. Self-Sustainable Industry Supported IIIT Research University
2. Must be located in Metros or in the middle of IT Industry Hub
3. 40% Income Generation through industry oriented Research & Technology Transfer
4. Government provides only Land and Buildings either directly or through PPP model
5. Intensive Search for internationally renowned faculty by conducting interviews at USA
6. 40% to 75% faculty with PhD from World Renowned Universities & remaining from IIT / IISc
7. Industry supported Research Centers, Labs, Chair Professors, Scholarships and Research Grants
8. During Internship, opportunity to do research and project work at many foreign universities
9. Controlled by BOG, which consists of renowned persons from academics and IT industry
10. Not having departments, organizing structure around Research Groups / Centers / Labs
11. Involving industry as partner, involving them in curriculum design and teaching too
12. Building strong international linkage through internationally qualified faculty
13. More weightage to coding and problem solving. Establish “Coding Culture”
14. US University style salary structure and service conditions
15. International Curriculum with high degree of flexibility
16. Nurturing Innovative Minds through Innovation Culture
17. Business Innovations through Incubation Center
18. Strictly merit based admission process
19. Fruitful international collaborations
20. Active Alumni involvement
21. Visionary Vice Chancellor [71] [73] [76]

### **IIIT Model**

The IIITs (total 22) established by MHRD (see columns 2 and 3 in the table 1.2-A) could not adopt few policies mentioned in above list. For example, they are offering salaries as per 6<sup>th</sup> pay commission, which couldn’t attract faculty with PhD from World Renowned Universities. Many of them are not located in Metro Cities and thus facing problems of developing strong links with industry.

### **1.8. Remarks**

I found that authorities are ready to follow 80% parameters mentioned in the IIIT model and dilute the remaining 20% policies. For achieving the goal of top ranking T-School, they need to adopt almost every best practices mentioned in IIIT Model. In addition to this, they need to invent few more innovative strategies and policies. All the academic parameters are interlinked. If you neglect any one of them, then others will be affected. Remember that, **one small loophole can defeat the entire purpose of the venture**; I mean “A small leakage can drain entire tank”.

## 1.9. Major Problems: Budget Constraints and Establishing Self-Sustainable Institute

IIIT Model is unique in many respect. It is self-sustainable model. The government provides land and building and partial operating cost. IIITs are generating the rest of the required finance. The MHRD has provided the **scheme of setting up 20 new Indian Institutes of Information Technology (IIITs) on Public Private Partnership (PPP) modal**. The key considerations of this scheme, especially for Financial Model are as follows. [31]

### Factsheet

#### IIIT by MHRD

##### 1. Objectives

A major objective in establishing IIITs is to set up a model of education which can produce best-in-class human resources in IT and harnessing the multi-dimensional facets of IT in various domains. While the number of students produced by these IIITs would be small, the impact they create would be great. Thus, the 20 new IIITs should be created to act as the Lead or Spearhead institutions that

- a. Are autonomous, not-for-profit, self-sustaining, research-led education institutions
- b. Are set up under an Act of Parliament (since this process is time consuming, the IIITs initially may be registered as Societies under the Societies Registration Act 1860)
- c. Are set up to contribute significantly to the global competitiveness of key sectors of the Indian economy and industry
- d. Are focused on applied research and education in IT in selected domain

##### 11. Financial Model

Financial viability and self-sustainability of the IIIT are key considerations towards the preparation of the financial model for the IIIT. The IIIT should be provided complete autonomy to set fees and raise funds through donations, with no link to the size of the corpus that each IIIT can maintain. For each IIIT, the State Government will make available 50-100 acres of land at no cost.

Eastern Region. During the first four years of setting up each IIIT, the Central Government will provide assistance towards recurring expenditure to the extent of Rs.10 crore yearwise requirement of which will vary depending on growth of the institutes and requirement of funds. Each IIIT shall meet its entire operating expenditure on its own within 5 years of commencement out of students fees, research and other internal accruals. The concerned State Government will

Each IIIT is expected to become financially self-sufficient and able to meet its entire operating expenditure (Opex) without any support from the Central or State Government within five years of its commencing operations. The Opex would be met from the Institute's revenues generated through student fees, endowments, research grants, etc. Scholarships, Faculty Chairs, Additional Infrastructure etc. will be contributed by Industry, Govt. & donors.

Fig. 1.9: MHRD specified the Financial Model for IIIT based on “Self-Sustainability within 5 Years” through Revenue Generation [31]

- The total project cost of IIIT project, excluding cost of land (provided by state government), is around Rs. 140.50 Crore. The details are available on MHRD website. [31]
- IIIT-A

12. Budget allocated to each of agencies, indicating the particulars of all plans, proposed expenditure and reports on disbursements made;

The Annual Budget and Annual Accounts are finalized with the approval of Finance Committee/BOM. The disbursements are made by the IIIT-A Head Quarters which is finally recorded in the Annual Accounts.

Financial Year	Plan Budget (in Rs.)	Non Plan Budget (in Rs.)
2008-09	65.00 Crore	17.00 Crore
2009-10	66.65 Crore	18.27 Crore
2010-11	82.15 Crore	20.30 Crore

Table. 1.6: IIIT-A Budget from 2008 to 2010, which gives idea of total budget of IIIT [51]

- IIIT-B
- The Institute meets its operating expenditure from
  - Student fees (60%)
  - Research grants (20%)
  - Interest from corpus and other incomes (20%)
  - The IIIT, unlike IITs and IISc, does not receive grants from government towards its operations. [37] [53]
- In initial phase the Government of Karnataka took the initiative in providing the land and capital expenditure. The industry has supported by providing grants to build a corpus, chair professorships, scholarships and research support. The Government of India also supports the Institute by providing grants for research and laboratories. The total grant to IIIT-B from the government has been Rs 10 crore over 10 years. [4]

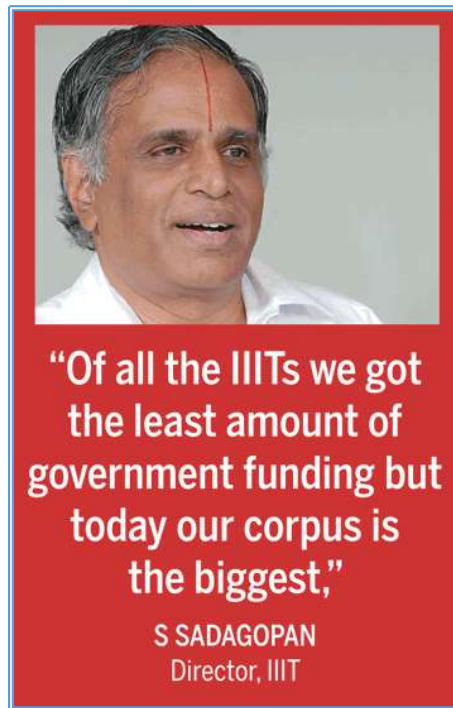
*Best Practices*

Roughly 50% of the IIITB's budget is spent on academic activities, excluding salary and including research. The Institute Revenue Budget for 2012-2013 has the following breakup with amounts in lakhs:

	Salary	Academics	Infrastructure	Others	Total
<b>Amount</b>	461	813	379	0	1653
<b>Percentage</b>	27.89%	49.19%	22.92%	0%	100%

IIIT-B Budget 2013 [4]

*Best Practices*



Stated by Dr. Sadagopan Director IIIT-B [57]

- IIIT-D

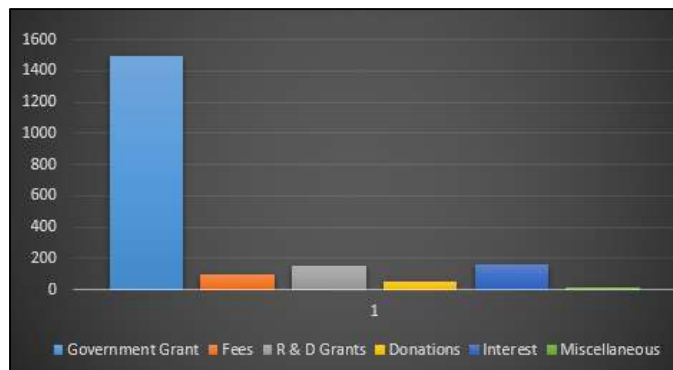


Fig. 1.10: IIIT-D: Income in 2009-10 (Established in 2008) [70]

*Best Practices*



IIIT-D: Spending 22% on Salary 2009-10 (Established in 2008) [70]

IIIT-H

*Best Practices*

Set up under the Not-for-profit Public Private Partnership (N-PPP) model, IIIT-H raises all of its operational expenditure, and has been doing so right from its inception.

Stated by Dr. Rajeev Sangal, Director, IIIT-H [176]

**1.9. Remarks**

The IIIT-B, IIIT-D and III-H are specially focusing on “Self-Sustainable” issue. They are giving more weightage for revenue generation through Research, Innovation, Industry Funding and Technology Transfer etc.

**1.10. IIIT: For Survival Needs Industry Support**

Very strong industry support is needed to build IIITs.

**Factsheet**

IIIT-B

The industry can support IIIT with

- Instituting Chair professorship: Chair Professorships are grants to the Institute. The Money donated is kept in an earmarked fund and invested. The interest earned on investments as well as the principle available is used to meet the expenditure of the Chair Professor. A grant of Rs 50 lakhs will enable a Chair Professorship of 5 years, Rs one Crore for 10 years and Rs 3 crores for 33 years.
- Offering Scholarships: A grant of Rs 15 lakhs will graduate one Integrated M.Tech student meeting both tuition and living expenditure over the five year period. A grant of Rs 6 lakhs will enable one M Tech student to meet his tuition and living expenditure. The Institute charges



lower tuition for PhD scholars. Thus a grant of Rs 15 lakhs will meet their reduced tuition, living expenditure and leave them with a stipend over a four year period.

- Support to Research Centres: This would be based on discussion and mutually agreed work plan over a three or five year period.
- Contribute towards construction of new academic block and
- Support to innovation: Provide grants to our Sec 25 company IIITB innovation centre, which will enable it to offer seed capital to innovative ideas. A grant of Rs 50 lakhs will enable us to provide seed capital to an idea till it reaches the market. Needless to say the grantor will be involved in all stages of decision making for any of the above ways of participation. [36]

### 1.10. Remarks

The IIITs located in Metros (Innovation Cluster) with extremely good faculty members can attract industry funding. The global talent (faculty) can be attracted through Culture of the institute (Research, Innovation, administrative etc.) Excellent service conditions and eye catching salary structure etc.

### 1.11. Guiding Principles of IIIT Research University Model

Prof. Rajeev Sangal, Former Director IIIT-H stated that **“The difference between IIT and IIIT is research. Focus of IITs may also be doing research but IIIT Hyderabad has a greater focus; research that can also lead to technology development. Therefore publishing a paper is not the end of research rather it is the beginning which we try to do it in IIIT... To give you an example, we have built research centres with large critical mass. So if you take our language technology, there are 130 researchers in the centre and I do not think any IIT will have a centre of that scale except for one or two exceptions. Secondly, we do not get government funds and after getting land and building from the government, we have to raise our own operational expenses and finances. Research contributes significantly to revenue generation, approximately 40 percent of the total revenues generated and 60 percent is through tuition fees... since we have to raise finances on our own there is an added pressure to perform, build industry interface and raise money”**. [37]

P.J. Narayanan, Dean (Research and Development) at IIIT-H said that “We have no management. We have just a governing council. The ultimate decision-making authority consists of 16 members, with Raj Reddy of Carnegie Mellon University, US, as its chairman. The council consists of distinguished academicians, industrialists and a couple of representatives of the Andhra Pradesh government.... We are not getting any government grants on an annual basis. **We are not on the budget item on any government.** We have to run our own show. However, apart from allotting the land and buildings, the Andhra Pradesh government did help this institute with some funds during the initial years and ensured that private firms came in to associate with us.... **Unlike the IITs, which are “literally micro-managed” by the ministry of human resource development, IIIT-H is completely free to do what it wants.** That enables the institute to offer freedom and flexibility to faculty and students to take up innovative courses and research.... We work with several Central government agencies and ministries such as the ministry of HRD and ministry of

communications and information technology on several research projects and we get funds for such projects.... The real strength of our institute today is that we have some 225 students currently doing MS by research, and we are going to have 225 research papers”. [33]

IIIT differs from other Technical Institutes. Its unique model of education, research, and industry interaction. The Aims and Objectives of IIIT Model are as follows:

#### 1.11.1. Innovation Culture

The basic objective of every IIIT is “Fostering innovation and excellence in the field of scientific research and technical education for serving as valuable resource for different industries and society as a whole. The main aim of the institute is to nurture and empower students and to produce future leaders and Innovators in their respective specializations”. [13]

#### 1.11.2. Job Creator and Not Job Seekers

The Institute envisages to underline the vision of fostering job creators and not job seekers alone, to ensure faculty and students alike apply knowledge to create solutions which will address the needs of industry, government and society at-large. [13]

#### 1.11.3. IT focused Research University

IIIT was set up as a research university focused on the core areas of Information Technology, such as Computer Science, Electronics and Communications, and their applications in other domains. The institute evolved strong research programmes in a host of areas, with computation or IT providing the connecting thread, and with an emphasis on the development of technology and applications, which can be transferred for use to industry and society. This required carrying out basic research that can be used to solve real life problems. As a result, a synergistic relationship has come to exist at the Institute between basic and applied research. Faculty carries out a number of academic industrial projects, and a few companies have been incubated based on the research done at the Institute. [14]

#### 1.11.4. Unique Organizing Structure

### *Best Practices*

#### **1.1A Cluster of Research Centers not Departments**

IIIT-H is organized as research centers and research labs (RC/RL), to facilitate interdisciplinary research. It does not have departments, as they draw disciplinary and organizational boundaries in the minds of faculty and students.

Views of Dr. Rajeev Sangal, Director IIIT-H [176]

*Best Practices*

IIIT Hyderabad is structured around research centers and labs as opposed to schools and departments. Each research center focuses on a broad problem area and brings together experts possibly with varied background to conduct research and development on specific aspects of that problem area, constantly pushing the science to the next level.

The current Research Centers and Laboratories are listed below based on their research focus on technologies and domains. There are also domain centers which make use of technologies in typically unusual domains in innovative ways.

IIIT-H: Organized around Research Center [169]

*Best Practices*

**Full Time Faculty**

The Institute is organized as research groups and education programs, and has not maintained strong department boundaries. However, faculty can be broadly grouped according to their disciplines

IIIT-D: Organized around Research Groups [171]

*Best Practices*

**Research**

Research Profile of IIITB

At IIITB, we follow the notion of research labs and centers which is an abstraction of a particular theme/area. A research lab encompasses people, projects, physical facilities, and activities. A research center or a center of excellence is an abstraction either in terms of the broader set of research themes being followed or in terms of hierarchy of research activities. Please click on the respective research domain above to get more details about its focus of research, faculty members involved, and the active labs and centers.

IIIT-B: Organized around Research Labs and Centers, which encompasses people, physical facilities and activities [170]

Normally the IIIT model is **not organized around departments**. IIIT is **organized as Research Groups** (research centres and labs), instead of the conventional departments, to facilitate interdisciplinary research and a seamless flow of knowledge within the Institute. Faculty assigned to the centers and labs conduct research, as well as academic programs, which are owned by the Institute, and not by individual research centers. [14]



Fig. 1.11: IIIT-A and IIIT-Manipur: Organizing Structure around Departments [166]

The following Table shows that, the IIITs, which are **organized around Research Labs**, are top ranking T-Schools of India. The IIITs are Research Universities and thus this new organizing structure should be preferred for better performance.

At IIIT Website: Specially mentioned that Organized around Research labs	MHRD controlled 17 IIITs At IIIT websites: <b>No information</b> regarding “Organization of IIIT around Research Labs”			Organized around Schools	IIIT websites: <b>No information</b> regarding “Organization of IIIT around Research Labs”	Organized around Departments
	Organized around Departments	No information about organizing structure at website	Couldn't find Website			
IIIT- H IIIT-B IIIT-D	IIIT - Allahabad IIIT - Manipur	IIIT – Gwalior IIIT - Jabalpur IIIT – Kancheepuram IIIT - Guwahati IIIT – Vadodara IIIT – Sri City IIIT – Lucknow IIIT - Kurnool IIIT – Kota IIIT – Una IIIT – Srirangam IIIT – Kalyani IIIT – Dharwad	IIIT – Sonapat, IIIT – Kottayam	IIIT-K	IIIT-NR	IIIT-BH

Table 1.7: Classification of existing 22 IIITs on the basis of Organizing Structure around Research Labs [154-168]

**RESEARCH GROUP**  
**IMAGE ANALYSIS AND BIOMETRICS**

IMAGE PROCESSING, PATTERN RECOGNITION, MACHINE LEARNING AND BIOMETRICS

<p><b>FACULTY</b></p> <p><b>Dr. Mayank Vatsa</b> PhD, Computer Science, West Virginia University, USA</p> <p><b>Dr. Richa Singh</b> PhD, Computer Science, West Virginia University, USA</p>	<p>IIIT-D has a strong group on biometrics that is involved in cutting edge research in biometrics, image processing, and machine learning. They have built prototypes for unconstrained face recognition, multimodal biometrics, and biometrics CAPTCHAs as well as have created and shared several important biometric databases with the research community.</p> <p><i>In the past five years, the group has published over 55 research papers in reputed journals and conferences and has received 8 best paper and poster awards. Dr. Vatsa and Dr. Singh have also served in different government standards committees for face, fingerprint, and</i></p>	<p><i>iris recognition. Dr. Vatsa is an Associate Editor for Information Fusion and IEEE Biometrics Compendium journals, and PC Chair of reputed international conferences. Dr. Singh is an Associate Editor of Information Fusion and organizing committee member of several conferences. They have received support of around ₹ 4 crores from different organizations. Himanshu S Bhatt has received IBM PhD fellowship and Anush Sankaran, Tejas Dhamecha and Praful Agrawal have received TCS PhD fellowship.</i></p>
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Fig. 1.12: IIIT-D: Research Group – Image Analysis and Biometrics [16]

**RESEARCH GROUP**  
**INFORMATION SECURITY AND PRIVACY**

DIGITAL FORENSICS, CRYPTOGRAPHY, CRYPTANALYSIS, THEORY AND PRACTICE OF CRYPTOGRAPHY, CYBER CRIME, PRIVACY, HUMAN COMPUTER INTERACTION, NETWORK SECURITY, TRAFFIC ANALYSIS, ANONYMITY, COMPLEX NETWORKS, PRIVACY AND SECURITY IN ONLINE SOCIAL MEDIA (PSOSM), USABLE SECURITY

<p><b>FACULTY</b></p> <p><b>Dr. Ponnurangam Kumaraguru</b>  <i>PhD, Computer Science  Carnegie Mellon University,  USA</i></p> <p><b>Dr. Somitra Kumar Sanadhya</b>  <i>PhD, Computer Science  Indian Statistical Institute,  Kolkata</i></p> <p><b>Dr. Gaurav Gupta</b>  <i>PhD, Computer Science  Jadavpur University, Kolkata</i></p> <p><b>Dr. Donghoon Chang</b>  <i>PhD, Information Management  and Security, Korea University,  Korea</i></p> <p><b>Dr. Vikram Goyal</b>  <i>PhD, Computer Science and  Engineering, IIT Delhi</i></p>	<p>Computer security and privacy is one of the thrust areas of the Institute. This group is engaged in investigating security and privacy issues in emerging technologies; developing technologies and insights that will help detect and prevent computer frauds and cyber crime. It aims to provide a new understanding of key topics in the security of large networks using multi-disciplinary approaches; studying and developing proactive digital forensic solutions i.e. scalable solutions to tackle rapidly changing technology; doing cryptanalysis of cryptographic primitives such as Hash functions, Block ciphers and Stream ciphers; and developing technologies for</p>	<p>auditing privacy and security violations.</p> <p><i>Dr. Kumaraguru has won several best paper and poster awards. Dr. Sanadhya was a PC Co-Chair of 2nd international conference on "Security, Privacy and Applied Cryptography Engineering" 2012. Several PhD scholars in this group have received competitive fellowships.</i></p>
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Fig. 1.13: IIIT-D: Research Group – Information Security and Privacy [16]

Building Science is a synthesis of Civil Engineering and Architecture. It involves all stages of building design, right from formulation of the concept, preparation of drawings, execution of work to maintenance and demolition of buildings. The building should have structural integrity, functional efficiency and aesthetics and provide quality environment for the occupants. Such buildings would be affordable, energy efficient, comfortable, safe, responsive to inhabitants and provide a healthy environment.

Introduction of computer techniques, new construction methods and approaches in building design, earthquake loadings and need for conservation of energy has created a demand for professionals who have specialized training in creating new building systems. This calls for a specialized course, which provides a deep understanding of the building process and the existing and emerging IT tools.

The M.Tech. (IT in Building Science) is an interdisciplinary programme open to graduates from the fields of architecture and civil engineering. It has a focus on research and development of advanced information technology tools and their application in building science for the design of better construction methods and buildings. The aim is to minimize the costs involved over the entire life cycle of these buildings. The curriculum has an integrated approach for solving problems in the industry by providing a synthesis of IT techniques and Building Science.

Fig. 1.14: Specialized courses: IIIT-H M.Tech. (IT in Building Science) [20]

To enhance the research culture of the institute many institutions in the world have adopted this organization structure.



Fig. 1.15: Vienna Institute of Demography Austria is structured around 7 Research Groups [220]



Fig. 1.16: Health Systems Institute, Georgia Institute of Technology USA structured around Research Groups [221]

### 1.11.5. Different Administrative Structure

IIITs are not following department structure and thus don't have HODs. In addition to this the position of Controller of Examination is missing from many IIITs. For smooth functioning of the institute, however, they have created various Dean Positions. The overall organizing structure has following authorities:

Statutory Bodies: There are four statutory bodies as per Rules & Regulations of IIIT Hyderabad.

1. Governing Council or Governing Board
2. Finance Committee
3. Executive Committee
4. Academic Council

Authorities of Institute are:

1. Chairman and Governing Council
2. Director & Chairman, Academic Council
3. Dean (Academics)
4. Dean (R&D): Industry Interface, Research, Consultancy, Funding, Revenue Generation
5. Dean (Faculty)
6. Dean (Students)
7. Registrar
8. Finance Officer
9. Controller of Examinations
10. Head, Education Outreach
11. Head, Industrial Outreach
12. Administrative Officer
13. University Engineer
14. Dean Planning and Development
15. Dean International Relations
16. HR Manager
17. System Administrator
18. Hostel Wardens
19. In charge Accommodation
20. Training & Placement (T&P) Officer
21. System and Network Administrator
22. Chief Librarian
23. Purchase Officer
24. Store and Inventory Officer
25. Campus Supervision, Maintenance and Fire Safety Officer
26. Security, Discipline, Intelligence and Vigilance Officer
27. Medical Officer
28. Publication division Manager
29. Emergency Helpdesk Manager
30. Catering Services Manager
31. Travel, Hospitality, Logistic Services and Operation Manager
32. Incubation Center Manager
33. Innovation Centers Manager

IIIT-H: The following councils / committees are for the administrative convenience of the Institute for its day-to-day functioning to reach the objectives of the Institute.

1. Governing Council
2. Academic Council
3. Finance Committee
4. Institute Steering Committee
5. Academic Affairs Committee
6. UG programme committee
7. PG programme committee
8. PG Committee
9. Scholarship Committee
10. Student Travel Grants committee
11. Education Outreach committee
12. Industry Outreach committee
13. Placements Committee
14. Events Committee
15. Brand Building Committee
16. Alumni Affairs
17. Student Life Committee
18. Computer/Technical Resource Committee
19. Library Committee
20. Campus Beautification committee
21. Building Works Committee
22. Space Committee
23. Quarters allocation committee
24. Disciplinary Committee
25. Faculty Search committee
26. Faculty Appraisal Committee
27. Staff Committee
28. Emergency Medical Fund Committee [34]

The detailed administrative structure with job profile is available at IIIT-H website in Annexure 2 (pp.92-116). [35]



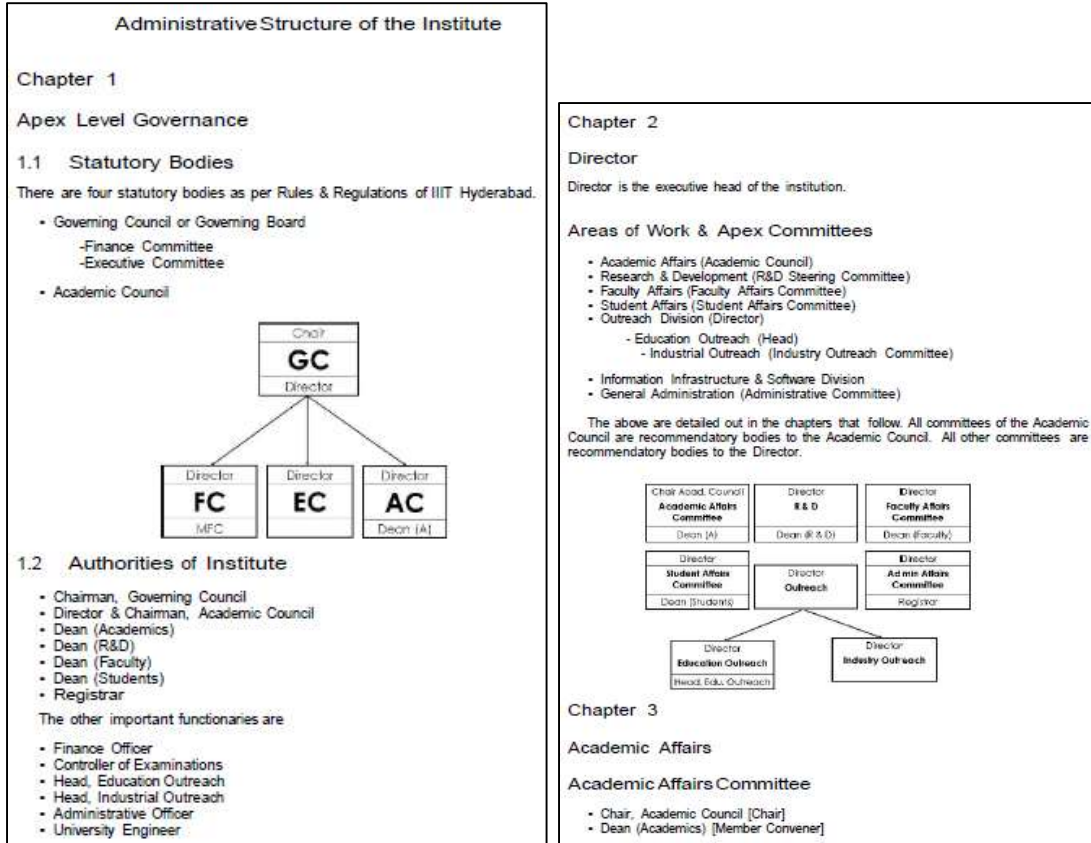


Fig. 1.17: IIIT-H: Administrative structure [35]

**1.11.5. Remarks**

The detailed job profiles of above mentioned positions are given in my book “Strategy to Develop World Class University” (Chapter 3, pp. 38-115). [10]

**1.11.6. Partner of Global Academic and Industrial Organizations**

IIIT organize itself as a conglomerate of R&D Centers, some of which would be in partnership with different companies and global organizations. All centers will also be engaged in teaching and thesis guidance. These centers, with various labs, will be the hub of activity, with active contribution from faculty and students—BTech, MTech and PhD. [15]

- **Cutting Edge Research Programs:** To undertake cutting edge research programs that establish a strong link between academia and industry [16]
- **Knowledge Creation:** The focus of the institute is to provide students with opportunities to do research and create knowledge alongside learning. [17]
- **Create Innovative Entrepreneur and Develop IP Culture:** Act as a catalyst in fostering an innovative entrepreneur-focused ecosystem to ensure that new products, solutions and IP are created in the State taking advantage of the intellectual capital of the State. [18]
- **Research with Social Impact:** It is also at the forefront of research that has the potential to make a major social impact. [5]

### 1.11.6. Remarks

Similar type of models are already implemented in many World Renowned Universities. More detailed information is available in my book “Washington Accord & Multi-Objective Integrated Model for Developing WCU (World Class University)” (Chapter 8, 9, pp. 141-182). [12]

### 1.11.7. Basic Principles Followed at IIIT-D

#### *Best Practices*

- Instead of bluntly running after false metrics, the students were instilled with an ethos, where the journey counts, sometimes more than the destination.
- Academic honesty is often cited by many professors as the key to success in that world, there's no point mixing facts and dropping numbers on the long run. This same ethic is followed in IIIT-Delhi.
- The faculty and the admin are very clear on what they are and what they aren't.
- Our Faculty members are clearly the greatest flag bearers of our institute. Even then, the faculty profile was one of our greatest assets. [26]

### 1.12. Major Issues Need to be Addressed for Establishing Best IIIT

Prof. S. Sadagopan, founder director of IIIT-B said that “Attracting and retaining top-notch **faculty, students and staff** continue to remain our main challenge, though the high quality of our faculty & students in the past fifteen years, is helping us over the years. **Attracting Research funding** to keep our Laboratories at the cutting-edge is another challenge. Regulatory issues and infrastructure upkeep (and funding for that) is the third challenge.” [2]

Sanjeev K Aggarwal, Professor of Computer Science and Dean, IIT Kanpur stated that “The most important parameter of success of an institute is the quality of faculty it attracts. **IIIT Delhi has done an excellent job of recruiting high quality faculty in a very short time**, and is already competing successfully with well-established institutes in terms of attracting faculty. I am confident that the Institute will reach great heights as it matures further.” [109]

Initial Issues are:

1. Location in IT Park or Industrial zone and near Innovation Cluster (Ecosystem)
2. Should be based on PPP Model

The Major Issues, while establishing IIIT are:

3. Appointing faculty with PhD (Computer or Information Technology) for minimum 10 Research Groups of various research fields of Computer and Information Technology
  - Around 50 to 75% faculty with PhD degree from foreign renowned Universities and
  - Remaining PhD faculty from IIT

- Chair Professors (Minimum 5) with Industry Endowment
- 4. International Academic and Industrial Tie-ups and Partnerships
- 5. Business and Technology Innovation (Incubation) Center (Section 25 Company)
- 6. Attracting Global Talent (students)
- 7. Use of Technology

Other moderate and routine Issues are:

- 8. NBA Accreditation (Graduate Attributes focused system as per Washington Accord)
- 9. Curriculum Development and Pedagogy
- 10. Adopting excellent Evaluation Process
- 11. Global Employability
- 12. Patents and Research papers in High Impact Factor Journals
- 13. Research Funding from Government
- 14. Internationalization

Issues to be addressed after passing out first batch of students

- 15. Alumni Involvement
- 16. Government Recognitions

Other issues are:

- State of Art Initial Infrastructure, facilities and support systems, which should match with top 3 IITs
- Various specialized non-teaching staff positions and administrative positions like other top 3 IITs
- No PhD qualification restriction for appointing staff at Research Centers and Visiting / Adjunct faculty positions.
- Special financial support for staff development, training, mobility and international exposure
- Quick decisions from top management

I would like to discuss each of these issues in the rest of the book.

## **Chapter 2: Issues, Which Need to be Focused at the Time of Creating IIT University Act**

## 2.1. Constitution of Board of Governance

Ideally, the Board of Governance must have members from following categories. The total number of members should be odd figure (like 11, 13 or 15)

- Industry (total 3): CEO / MD / Director of “NASSCOM listed Top 20 Ranking IT Companies” [115]
- Academia (total 3):
  - 1 or 2 Vice Chancellors / Directors of Premier Academic Institutes of India with 25 years of Academic Experience and at least few years of collaboration, research and fundraising experience.
  - 1 or 2 Eminent Professors of World Renowned Universities with 25 years of Academic Experience and at least few years of collaboration, research and fundraising experience.
- Government Nominees (total 2):
  - Director, Higher and Technical Education Department of the State Government
  - Financial Advisor from Government Finance Department
- Promoter’s Nominee (2 to 7)
  - Major Promoter’s Nominees: 1 or 2
  - Minor Promoter’s Nominees (for minimum contribution of Rs. 25 Crore): One representative from each promoter (Not more than 5)
- Institute Nominees (total 3): Director, Dean and Professor

Many times the political interference in BOG appointments disturb the balance between Academicians, Industry Personals, Financial Advisor and Administrators. It can hampers the decision making process of BOG and spoils the development of institute. Let’s see the Governing Council of IIIT-H, which is properly balanced.

Name	Affiliation
Prof. Raj Reddy	University Professor of Computer Science & Robotics, School of Computer Science, Carnegie Mellon University (CMU), Pittsburgh, USA
Shri R. Chandrashekhar, IAS (Retd) (Ex-officio)	President, NASSCOM, New Delhi
Shri S. Ramadorai	Vice Chairman, Tata Consultancy Services, Mumbai
Shri C. Srinu Raju	Managing Director, Peepul Capital Advisors P.Ltd., Hyderabad.
Shri Sangita Reddy	Joint Managing Director, Apollo Hospitals Enterprise Limited.
Dr. Vinton G Cerf	Vice President and Chief Internet Evangelist, Google
Prof. Narendra Ahuja	Donald Biggar Willet Professor of Engineering, University of Illinois, USA
Prof. Ashok Jhunjhunwala	Professor, Indian Institute of Technology, Madras
Prof. Rajeev Sangal	Director, Indian Institute of Technology, (Banaras Hindu University), Varanasi
Prof. U. B. Desai	Director, Indian Institute of Technology, Hyderabad
Shri. Jayesh Ranjan, (Ex-officio)	IAS, Secretary, ITE & C Department, Government of Telangana
Smt. Ranjeev R. Acharya, (Ex-officio)	IAS, Principal Secretary, Higher Education Department, Government of Telangana
Prof. P. J. Narayanan	Director, International Institute of Information Technology, Hyderabad
Prof. Jayanthi Sivaswamy (Ex-officio)	Dean (Academic), International Institute of Information Technology, Hyderabad
Prof. Vasudeva Varma (Ex-officio)	Dean (Research), International Institute of Information Technology, Hyderabad

Fig. 2.1: Board of Governance of IIIT-H

The IIIT-D has selected altogether different structure. They have **General Council** as well as **Board of Governance**. It's a double check for smooth functioning of this prestigious IIIT. I personally feel that it's a better approach.

*Best Practices*

## Governance of IIIT-Delhi

IIIT-Delhi was created by the Delhi Govt. in 2008 as per the IIIT-Delhi Act.

- **General Council** is the highest body overseeing the institute, and advises the **Vice-Chancellor**.
- The IIIT-Delhi Act ensures administrative and academic autonomy in the following way:

<p>Administrative autonomy</p> <ul style="list-style-type: none"> <li>• <b>Board of Governors</b> consists of 4 experts, 2 Govt. nominees, 2 professors, the Director, and the Chairman</li> <li>• Board decides the salaries, the number of positions, selects the 4 experts</li> </ul>	<p>Academic autonomy</p> <p><b>Senate &amp; Board</b> can start degrees/programs</p> <p>Senate is empowered to take all academic decisions</p>
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The members of the governing bodies are listed below.

Governance of IIIT-D: General Council as well as Board of Governance

As per “The Indian Institutes of Information Technology Act, 2014” the BOG consist of following members.

**13. (1)** The Board of Governors of each Institute shall be the principal executive body of that Institute. Board of Governors.

**(2)** The Board of Governors of each Institute shall consist of the following members, namely:—

- (a)** a Chairperson, an eminent technologist or industrialist or educationist to be nominated by the Visitor from a panel of three names recommended by the Central Government;
- (b)** Secretary incharge of Information Technology or Higher Education in the State in which the Institute is located, *ex officio*;
- (c)** one representative of the Department of Higher Education, Government of India dealing with Indian Institute of Information Technology, *ex officio*;
- (d)** one representative of the Ministry of Communication and Information Technology, Government of India, *ex officio*;
- (e)** Director of Indian Institute of Technology to be nominated by the Central Government;
- (f)** Director of Indian Institute of Management to be nominated by the Central Government;

- (g) four persons having special knowledge or practical experience in respect of information technology or engineering or science or allied areas to be nominated by the Council;
- (h) two Professors of the Institute nominated by the Senate;
- (i) Director of the Institute, *ex officio*;
- (j) the Registrar, *ex officio* Secretary.

Fig. 2.2: IIIT Act 2014: Guidelines for formation of BOG for IIIT [175]

### *Best Practices*

Prof. S. Sadagopan, founder director of IIIT-B said that “Of the 15 board members on IIIT-B’s governing body, the state government has one member as does the Union government. The balance is made up of representatives from industry (Infosys, HP, Microsoft, Intel, ICICI Bank, etc.) and academia (University of California, MIT, Stanford, IIM-Bangalore, etc.)”. [57]

### **Case Study**

While forming BOG of one of the IIIT, the government have appointed very high profile and renowned personalities. But they couldn’t include a single academician with “25 years of academic experience and at least few years of collaboration, research and fundraising experience” as a member of their BOG. On the top of that, the Director of that institute is not having academic experience. In academics, most of things are non-tangible. Only experienced academic administrator can sense the issues and can tackle the situations in a better way.

The “Survey of Industry-linked Engineering Institutes” by AICTE, CII and PWC clearly mentioned that “To ensure active **participation from industry**, efforts should be made to **initiate interactions at the operational level** than **just securing representation** as member in the **Board of Governors**. Such operational-level interactions will enable more tangible rewards mutually”. [219]

## 2.2. Location: Near Software Park or Industrial Zone or Innovation Cluster

As per Table 1.1, the location is a very important factor for deciding success of IIIT. Only 3 IIITs are at A+ locations and dominate the list.

As per MHRD document “Scheme of setting up 20 new Indian Institutes of Information Technology (IIITs) on Public Private Partnership (PPP) modal” the location of IIIT should be as follows. [31]

## 6. Location

Given the importance of the location towards the success of the IIIT, it is important that the location for each IIIT is a well-thought decision arrived at by a careful consideration of all factors and criteria.

Some criteria that should be considered for selection of the location are as follows:

- Presence of a number of IT parks & IT SEZs will enable the institute to leverage the good quality infrastructure.
- Presence of leading IT companies will enable the development of academia- industry linkages.
- Presence of non -IT industry will enable the IIIT to develop domain specialization.
- Availability of infrastructure including good connectivity (by air and/or road), local transport, clean city environment in terms of sanitation, good quality hotels, housing facilities etc.
- The location should allow for future expansion of the institute.

Fig. 2.3: MHRD specifies the Location for IIIT under PPP Model [31]

### Factsheet

#### IIIT-B

- The physical location on the Institute in Electronic City in Bangalore provides a natural advantage for constant interaction, relevance and enrichment through industry experts, who contribute to teaching as Adjunct Faculty, and in other synergistic activities in the form of recruitment, consultancy projects, research projects, joint organization and hosting of international conferences, etc. Thanks to the uniqueness of IIIT-B vis-a-vis its location at the Electronics City, involvement of Indian IT industry and the PPP model of IIIT-B. [4]

#### IIIT-D

- With the above objectives in view, the Government of NCT of Delhi allocated 25 acres of land in the GB Pant Polytechnic Campus to enable the setting up of the IIIT-D permanent campus, which is located behind the Phase III Okhla Industrial Estate at a distance of 1 ½ km (approx.) from the Okhla railway station, South Delhi. [6]

#### IIIT-H

- It is located at Gachibowli area of Hyderabad, which is a fast developing area in which several new software companies are building their campuses including Infosys, Wipro, Microsoft and others. [23]
- Hyderabad emerges as startup favorite: Let's consider Hyderabad city. Hyderabad host to some of the best known multinational companies in the world, Hyderabad is now also **emerging as the preferred destination** for hundreds of young entrepreneurs opting out of conventional careers and setting up their own ventures. Much of the credit, it appears, goes to highly-equipped incubation cells of top notch educational institutes in the City such as IIIT, ISB, NIT



and BITS Pilani, which offer space, support and networking opportunities to aspiring businesses. [90]

#### IIIT-Kalyani (Kolkata)

- IIIT Kalyani is located at an hour drive from the bustling metro-city, Kolkata, which is also hub of immense IT activities with presence of IT Companies such as Wipro, TCS, Cognizant, IBM, Capgemini. It is a calm, peaceful and productive place to study and student-friendly atmosphere all around. [88]

#### IIIT-S (Andhra Pradesh)

- The land allocated by GOAP for the IIIT campus is in Ramachandrapuram, Chittoor District, Andhra Pradesh. The IIIT land comes under the administrative purview of Industrial Area Local Authority (IALA) Sri City. Sri City is a Planned Integrated Business City (Township) located 55 km North of Chennai on NH-5 along the border of Andhra Pradesh (AP) and Tamil Nadu (TN) States of India. Due to its close proximity to Chennai, IIIT benefits from the well-developed social infrastructure of Chennai. [32]

### 2.2. Remarks

The location of IIIT is generally preferred near Software Park, which should be inside prominent Innovation Cluster of the nation. For example, Bangalore, Delhi and Hyderabad are known software clusters of India and thus IIITs in this area got the advantages for developing industrial interface, which is needed for generating funds. The Location decides the growth and success rate of IIIT.

More detailed information is included in my book “113 Difficulties for Developing World Class Universities” (Chapter 6, Section 15: Location Matters: WCU Can’t Establish Anywhere, pp.170-174). [9]

In addition to this more detailed information is available in my book (Free Download) “Washington Accord & Multi-Objective Integrated Model for Developing WCU”, (Chapter 14: State, Location & Legal Provisions Can Affect Governance Model, Finance & Resources, pp. 241-250). [12]

### 2.3. PPP Model

For establishing IIIT, the industrial interface is the most important issue. Thus all new 20 IIITs are based on PPP model. As I mentioned earlier, few established IIITs have strong industrial support.

#### Factsheet

##### IIIT-H

Soon after he became the chief minister of Andhra Pradesh (1995), N. Chandrababu Naidu realized that if Hyderabad wished to become the next Silicon Valley, it had to build a similar ecosystem of innovation. Easier said than done. How does one build world-class teaching and research universities such as Stanford and Berkeley in a few years? Naidu had a plan. He proposed a public

private partnership (PPP). In response, five companies (Satyam, IBM, Oracle, Motorola and Metamor) chipped in around Rs 3 million each, while the government granted 60 acres and buildings to roll-out the International Institute of Information Technology (IIIT), Hyderabad, in 1998. [219]

### 2.3. Remarks

The IIITs are not fully funded by government. The 40% income should be generation through industry oriented Research & Technology Transfer. The PPP model gives the strong base for revenue generation. More detailed information about PPP is included in my book “Funding Techniques of World Renowned Universities” (Chapter 6, Section 6.3.10: Proposed PPP Model for HEI, pp. 50-51). [10]

More details are available in of my book (Free Download) “113 Difficulties in Developing World Class Universities”; specially in Chapter 8 (Section 8.11) and in Chapter 10: Two Way Industry University Interface: Collaboration to Partnership, of my book “Strategy to Develop World Class University”. [9] [10]

### 2.4. To Attract Funding Needs Industry Oriented Vibrant Research Groups

The selection of Research Group is most vital decision for any IIIT. For Research Groups, they must select most vibrant fields of Information Technology, so that they can attract substantial funds from industry through partnerships and collaborations. [8]

### 2.4. Remarks

Instead of the conventional departments, IIIT is organized as Research Groups (research centres and labs), to facilitate inter-disciplinary research and a seamless flow of knowledge within the Institute. These research group must get funding from industry. Thus care should be taken for

- The Multidisciplinary approach
- Flow of knowledge within institute
- Innovation culture
- Students career and
- Industry demanded research area

### 2.5. Admission Policy

#### 2.5.1. Reservations in Admission Process

#### Factsheet

IIIT-H

- No, there is no SC/ST/BC, women, physically challenged etc. quota or reservation of any kind for IIIT admissions. All admissions are on strictly merit basis and in open category. [23]

International Institute of Information Technology, Hyderabad

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## FAQs | UG Admissions

- Q1: I have received admission in IITs. Why should I consider joining IIIT Hyderabad?
- Q2: Why should I join the 5-year dual degree programme? In the 4-year programme, I finish one year early.
- Q3: What are some of the areas in which UG students can do research?
- Q4: What is the eligibility to get into any of the above programs?
- Q5: Is branch change allowed?

- Q21: I have paid on-line through debit/credit card. How do I verify if payment was successful?
- Q22: Will I receive confirmation if I send form by post / courier?
- Q23: 12th marks have not been announced for my board. What should I do?
- Q24: I have not received any confirmation email after completing phase I. What should I do?
- **Q25: Is there any SC/ST/BC, women, physically challenged etc. quota for IIIT admissions?**
- Q26: Will IIT JEE rank be considered along with JEE(Main) rank for admission?
- Q27: If I apply for admission does that guarantee that seat is reserved for me?

please send an email to [ugadmissions@iiit.ac.in](mailto:ugadmissions@iiit.ac.in) with transaction ID, Bank account no., Date/Time of transaction, Transaction amount, your name, email address, etc. details and we will reply to you within 7 working days.

**Q25: Is there any SC/ST/BC, women, physically challenged etc. quota for IIIT admissions?**

No, there is no SC/ST/BC, women, physically challenged etc. quota or reservation of any kind for IIIT admissions. All admissions are strictly merit based and in open category.

**Q26: Will IIT JEE rank be considered along with JEE(Main) rank for admission?**

No, we only consider JEE(Main) Marks for regular admissions. There is however a provision for admissions based on Olympiads, NTSE

Fig. 2.4: No SC/ST/BC/Women/Physically Challenged Quota at IIIT-H [23]

- Normally in all IIITs the admissions are based on JEE Main. IIIT-H is not participating in CSAB counseling (JEE (Main) -2015). IIIT, Hyderabad offers BTech admissions through Institute portal using JEE (Main) 2015 Marks.
- The admission to the MTech programme has been completely based on GATE Examination since August 2013 cycle. Admissions to M.S. by Research and Ph.D. programmes have been

based on Interview of shortlisted candidates where the short-listing is done by the entire faculty.

- IIIT Fee: Higher than the Fee at IITs or NITs [23]

IIIT-H offers high quality infra-structure. It has modern well-kept living facilities. It also has one of the highest bandwidth availability per student. It has a highly qualified research oriented faculty with research centres. All this costs money. Most importantly IIIT does not run on annual Government grants. This allows complete autonomy and high academic standards, but does result in a slightly higher fee. However, financial assistance is available. [23]

**IIIT-NR**

- The PPP based IIIT has followed altogether different route. They have reserved
  - 50% seats: for students of Chhattisgarh
  - 15% seats: for people employed with NTPC or their wards
  - 35% seats: Students from outside Chhattisgarh

Please see the following snapshot of IIIT-NR.

**ADMISSION**

The split of student intake at IIITNR is as follows:

- > 50% seats are reserved for students who possess domicile status of Chhattisgarh and have passed 10th & 12th from the State of Chhattisgarh.
- > 15% seats are reserved for people employed with NTPC or their wards.
- > 35% are reserved for students from outside Chhattisgarh.

Fig. 2.5: Admission Strategy of IIIT-NR [141]

**IIIT-D**

**Number of seats + reservation**

The number of seats for the CSE and ECE programs starting in 2015 are 110 and 70 respectively, of which 85% are reserved for Delhi students and 15% for outside Delhi students. (01 supernumerary seat is reserved for Kashmiri Migrants and twelve supernumerary seats are reserved for foreign nationals.)

Category	CSE		ECE	
	Delhi	Outside	Delhi	Outside
General	47	8	30	3
SC	14	2	9	2
ST	NIL	1	NIL	1
PwD*	3	NIL	2	NIL
Defence **	5	1	3	1
OBC	25	4	16	3
Total	94	16	60	10

1 Seat is reserved as supernumerary for Kashmiri Migrants

12 Seats are reserved as supernumerary for Foreign Nationals

Fig. 2.6: IIIT-D Admission Process [215]

Dr. Dheeraj Sanghi, Former VC LNMIIT Jaipur, Professor IIT Kharagpur stated in his blog that “However, I was in for surprise. IIIT Delhi is a Delhi Government institute, and just like all other Delhi Government engineering colleges, it too has an 85% quota for Delhi students. So, obviously, we **compete mostly with other Government engineering colleges in Delhi....**”. [216]

### 2.5.1. Remarks

“Reservation Policy” is a political decision and should be decided by respective state government or central government. One thing is sure, without attracting Global Talent (students), the IIIT can’t establish Research University with world class education standards. The Success of IIIT depends upon this crucial decision. The diversity of students is an important factor for establishing the culture of innovation. Thus institute must attract global talent and admit the students from all over world to enhance the culture of innovation.

### 2.5.2. Unique Admission Policy of IIIT-D

#### *Best Practices*

In 2014, instead of an offline programming test, the score of the applicant in the Long Programming Challenge of [CodeChef](#) (a non-profit educational initiative by Directi) was considered for the [M.Tech selection procedure](#). It brought IIIT Delhi close to attaining its goal by encouraging a larger number of students across India to apply for its Master’s degree as the programming test was made online. The process was a success and benefited the students as well as the institute. The former by motivating them to do better quality of programming and the latter by providing them candidates with a proven level of programming skill.

#### *Best Practices*

On similar lines, to encourage budding programmers, changes were made to the [admission process for B.Tech](#) where bonus points were given to the candidates who showed their excellence in Olympiads (like INOI) and other school programming contests (like ProCon Junior).

### *Best Practices*

**Eligibility Criteria for Bonus Marks at IIIT-D**

Upto 10 bonus marks will be given to candidates as mentioned below:

1. **Olympiads, Indian National Olympiad in Informatics, Maths, Physics, Chemistry, and Biology:**  
 10 marks, if the student was selected for the summer training camp for selection of the final team for International Olympiad (i.e. IOITC, IMOTC, OCSC for Physics, Chemistry, or Biology); **Supporting** documents needed: Certificate/letter from organizers certifying this – IIITD will also verify this directly with organizers of the Olympiads
  - 6 marks, if the student qualified to appear in the National Level Exam for selection for the summer camp (i.e. INOI/INMO/INPhO/INChO/INBO). **Supporting** documents needed: Qualification letter/email to appear in the exam – IIITD will also verify this directly with organizers of the Olympiads.
2. **Procon Junior programming contest:**
  - 10 marks for the medal winners; **Supporting** documents needed: Certificate/letter from organizers certifying this.
  - 6 marks for those who got certificates of Achievement; **Supporting** documents needed: Certificate/letter from organizers certifying this.

Innovative MTech and BTech admission policy of IIIT-D [179] [182]

#### 2.5.2. Remarks

By giving extra weightage to programming skills, the IIIT-D has introduced the new concept for attracting and selecting best student during admission process.

## 2.6. Selection of Faculty

### 2.6.1. Selection of Faculty: Need to Understand Classification of PhD in Computers

In India there is a watertight compartments of different faculty or disciplines like engineering, medical, management, commerce etc. The PhD in Computers can be done in variety of ways. But only PhD in Computers mentioned in 4<sup>th</sup> Category are eligible for teaching faculty at IIIT or Engineering College. In addition to this under 4<sup>th</sup> category, the candidates who are having teaching experience in Computer Department in Engineering Colleges can be considered for Associate Professor or Professor in IIIT or Engineering Colleges.

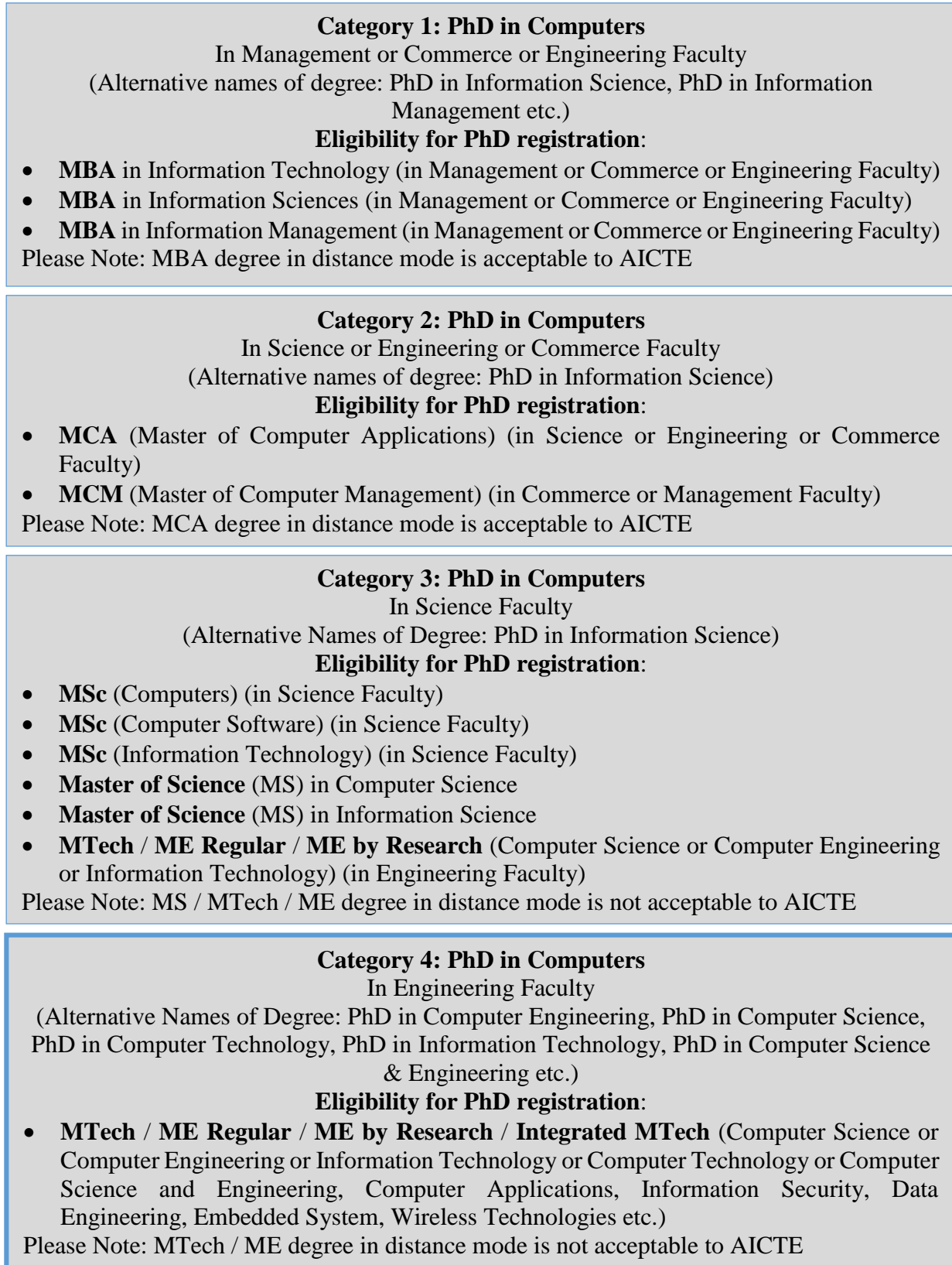


Fig. 2.7: Classification of PhD (Computers) in India

## 2.6.2. Selection of Faculty: Twin Objectives

### *Best Practices*



IIIT-D Director Prof. Pankaj Jalote: Faculty attrition in Research Universities [27]

### **2.6. Remarks**

- Many times the VC Search Committees may not understand complexities of Ph.D. (Computer). The IIIT University Act must specify the rules and regulation about faculty and director appointment without any ambiguity.
- The faculty members must be selected very carefully. It is very difficult to identify faculty with PhD from reputed institute with interest in research as well as teaching.

## 2.7. Director or Vice Chancellor Selection Process

### 2.7.1. Academic Experience should not be Neglected

In India, PhD (Computers) in Engineering Faculty with Industry experience can be appointed as a Director for IIIT. The person from industry can easily understand issues like Research, Innovation Collaborations with Industry etc. But for a person from industry, it is little bit difficult to address the non-tangible issues like

- Improvement in Teaching quality and Pedagogy
- Perfect blend of Academic and Innovative Research Culture
- Intricacies of International Accreditation Processes
- Curriculum Design Complexities
- Balancing between Education, Training, Employability Skillsets development



- Understanding Student Psychology and Management
- Understanding the Psychology of Teaching Community

I personally feel that such person must have at least few years of teaching experience in engineering institutes.

### 2.7.2. Selection of Director or Vice Chancellor: Need of More Refined Processes

The IITs need to perform with limited faculty members and students. The best IIT can be established only through “Academic Commandos”. Thus, I personally feel that, at least for IIT, the VC Search Committee should not act like Selection Committee. To understand the difference between Vice Chancellor Selection Process in India and Abroad, one should read the documents (2014) of Oxford University namely “VC Final Appointment Details” and “Call for Applications for The Position of Vice Chancellor”, USIU. [146] [148]

#### **Case Study: Selection of an IIT Director**

By Dr. Dheeraj Sanghi, Former Director, LNMIIT Jaipur, Professor IIT Kharagpur, India

How do we recruit an employee in an organization at the lowest level, say an office assistant or a clerical staff. We take out an advertisement, and receive a large number of applications. We use a shortlisting criteria to call lots of them to spend a day at the organization. We have a series of tests, check their language skills, check their basic analytical skills, and check their computer skills. After each stage, keep reducing the numbers, and finally we have an interview. It is a pretty rigorous exercise that takes a significant amount of time and effort by several persons in the organization.

When we are recruiting at more "important" levels like a faculty, we typically ask each candidate to spend a couple of days in the Institute, give a seminar, interact with all faculty members, get letters of recommendations, and we read a few of the top papers. Again a huge amount of effort with several candidates to select one faculty member.

How do we recruit a student in IITs? I don't need to explain the JEE and GATE exams. Even for PhD admission, the interview process is pretty strict and often lasts for more than 30 minutes for any candidate who is serious...

How do we recruit a Director of an IIT? After the usual application/nomination process, there is a search cum selection committee which shortlists the candidates and invite these candidates for an interview. You would imagine that to recruit a CEO level position, the interaction with the candidate would last the whole day, and perhaps interaction with multiple stake holders. NO.

The interaction with 36 candidates will be over in 6 hours. That means about 10 minutes per candidate. Yes, we recruit a Director in a fraction of the time compared with the recruitment of an administrative staff, a student, a faculty, or pretty much anyone else in the Institute...

Why does this happen. It happens because of the belief that some people have super-human powers. They can look at you and decide how good you are. Indeed there are people who can just look at a CV and decide how good you are for the position of the Director.

**I am aware of the selection of VC of a prominent university where the VC was decided purely by looking at CVs. [145]**

The World Renowned Universities are involving external companies in VC Search process. The News Letter of Queen's University Canada stated that "The advisory selection committee has retained **Boyden global executive search, a firm** with considerable experience in recruiting academic leaders, to assist in the search process". [149]

### Case Study: University of Sussex UK Recruitment of Vice-Chancellor

The Council of University of Sussex UK has appointed the **executive search company Perrett Laver** to assist in the recruitment process for a new Vice-Chancellor. Specializing in identifying executive talent for education and research institutions, Perrett Laver has worked with numerous universities on similar senior level appointments.

The company will soon run an advertising campaign, in conjunction with an extensive search process, to identify potential candidates for the Vice-Chancellor role. Perrett Laver will also manage the interview process for this position.

Staff from Perrett Laver will visit the University in November to hear from a wide cross section of staff and students. They will hold a number of open meetings on campus to allow people to share their thoughts about what sort of Vice-Chancellor they would like to see at Sussex.

Information about these events will be made available as soon as possible, however if people are unable to attend, Perrett Laver has also invited people to get in touch directly via email.

A consultation is currently taking place within the University to help with the process of drafting the job description and person specification for the Vice-Chancellor role. The online consultation closes at midnight on Wednesday 11 November 2015.

The recruitment process is expected to run until April 2016. After this point an announcement about the new Vice-Chancellor will be made at the earliest opportunity. [150]

At present a government-appointed search committee identifies and recommends names for appointment as vice-chancellors, a process open to abuse and political influence. Charges of lobbying and attempts to influence the committee, which usually consists of three to five members, have come up frequently. [147]

Without Political-Will, it is difficult to establish or flourish the highly sophisticated IIIT Research Universities in India. The government support is required for shaping these institutes. But most of the time, the over interference hampers the academic freedom and growth of the institute. In my opinion, only in few IIITs, the government could keep this balance.

### Case Study: North Carolina Central University USA

North Carolina Central University is preparing to launch a search for a new vice chancellor of Student Affairs and Enrollment Management. Dr. Jennifer A. Wilder has been appointed interim vice chancellor for Student Affairs and Enrollment Management. Chancellor Debra Saunders-White has been gathering **feedback from students, staff and faculty**. The new vice chancellor will succeed Dr. Kevin Rome, who left NCCU to assume the presidency of Lincoln University in Missouri.

“**Students should be fully engaged in this process** and provide input on what they want in the next vice chancellor,” said Stefan Weathers, Student Government Association president.

Wilder worked with student leaders to plan town hall meetings to create a survey that was distributed the student body. The survey contained a set of questions including the qualities of NCCU, opportunities and challenges for the next vice chancellor, desired traits, experiences and three response questions. Students characterized NCCU as a friendly, welcoming and closely knit campus community. Students would like the next vice chancellor of Student Affairs and Enrollment Management to be a person of high integrity who has a track record of student success, and who is willing to strengthen the academic profile of the student body. Students would like someone who has experience at both HBCU’s and predominantly white institutions.

“Students should respond to the survey and participate in any forums that are offered as part of further information gathering and the interview process,” said Wilder. [151]

### 2.7.3. Don’t Run After Labels

#### Case Study: ISRO: Just 2% of Isro’s engineers are from IITs, NITs

ISRO may be making great strides in space, but when it comes to attracting graduates from premier institutes like IIT, it has a long way to go. Details gathered through an RTI application show that **only 2% employees** of Indian Space Research Institute (ISRO) are graduates from **IITs or NITs**.

With satellite launches and interplanetary exploration increasingly becoming as commercial as scientific, ISRO will need products of premier institutes. "But this is not a trend that affects only ISRO," says V Adimurthy, senior advisor of interplanetary mission at Vikram Sarabhai Space Centre, Thiruvananthapuram. **Other sectors like roadways and railways too don't attract them,**" says the IIT-Kanpur alumnus.

Moreover, **ISRO's centralized recruitment system doesn't differentiate between an IIT graduate and one from another engineering college**. “We look for strength in fundamentals, wherever the person is from. It is essential to have people from different institutions.” [152]

While selecting Vice Chancellor, Director or Faculty, the IIITs are giving over weightage to foreign qualifications or degrees from IITs. I think, the weightage must be given to appropriate rigorous selection process.

I observed that, in one of the VC selection process, a particular candidate could succeed only because of foreign qualifications, label of IIT and experience at Government R&D center. The VC Search Committee didn't bother about research quality, h-index, academic experience etc. To impress the voters, the politicians prefer person with such labels. The Indian Education System can't improve with such adhoc techniques.

### 2.7. Remarks

- Need to improve the VC selection process. One should not select VC simply on the basis of Bio-data i.e. without personal interaction.
- The VC must have experience to manage Academic Institutes of Degree level institutes. Otherwise he wouldn't be able to understand intricacies and importance of many academic processes.
- Unnecessary importance to foreign qualifications should be avoided.
- While preparing the IIIT University Act, take maximum precautions. It is not good practice to violate our own act. One can't establish leading institutes through these tactics.

### 2.8. Selection of Mentor Institute



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**NEWS**  
**College of Engineering Pune to mentor IIIT Pune**  
 26 Dec 2015

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College of Engineering Pune will be mentoring the upcoming Institute of Information Technology in Pune (IIIT).

As per the MHRD notification, 'The Academic session shall start from 2016-17 with courses of B. Tech (Computer Science) and B. Tech (Electronics and Communication Engineering) offered in the first year with the intake of 60 seats in each stream.

### ACADEMICS

IIIT Bangalore has kindly agreed to mentor IIITNR. This relationship will not only provide IIIT-NR access to the best faculty of IIITB, but will also help in learning how best to interface with industry towards encouraging demand-driven innovation.



Fig. 2.8: Every new IIIT initially takes help from Mentor Institute [173] [174]

Initially the mentor institute supports the new IIITs. The mentor institute provides all technical support to the upcoming IIIT. In short, the mentor institute and mentor director are responsible for implanting the academic, research, innovation culture of the institute.

I observed that, many times mentor institute's own culture is not as per requirement of IIIT Model. In such case, the new IIIT may not grow as desired.

The MHRD is controlling number of IITs and NITs thus the MHRD initiated IIITs got better mentor institutes (except few). Remember that, the IIITs have limited staff and they are overloaded. Thus to become Mentor institute is a most challenging task for them. The other players have selected better mentor institutes but could not get full support because of this constraint.

## 2.9. Objectives of Each IIIT are Different

Information Technology is an important tool for development of different areas of knowledge economy. India is emerging as a global player in the field of Information Technology. There has been a steady rise of software and IT sector in India since 1990's. As the IT industry is expanding rapidly, manpower requirement is growing exponentially. In order to develop manpower for different areas of the knowledge economy, education and training of information technology is a core prerequisite. The Central Government has established four IIITs at Allahabad, Gwalior, Jabalpur and Kanchipuram. These institutions are meant provide undergraduate as well as postgraduate education. The IIIT at Gwalior is for IT in Management. The IIITs at Jabalpur and Kanchipuram are for IT in Design as well as Manufacturing. [184]

Each IIIT is pursuing different objectives. Before starting IIIT, the Mission, Vision and objectives of the institutes should be very clear and should be specified on the website of the institute. Let's see the objectives of few IIITs.

### 2.9.1. Objectives of IIITD&M Kancheepuram

“Globalization has created uniformity in customer expectations world over. With opening up of Indian economy, our manufacturing sector has to compete globally even for the domestic market. This would require strong products with leading technology / quality and compelling cost advantage. Suitably trained manpower with skill sets appropriate for design, development and prototyping using modern IT tools is critical to achieve this goal. This Institute will serve as an inter-disciplinary institution for education and research in the area of Product Lifecycle Management (PLM) encompassing design and manufacturing using state of the art concepts, tools, processes and practices of the industry world over...The programmes are aimed at providing solutions to current technological challenges in wide domains like robotics, home entertainment, telecommunication automotive systems, etc. Design engineers and researchers passing out from IIITDM Kancheepuram will find scope and relevance in IT and IT enabled product companies, in particular analog and digital electronics IC companies, embedded systems players, automotive design, consumer product design and manufacturing and knowledge/service based industries. With mastery in domain specific design, engineering skills and required managerial expertise, our

graduates can entrepreneur organizations involved in the design and manufacture of commercially successful electronic or mechanical products” [136]

### 2.9.2. Objectives of IIITM Gwalior

It is an effort by MHRD towards creating professionals in areas of management and information technology from the same institute. This institute was created for facilitating higher education, research, and consultancy in areas of information technology (IT) and business management. [137]

### 2.9.3. Objectives of IIIT-Allahabad

The Institute has been conceived with the ambitious objectives of developing professional expertise and skilled manpower in Information Technology (IT) and related areas. [51]

The Institute has been conceived with the ambitious objectives of developing professional expertise and skilled manpower in Information Technology (IT) and related areas. As an apex nucleating institute in the area of IT, the establishment of IIIT-A, is a major step of Govt. of India towards strengthening the indigenous capability necessary for exploiting profitably and harnessing multi-dimensional facets of IT at all levels, and attaining expertise to enable the country to emerge as a leading player in the global arena. [153]

### 2.9.4. Objectives of IIIT-S (Sri City, Chittoor District, Andhra Pradesh)

The IIIT is a Research & Teaching Institute focused on the core areas of Information Technology: Computer Science, Electronics and Communications, and their applications in other domains. The institute will have strong research programmes in a host of areas, with Technology being the connecting thread. The emphasis will be on the development of Technology and Applications, which can be transferred for use to Industry and Society. [138]

### 2.9.5. Objectives of IIITDM Jabalpur

Probably at no previous moment in the world history have commerce and industry become so complex, extensive, and globally interrelated as they are today. India, which is going through a rapid growth in its manufacturing sector, is not unaffected by these changes. The modern manufacturing environment entails a large variety of cross-disciplinary activities including the Design and IT. Engineers consequently are being called upon to work within new environmental, economical and social constraints which are increasingly becoming a part of contemporary engineering practice. Obviously, these elements need to find their way into the engineering curricula. However, traditional engineering instructional formats isolate teaching and research into specific disciplines with un-integrated curricula and therefore the structure of our engineering curricula have hardly changed in accordance with the modern manufacturing needs. Such divisions in the existing higher education formats are found to act as barriers to learning, behavior, and performance.

Another aspect of engineering education which needs to be considered is the basic nature of the IT profession. The IT driven market of today features a model of innovation which is quite

different from the research models that most institutes are familiar with. The new market model for innovation emphasizes on fast concept, funds projects with venture capital, fosters innovation by rewarding entrepreneurs who specialize in transforming people's practices to become more productive with the help of new technology. In contrast, the conventional research model emphasizes on careful development of ideas and principles and achieves innovation only after ideas have gone through a long pipeline that distills out the best and brings them into practice over a period of 15-20 years. This dichotomy between the new market-driven model and the conventional idea-pipeline model poses another great challenge to educators of engineering.

The current engineering education system in India, though huge and diverse, is mainly based on the conventional idea of pipeline model. To integrate the knowledge of a given discipline with IT enabled design, prototyping as well as manufacturing considerations, a need therefore exists for developing a new academic programmes. Apart from laying an emphasis on IT, the new approach should also give emphasis on aesthetic, ergonomic and functional considerations of products. The academic programme should also be able to respond to industry driven adaptive management structure.

With above requirements in mind, the Ministry of Human Resource Development (MHRD), Government of India, felt the need to set up a national institute devoted exclusively for Information Technology (IT), Design & Manufacturing (D & M). It was envisaged that such an academic institute would promote excellence in the desired areas of specialization and would facilitate and promote the competitive advantage of Indian products and manufacturing in global markets. Further, the new Institute would serve as an inter-disciplinary institution for education and research by keeping the concept of Product Lifecycle Management (PLM) in mind. The India Institute of Information Technology, Design & Manufacturing (IIITDM) Jabalpur was thus established in January 2005. Strong industry interface and close cooperation with other academic and research institutions are the key features of this Institute. [139]

### 2.9.6. Objectives of IIIT-Delhi

It aims to encourage innovation and entrepreneurship in specified domain areas of IT. Towards this end it plans to organize itself as a conglomerate of R&D Centers, some of which would be in partnership with different companies and global organizations. All centers will also be engaged in teaching and thesis guidance. These centers, with various labs, will be the hub of activity, with active contribution from faculty and students—BTech, MTech and PhD. [140]

### 2.10. Two Major Challenges in Initial Years

In initial years there are two major challenges for Excellence Performance

- Initially IIIT is normally having “One Third Intake of Smallest Engineering College”
- Very Limited Faculty Members

The UG intake capacity of AICTE recognized Smallest Engineering College is 240, whereas IIIT (with two branches of engineering) is normally having just 80 UG intake capacity. It means initially IIIT is just 1/3 of smallest engineering institute.

The moderate size university has normally more than 300 staff members (say about 200 faculty and 200 technical staff). Even in established engineering college is normally have 150+ faculty members. It is quite easy to manage the University activities through these employees. But in IIIT the situation is altogether different. Initially, it has just two departments and very few faculty members. That is, approximately 5 faculty members in first year, 10 in second year and 18 in third year.

It is very challenging task to manage hundreds of University activities with limited staff and students. The initial years are very important for IIIT. During these years, the BOG and the Director need to establish the Teaching, Research, Innovation, Funding and Innovation Culture of the University. From day one, every stakeholder expects an excellent performance. Even for a best administrator, it's a herculean task.

To overcome these practical difficulties, the strategic planning and action plans must be ready before starting IIIT University.





## **Chapter 3: Issues, Which Need to Be Focused Before Commencing Classes (Part I)**

### 3.1. Infrastructure

World class infrastructure is needed, which includes space for administrative block, teaching halls, labs, hostels, mess, canteen, indoor sports, library etc.



Fig. 3.1: IIIT-A [204] [205]



Fig. 3.2: IIIT-D [213]



Fig. 3.3: IIIT-B [206] [207] [208]



Fig. 3.4: IIITDM Kancheepuram [203]



Fig. 3.5: IIIT-H [209]



Fig. 3.6: IIITDM Kancheepuram [203]

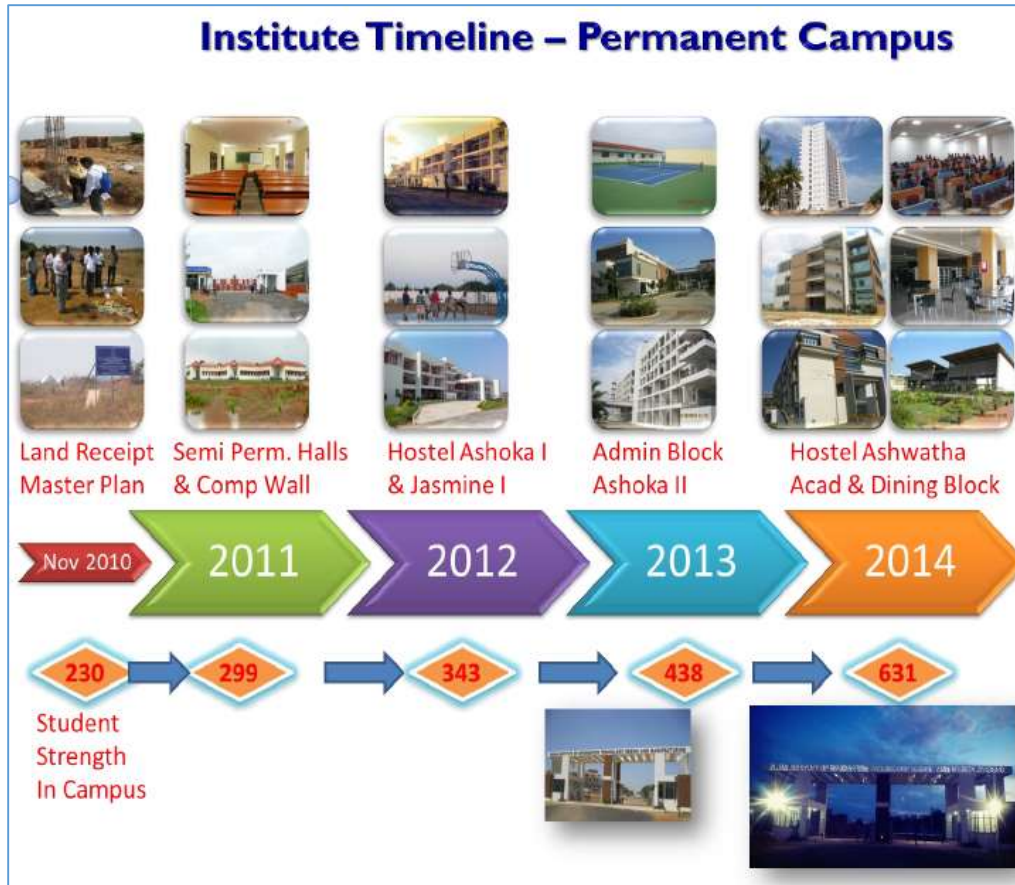


Fig. 3.7: IIITDM Kancheepuram – Time Line [203]



Fig. 3.8: IIITDM Jabalpur [211]



Fig. 3.9: IIITM Gwalior [212]



## Factsheet

### IIIT-D

- IT & Computing Infrastructure: IIIT-D has truly world class, campus-wide state of the art information technology tools that are designed to meet the computing and communication needs of the institute, which has a fast, reliable and rugged computer network of more than 500 Nodes. The institute has more than 100 laptops issued to its faculty, staff and students. To provide printing and other facilities, the institute has 91 printers and scanners. In order to facilitate proper teaching aid, all classrooms here are equipped with projectors and audio systems. All the hostels, faculty blocks, administrative block, library, classrooms and residences, are connected through redundant 10 gigabit fiber backbone network. All the blocks are connected through layer 2 & 3 switches to provide 1Gbps connectivity at the user end. Every hostel room has a dedicated LAN connection to provide round the clock access to resources on the net. Wireless network with 92 access points is also enabled in the faculty block, library, classrooms and hostel blocks.

- **Internet Access:** Through a 1 Gbps Internet leasedline from NKN with a backup connection of 100 Mbps running in failover mode. Internet connection range is provided through both Lan and Wi-Fi in all blocks inclusive of residences, academic, dinning, library and hostels.
- **Data Centre:** IIIT-D has a full-fledged data centre of its own. It hosts 40 Servers and network unified storage of 45.3TB. The data centre is powered by redundant UPS backup to ensure maximum uptime. All servers are connected to Internet by public IPs
- **IP Telephony:** Our entire Campus is equipped with IP telephony. It has 115 IP phones and more than 100 analog phones.
- **IP Address and IPv6:** The institute has its own /24 public IPV4 and /48 IPv6 address block. It has taken an initiative to transform itself into an IPV6-enabled Campus.
- **Software:**The institute mainly focuses on usage of free operating system like Ubuntu etc. But keeping in view its requirements, the institute also has licenses for Microsoft Windows, RHEL, Microsoft Office. Its also has licenses for specialized software like matlab, synopsis tools, cadence, mentor graphics etc.
- **Video Conferencing:** Polycom HDX7000 VC System is available with optional ISDN line & also connected with Internet.
- **Cisco WebEx:** We have single session 25 users Cisco WebEx web conferencing facility.
- **VPN:** It can be used to access all IIIT-D IT resources from outside campus using any Internet connection.
- **UPS:** We have 3 x 100KVA (Configured in N+1 in redundant mode) and 20 KVA (Dedicated) UPS powering the critical IT infrastructure.
- **ERP:** IIITD provides Academic ERP to students and faculty. For students, ERP provides the facility to register for courses, add-drop courses and view grades. For faculty, it provides the facility to view the courses they are offering, view list of students enrolled in the courses and enter grades.The ERP portal can be accessed at <https://erp.iiitd.edu.in>
- **Tape Library Backup Solution:** The institute Data Centre has an LTO 6 Tape Backup solution deployed for taking onsite and offsite backup of critical data. It consists of a DELL Power Vault TL 2000 Tape Library and a Backup Server. Presently we have one Read-Write Tape Drive with 24 slots in our TL2000 Tape Library. The Tape Library is directly connected to SAN and provides direct backup from SAN storage, besides allowing us to make any server disk to tape backup through the backup server.
- **HPC:** The primary mission of the High Performance Computing Facility (HPCF) is the delivery and support of an HPC resource to be used by IIIT-D faculty members, research scholars and students. Our HPC system comprises of a modular Blade Chassis with 4 blades populated at present. A separate rack server for GPU processing with Nvidia Tesla K20 GPU card of 2496 Cuda cores has also been installed. All servers are connected using 10G interconnect and are also connected to SAN storage. The entire HPC setup currently has 92 CPU Cores and 441 GB RAM with a theoretical TFLOP rating of 1.79. It is a highly scalable setup and is targeted to reach around 1000 cores in near future. [7][214]

### 3.2. State of Art Support Services

#### Factsheet

#### IIIT-D

IIITs appointed specialized managers for various jobs like

- Attracting funds from the industry
- Web Development
- IT service management etc.

<p align="center"><b>Advertisement No. 01/ 2015</b></p> <p>Online applications are invited for the following posts at Indraprastha Institute of Information Technology, Delhi (IIIT-Delhi), a State University created by an Act of Govt. of NCT of Delhi:</p> <ol style="list-style-type: none"> <li><b>1. Senior Manager/ Deputy General Manager (Academics)</b></li> <li><b>2. Senior Manager/ Deputy General Manager (External Relations &amp; Fund Raising)</b></li> <li><b>3. Manager (Alumni &amp; Fund Raising)</b></li> <li><b>4. Manager (Internship &amp; Placements)</b></li> <li><b>5. Assistant Manager/Junior Manager (Academics/HR/ IRD)</b></li> </ol>
<p align="center"><b>Advertisement No. 03/ 2015</b></p> <p>The Detailed CVs are invited for the following posts at Indraprastha Institute of Information Technology, Delhi (IIIT-Delhi), a State University created by an Act of Govt. of NCT of Delhi:</p> <ol style="list-style-type: none"> <li><b>1. Deputy General Manager/ General Manager (IT)</b></li> <li><b>2. Web Manager (In the scale of Junior Manager/ Assistant Manager)</b></li> <li><b>3. Assistant Manager/ Junior Manager</b></li> <li><b>4. Admin Assistant to Head, CERC.</b></li> <li><b>5. Multi skill Assistant</b></li> </ol>
<p align="center"><b>Advertisement for the Post of Controller of Finance/ Deputy General Manager at IIIT Delhi</b></p> <p>Applications are invited for the position of Controller of Finance/ Deputy General Manager at the Indraprastha Institute of Information Technology (IIIT) Delhi. A State University recently created by an Act of Delhi Govt. IIIT Delhi is a research-led institute, fashioned after IITs.</p> <p><b>Post Code: 01</b>  <b>Post: Controller of Finance/ Deputy General Manager</b>  <b>Job Description</b></p>
<p align="center"><b>Notification for the Post of GM/ DGM/ Senior Manager, Corporate Relations and Placements at IIIT Delhi</b>                  (Feb 22, 2013)</p> <p><i>Indraprastha Institute of Information Technology Delhi (IIIT-D), a state university established by the Government of Delhi in 2006, is looking for an outstanding candidate for the position of General Manager (GM) / Deputy General Manager (DGM) / Senior Manager for <u>Corporate Relations</u> and Campus Placements.</i></p>

Fig. 3.10: IIIT-D: Advertisement for staff positions for Fund Raising, Corporate Relations, Controller of Finance etc. [44] [66] [81]

### 3.1. & 3.2. Remarks

Everybody expects that, **from day one**, any new 5 Star Hotel should provide all the services and facilities efficiently. Have you seen any **new** 5 Start Hotel with 2 Star facilities and services? Unfortunately in India, this principle is never considered before starting any premiere education institute. Almost every new IITs, IIITs and NITs have been started at adhoc location without full facilities. These initial Adhoc strategies spoils the reputation of the institute. The world class infrastructure is must for establishing IIIT. There should not be any compromise on this issue.

The efficiency of any institute depends upon support services. No one can satisfy the stakeholders without good support services. It should be available from the day one of the institute.

The best example is IIIT-NR. It is the only IIIT in India, which has completed the world class infrastructure before commencing the classes (phase 1).

### 3.3. Faculty Issues

#### 3.3.1. Faculty with Foreign Qualifications

The fate and standing of IIIT is decided by faculty. The faculty from World Class Universities play very important role.

#### *Best Practices*

##### **Factsheet: Foreign Qualifications**

**IIIT-D:** Total Faculty: 38, Faculty with Foreign Qualifications: 28 (**74%**)

**IIIT-B:** Total Faculty: 33, Faculty with Foreign Qualifications: 19 (**58%**)

**IIIT-H:** Total Faculty: 55, Faculty with Foreign Qualifications: 24 (**44%**)

Out of 21 IIITs, following 4 IIITs are declared as “Institutes of National Importance”

**IIIT-DM Jabalpur** (Total Faculty: 44, Faculty with Foreign Qualifications: few)

**IIIT-Gwalior** (Total Faculty: 27, Faculty with Foreign Qualifications: Nil) **[186-188]**

**IIIT-Allahabad** (Total Faculty: 52, Faculty with Foreign Qualifications: few)

**IIIT-Kancheepuram** (Total Faculty: 30, Faculty with Foreign Qualifications: 2) **[190]**

**IIIT-S:** Total Faculty: 9, Faculty with Foreign Qualifications: 2 **[89]**

**Case Study: Article Published in “The Wire”**

A survey of faculty across select new and old IITs shows that two of them, Delhi and Powai, hired over **75% of their new faculty** across three departments – EEE, CS and ME – **with foreign PhDs**. ...As a rule, however, a potential faculty with a PhD earned from a top-100 (or even top-300) university in the world is likely **to be a better fit** at elite institutions, which demands not just competent teaching and mentoring but also high quality research, than one from an Indian university. This is because PhDs obtained from Indian institutions, even some of the better ones, **tend to fall well short of the standards** set by the leading universities in the world especially in terms of research training. ...An unpublished study by Biresh K. Sahoo, Ramadhar Singh and others found that on average, **faculty with foreign PhDs are twice as productive as those with PhDs from Indian institutions** (the paper can be obtained from the authors). Though the findings are drawn from business and management schools, it would be surprising if similar results are not obtained from other disciplines as well. It is **not a coincidence** that some of the leading Indian institutions today—whether IISc or some of the IITs—in world university rankings are **those which attract, hire and retain fairly large numbers of foreign PhDs**. Other leading institutions tend to be those located in liveable cities, which too are attractive for Indians returning from abroad with PhD degrees. [200]

**Case Study: Article Published in “The Wire”**

In all, the eight IITs hired 245 assistant professors in EEE, CS and ME over the past few years. Of these, 130, or **about 53% of the total, were trained abroad** (earning their PhDs in the US or elsewhere). While the older IITs hired 86 of the 129 new faculty members (67%) with PhDs from abroad, the new IITs hired 44 of its 116 new faculty members (38%) with foreign PhDs. Clearly, there is more brain gain taking place at the older IITs.

	IIT-B	IIT-D	IIT-K	IIT-Kgp	
EEE	20/23	10/15	06/11	05/10	
CS	05/07	05/06	03/07	02/07	
ME	14/21	06/06	06/09	04/07	
<b>Total</b>	<b>39/51</b>	<b>21/27</b>	<b>15/27</b>	<b>11/24</b>	<b>86/129</b>
<b>%</b>	<b>76.47</b>	<b>77.77</b>	<b>55.55</b>	<b>45.83</b>	<b>66.66</b>
	IIT-P	IIT-R	IIT-H	IIT-Gn	
EEE	01/13	01/06	06/11	05/11	
CS	05/09	04/06	03/15	02/03	
ME	03/11	04/14	06/12	04/05	
<b>Total</b>	<b>09/33</b>	<b>09/26</b>	<b>15/38</b>	<b>11/19</b>	<b>44/116</b>
<b>%</b>	<b>27.27</b>	<b>34.61</b>	<b>39.47</b>	<b>57.89</b>	<b>37.93</b>

Brain Gain at the IITs: Assistant Professors with PHDs from abroad in EEE, CS and ME [201]



**8. Faculty**

The availability of best-in-class faculty is critical to the success of the IIIT initiative. There is a need to provide a research-oriented environment, sustainable faculty development initiatives and market driven compensation to attract and retain good faculty. A strong research orientation is required among the faculty at a IIIT, which will lead to excellence in teaching and attract faculty who are highly regarded in their fields of specialization.

Creating the faculty pool for the IIITs will require a systematic approach which addresses the issues in both short term and long term. In the short-term, it is imperative that a seed pool of highly qualified faculty is established in each IIIT. One of the key responsibilities of this seed faculty will be to implement processes to develop a pool of faculty both organically (through doctoral research scholars) and inorganically (attracting other faculty to join the IIITs). To achieve this, the IIITs acting singly or collectively should establish a search committee to 'head hunt' the right faculty members from both within India and overseas.

Fig. 3.11: MHRD IIIT Scheme: About Seed Faculty and Faculty from abroad [31]

3.3.2. PhD Faculty and Faculty Diversity

**TOP 10 ENGINEERING COLLEGES WITH DOCTORATES IN FACULTY**

Rank	Name of institute	City	Total faculty	Faculty with PhDs	% Faculty with PhDs
1	IIT	Kharagpur	542	542	100
2	ISMU	Dhanbad	190	190	100
3	IIIT	Gwalior	38	38	100
4	IIT	Guwahati	254	244	96.06
5	IIT	Bombay	489	466	95.3
6	IIT	Kanpur	368	350	95.11
7	IIT	Madras	447	402	89.93
8	IIIT	Allahabad	82	71	86.59
9	BITS	Pilani	690	588	85.22
10	IT BHU	Varanasi	268	213	79.48

Fig. 3.12: Outlook Ranking of Engineering Institutes on the basis of Doctorate Faculty 2010 [292]

Today, most of the IIITs are having 100% PhD faculty (mostly from IIT). Not only IIIT but many engineering institutes have achieved this target.

S N	Name of IIIT	Information collected from Website Link	Total Number of Faculty Members	PhD / Post Doc from Foreign University	PhD from IIIT / IISc / IIIT	PhD From other Universities in India	Non PhD Faculty Members
1.	IIIT-Gwalior	<a href="http://www.iiitm.ac.in/index.php/faculties/faculty">http://www.iiitm.ac.in/index.php/faculties/faculty</a>	26	Nil	15	11	Nil
2.	IIIT Kancheepuram	<a href="http://www.iiitdm.ac.in/Faculty.html">http://www.iiitdm.ac.in/Faculty.html</a>	27	01	21	05	Nil
3.	IIIT BH	<a href="http://placement.iiit-bh.ac.in/downloads/iiit_bh_faculty_profile_2015_batch.pdf">http://placement.iiit-bh.ac.in/downloads/iiit_bh_faculty_profile_2015_batch.pdf</a>	48	2	9	14	23
4.	IIIT Guwahati	<a href="http://www.iiitg.ac.in/facultyIII TG.htm">http://www.iiitg.ac.in/facultyIII TG.htm</a>	24	01	17	6	Nil
5.	IIIT-S	<a href="http://www.iiits.ac.in/people.html">http://www.iiits.ac.in/people.html</a>	7	02	3	2	Nil
6.	IIIT-K	<a href="http://www.iiitm.k.ac.in/people/faculty">http://www.iiitm.k.ac.in/people/faculty</a>	12	Nil	4	8	Nil

Table 3.1: Faculty analysis of few IIITs

The above table shows that

- Few IIITs could not achieve the target of 100% PhD faculty members
- Many IIITs are unable to attract faculty members with PhD / Post Doc degree from foreign renowned Universities.
- Few IIITs could even attract sufficient number faculty members with PhD from IIIT / IISc / IIIT
- Few IIITs couldn't maintained faculty diversity

*Best Practices*

Department / School	% of faculty from the same university	% of faculty from other universities within the State	% of faculty from universities outside the State	% of faculty from other countries
	Nil	3	06	27

IIIT-D: Faculty diversity [7]

### 3.3.2. Remarks

What is the secret of success of IIT? It is nothing but “Critical Mass”. That is, accumulation of global talent and effective utilization of that talent. Attracting Indian talent is an easy job and most of the IITs have achieved this goal. Attracting global talent is comparatively difficult task. Only few IITs could do it successfully.

### 3.3.3. Very High Salaries: Assistant Professor gets more than Rs. 11 Lakh

#### Factsheet

#### IIT-B

To attract best talented faculty, IIT needs to offer most attractive salary packages.

For Permanent faculty and staff		
Designation/level	Proposed Basic Pay ranges in Rs Lakhs per annum	
Professor	11.5 - 17.5	
Associate Professor	10.0- 14.5	
Assistant Professor	7.5 – 11.5*	
AG1/TG1	1.25 – 2.75	
AG2/TG2	1.5 – 5.0	
AG3/TG3	3.25- 6.75	
AG4/TG4	5.5 – 11.5	

- In addition to the Basic Pay the staff will also be entitled to 40% HRA subject to ceiling of Rs 40,000 per month and a transport allowance of Rs 5000 per month
- They would be entitled to a special allowance. This special allowance will be Rs Zero on 1<sup>st</sup> January 2013. This allowance will have three components (a) A component to compensate for inflation (b) A component for any additional responsibility ( warden , dean etc) and (c) A component for compensating a person after he/she reaches the maximum of pay range and stagnates.
- The Special Allowance will be worked out at December every year and proposed to Governing Body Sub Committee on Finances. It will be implemented with effect from 1<sup>st</sup> January every year, after obtaining approval of the sub committee.
- Increase in Basic and consequently to other components will be based on Performance appraisal while the increase in Special allowance as outlined above.
- Sample Calculations for faculty and staff as examples are at annexure 1.

For Contractual Faculty and Staff		
6. <b>Contractual Faculty</b> : Institute hires experience faculty as consulting faculty . Some of them work full time and some part time. They do not get benefits of PF, and health insurance , gratuity etc. They charge institute a fee. The following rates are being proposed for them .		
Designation	Existing fee per month for full time engagement	Proposed
Consulting Professor	94000-127000	135000- 185000
Consulting associate Professor	84000-110000	120000- 160000
Consulting assistant professor	65000-95000	95000- 135000

For those engaged on part time basis , the fee payable will be adjusted on pro rata basis.

Table 3.2: IIT-B: Faculty Salaries in 2013 [4]

*Best Practices*

- It is supposed to become financially self-supporting after initial grants from Delhi Govt. This gives the Institute financial autonomy and it is this that allows it to give a salary which is better than the Govt (or IIT) salaries.

- Administratively, it is an autonomous, Board-run Institute (current Chairman: Kiran Karnik, ex-President Nasscom). The Board comprises four independent experts, two members from Delhi Govt, two Professors from the Institute, and the Director. The Board decides most policies, including the salary structure.

IIIT-D: Better Salaries than IIT & BOG has powers to decide the salary structure [183]

*Best Practices*

**IIIT-D: Excellent Service Conditions to Attract Excellent Faculty**

- Decent compensation. **Over Rs 11 Lacs per year for a starting Asst. Prof.** – this includes salary, dearness allowance, house rent allowance, etc.
- The Institute **allows a faculty member to earn up to one third of the yearly salary from research grants** – similar to the “summer salary from grants” concept of US
- It actively supports **summer sabbaticals** in R&D labs/companies, through which a faculty member can earn extra while also building linkages
- It has **liberal consultancy norms** (one day a week, and no Institute overhead for up to some initial amount – Institutes in India can take as overhead about half).
- Will have a modern campus at Okhla (close to Nehru Place), with a Metro station within ½ km, making it convenient for families to commute to other places.
- It will also have modern, good quality, and spacious accommodation (**all faculty flats will be 3BR+study** - meaning junior faculty get large flats) for those who opt for on campus housing instead of their HRA.
- Good city with excellent connectivity – Delhi is widely regarded as one of the best cities in India for living; it has an excellent air and train connectivity – its new airport terminal being bigger than that of the next four metros combined. [71]

IIIT Guwahati

- But the IIITs control by MHRD are offering salaries as per 6<sup>th</sup> Pay Commission rules. Just take the example of IIIT Guwahati [76].

Pay Example for Assistant Professor
1. Pay Band: ₹15600 - ₹37400; Academic Grade Pay: ₹6000; Seven non-compounded increments will be given. So the starting pay will be 20140 + 6000 = 26140 + allowances (= ₹66517/-see below).
2. Every July 1, there will be an increment of 3% of the current band pay + academic grade pay. In the first year, this increment will take place only if the joining date is before January 1.
3. Allowances as part of pay: DA - 107% of pay (currently), NE allowance - 12.5% of pay; House Rent Allowance (HRA) - 20% of pay (if not staying in Institute provided accommodation);
4. Other major benefits: Medical support (100% out-patient, with limits, for hospitalization), Leave Travel Concession (as per Govt. rules).
5. Take Home Pay for a fresh PhD without HRA and without transport allowance: (26140*(1+1.07+125)) - tax deduction at source (10%) - Pension contribution (10% of (pay+DA)) - licence fee for accommodation = 61298 - 6130 - 5411 - 250 = <b>49507.00 (take home income)</b> . (minor allowances and professional tax deductions not included - will make no major difference). Transport allowance of ₹ 2000/- per month has not been included as this will be given only if the Institute does not provide transportation to and from work. Similarly, HRA will not be given if the Institute hires flats (unfurnished) and allots to the faculty and charges a "licence fee" from the employee (about ₹ 250/- per month).

Fig. 3.13: IIIT Guwahati: Salaries as per 6<sup>th</sup> Pay Commission [76]

### 3.3.3. Remarks

To establish the institute of international repute and to maintain the diversity of the faculty for better interdisciplinary innovative culture, the faculty with PhD degree from World Renowned institutes along with best Indian talent must be recruited. The MHRD controlled IITs are offering salary structure as per 6<sup>th</sup> pay commission and thus could attract the faculty from IIT and IISc but could not attract faculty with foreign qualifications. I personally feel that, the service conditions like IIIT-D are required to attract global talent.

More detailed information is included in my book “Strategy to Develop World Class University” (Chapter 8: Heart of WCU: The Global Faculty, pp. 186-203). [10]

### 3.3.4. Industry Relevance: Adjunct and Visiting Faculty

#### *Best Practices*

- IIIT-B works closely with industry; at least two **Adjunct Faculty** members have taught full courses (45 hours of lectures spread over 15 weeks of a semester) for 13 years. Several Adjunct Faculty members (typically 6-10) are continuously associated with IIITB, to provide industry relevance. At any given time, IIITB has 2-5 **Visiting Faculty** members from other national and international universities/ institutions for longer duration, which may span from 4 months to 2 years. IIIT-B has 17 Adjunct faculty and 3 Visiting faculty. [4]
- IIIT-D: 8 visiting faculty and 10 adjunct faculty



Fig. 3.14: IIIT-B: Regular, Adjunct and Visiting faculty [63]

*Best Practices*

- 8.04 Appointment on Deputation**  
The Institute shall have the power to appoint persons on deputation in the interest of teaching and Research and other specialized jobs.
- 8.05 Appointment of Consultants**  
In the interest of the Institute the Director may, with the approval of the Chairman appoint professionals, specialists and senior administrative and other technical officers as consultants on terms laid down by the Board as amended from time to time as per provisions prescribed by the Central Govt. for terms as may be prescribed / renewed.
- 8.06 Appointment on Contract**  
The Board, may appoint eminent persons on contract for a period not exceeding 5 years, with a provision of renewal for further period on such terms & conditions as may be decided in each case on merit.

IIIT-A: Consultants and Contract Appointments [73]

**3.3.4. Remarks**

Most of the time the industry experts are not doctorate and cannot be appointed as regular faculty. For providing better industry oriented knowledge to the students and for building better industry interface, it is necessary to appoint faculty from industry. If qualification is relaxed for appointing Adjunct Professor / Visiting faculty / Consultant / Contract basis Professor then it is feasible. Such provisions must be incorporated in University Act. The IIIT must identify such faculty to nurture the industrial innovation culture in the institute.

3.3.5. D.Sc. or D.Litt. or Post DOC Faculty

**Factsheet**

IIIT-B

Qualifications of the teaching staff							
Highest qualification	Professor		Associate Professor		Assistant Professor		Total
	Male	Female	Male	Female	Male	Female	
Permanent teachers							
D.Sc./D.Litt.	NIL	NIL	NIL	NIL	NIL	NIL	0
Ph.D.	8	0	6	1	8	5	28
M.Phil.	NIL	NIL	NIL	NIL	NIL	NIL	NIL
PG	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Temporary teachers							
Ph.D.	NIL	NIL	NIL	NIL	NIL	NIL	NIL
M.Phil.	NIL	NIL	NIL	NIL	NIL	NIL	NIL
PG	NIL	NIL	NIL	NIL	NIL	NIL	NIL
Part-time teachers							
Ph.D.	NIL	NIL	NIL	NIL	NIL	NIL	NIL
M.Phil.	NIL	NIL	NIL	NIL	NIL	NIL	NIL
PG	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Table 3.3: IIIT-B Faculty Qualifications [4]

IIIT-D

Qualification of the teaching staff							
Highest qualification	Professor		Associate Professor		Assistant Professor		Total
	Male	Female	Male	Female	Male	Female	
Permanent teacher							
PhD	2	Nil	3	2	3	26	36
M.Phil							

Table 3.4: IIIT-D Faculty Qualifications [7]

### 3.3.5. Remarks

IIITs are offering Post Doc degrees. Thus at least few faculty should have D.Sc. / D.Litt. / Post. Doc. Qualifications.

Remember that, in India after Ph.D. one can go for D.Sc. degree. But in countries like China, Japan, and South Korea usually “Sc.D. / D.Sc. is equivalent to a United States Ph.D. in science” [135].

### 3.3.6. Awards and Recognitions

#### *Best Practices: IIIT-B* International Achievements

- CanSat is a NASA sponsored and American Astronautical Society organized annual international competition. The contest allows student teams, from colleges and Universities around the world, to design, fabricate, and launch an aerospace system (CanSat). IIIT-H has been the only team from India to qualify for World Finals, each time, since 2009
  - 2011 - World Third
  - 2010 - World First, Only team from Asia to qualify for World Finals
  - 2009 - World 8th at World Finals, First ever team from India to qualify for CanSat.
- Text Analysis Conference (TAC): US Department of Commerce' agency National Institute of Standards and Technology (NIST) holds Text Analysis Conference (TAC) every year. TAC was called Document Understanding Conferences (DUC) till 2008. In 2009, TAC attracted from across the world around 40 leading research teams including the University of Columbia, Stanford, Microsoft Research, IBM Research Labs, University of Edinburgh, and National University of Singapore (NUS). Below are the results of IIIT-H's participation at TAC/ DUC.
  - 2009 - World No.1 in Knowledge Based Population Track (TAC)
  - 2008 - World No.1 in Squishy Question Answering Task (TAC)
  - 2007 - World No.1 in Query Focused Multi-Document Summarization Tasks (DUC)
  - 2006 - World No. 1 in Query Focused Multi-Document Summarization Tasks (DUC)
- ACM ICPC: It is the world's oldest, largest, and most prestigious programming contest. The 2012 edition drew for its first stage over 30,000 participants on more than 7,000 teams, representing around 2,200 universities, in over 85 countries. Results of IIIT-H's participation over the past four years.
  - 2012 - World 18th position, Only Indian college to qualify for World Finals, for fourth time in a row. Best performance by an Indian team in ICPC history (co-shared with IIT Delhi).
  - 2011 - World 42nd position, Only Indian college with two teams qualified for World Finals
  - 2010 - World 36th position
  - 2009 - World 54th position
- Google India Women in Engineering Awards: The Awards –called Google India Anita Borg Memorial Scholarship from 2012 – are meant to recognize and reward deserving women students in Computer Science and related majors, and inspire them to become active participants and leaders in creating technology. Given annually, the award is based on excellence in academics, passion for technology, demonstrated leadership, and originality of thought. IIIT-B got this from 2009-2011
- RoboCup: IIIT-H's Team Kshitji was the only team from India to have qualified for the finals of the RoboCup events, each year, for five years, since the inception of the international contest in 2004.
- Awarded Best New Agent Award at the Trading Agent Competition Supply Chain Management (TAC SCM), 2006.

#### National Achievements

- SPOJ – Every month since April 2009
- Number #1 globally at the Sphere Online Judge (SPOJ), a highly popular programming site, with over 30, 000 users from 120 countries, since April 2009.
- Codechef – Every month since Jan 2010. At least five of the top 20 winners at the Codechef's national-level monthly programming contests, since Jan 2008, have been IIIT-H students. [202]



**Factsheet**

**IIIT-H**

IIIT-H bags many awards and recognitions. It's really very impressive. The details are available at their website. The details are already mentioned in chapter 1 of this book. [47] [198]

IIIT-H has won the best-in-the world prizes in contests. For example, IIIT-H's team won the first prize at the finals of CanSat 2010, an international aerospace competition held at Abilene, Texas, USA. IIIT-H has won the overall first prize at Intel India Embedded Challenge 2011, out of 1,600 contestants from across India for its entry on a low cost, solar powered crop harvesting robot. IIIT-H has been the winner of unsupervised word sense disambiguation in SemEval-2010 contest at International Conference of Association of Computational Linguistics held at Uppsala University. In an uncommon achievement for an Indian University, two teams from IIIT-H were placed among the top four teams in India for participating in the 35<sup>th</sup> Annual ACM ICPC World Programming Finals. IIIT-H was the world winner of the prestigious DUC research contest in Automatic Summarization organized by NIST, USA in 2006 and 2007. It has been the winner of more than a dozen other national or Asian prizes and contests.

Fig. 3.15: Views of Dr. Rajeev Sangal, Director, IIIT-H [176]

**IIIT-BH**



Fig. 3.16: IIIT-BH: Awards and Recognitions [46]

**3.3.6. Remarks**

The world believes in your performance through awards and recognitions. The brand name of institute depends upon it. IIIT must pursue it to become market leader and in turn to attract more funds from industry for self-sustainability.

Like IIIT-H and IIIT-D, other IIITs need to focus on International competitions and platforms. They must develop the coding culture among the students.

## 3.3.7. Unique Culture: Tenure Appointment, Low Teaching Load, Feedback

*Best Practices: IIIT-D*

- The Institute has implemented the systems of yearly appraisal/feedback and **tenure to prevent complacency** from setting in. Complacency is undoubtedly the most common problem in Indian academics, and perhaps the main reason why many academicians fail to reach an international standing. [71]
- **Low teaching load** of 3 per year, with 1 per semester in the first two years. [71]
- **Tenure Track Faculty Positions:** A tenure-track faculty is expected to engage heavily in research and teaching. The eligibility criteria for tenure-track faculty positions are similar as in IITs. For an Assistant Professor position, a candidate must have a PhD in Computer Science &/or Engineering/Electrical &/or Math &/or Communication Engineering/ Computational Biology etc; (for interdisciplinary areas the PhD may be in an appropriate field), plus three years of experience. However, for PhDs from a well-known University/Institute (e.g. IITs/IISc/TIFR/ISI in India or well-known research universities across the world), and a good research/academic record, the 3 years of experience requirement may be waived. The pay scale for faculty is same as in IITs. In addition, up to 25% more personal pay may be provided. All regular faculty will be provided on-campus or leased accommodation. Other benefits include initiation research grant, travel support, book grant, professional society membership, etc., and personal benefits such as medical/LTC. IIIT-Delhi follows a tenure model in which an initial contract is given for 5/7 years. **Before completion of initial contract, an extensive evaluation of performance of Research & Teaching is done.** If the faculty member's performance is excellent, he/she can expect to get promoted and tenured. Otherwise, the contract may not be renewed. [108]
- **Teaching-Track Positions:** To promote excellence in teaching, IIIT-Delhi has created a few teaching-track faculty positions, which are primarily targeted **towards attracting outstanding teachers** into the Institute, and to whom both students and faculty may look up as **role-models for teaching**. Teaching-track faculty members are regular faculty members in the Institute but with a different emphasis between teaching and research. They will have a higher teaching load and will be expected to engage in **high quality teaching**, and accordingly, will be expected to have a **modest level of engagement in research**. The criterion for tenure and promotion also has a higher expectation in quality teaching than research. Minimum qualifications for a teaching-track Assistant Professor is same as mentioned above. However suitable candidates with MTech / MS / Equivalent and at least 5 years of experience are also eligible, if their teaching record and reputation is outstanding. [108]

*Best Practices*

- IIIT-B formally recognizes the faculty load as **40% teaching, 40% research and 20% consulting**. [4]
- IIIT-H: The retirement age of regular faculty is 68 years [35]

***Best Practices: IIT-D***

PhD students available to young faculty – unlike established places, junior faculty get to be supervisors of the PhD students. The Institute provides support for one PhD student for each faculty (for more, grants are easily available in India for good proposals.) As a result there are Assistant Professors who have upto three PhD students within one year of their joining. In most established Institutes in India, a young faculty member often gets his/her first PhD student after a few years (and a few never do). [71]

**Factsheet**

**IIT-D**

- Good initial R&D support – support for one international and one domestic conference for first five years for presenting papers; initiation research grant, book grant, membership of one professional body, etc. [71]
- High expectations in research – the Institute strongly encourages faculty to publish only in Tier I and II conferences (travel support is provided only for these), and international journals and Transactions [71]
- Support for Research grants from funding agencies. It seems there are more funds with supporting agencies (DST, DIT, AICTE, Naval Board, Indo-xx,...) than good proposals, and agencies are keen to get proposals from other than standard Institutes. IIT-Delhi actively encourages its faculty to apply for grants and has built various incentives (e.g. part of the overhead to go back to the PI, liberal norms for using the funds, etc.). As a consequence, within a year, the faculty members have obtained research grants for **over Rs 2 crores**. [71]

**IIT-A**

- Government of India policy on reservation of faculty positions as applicable to IITs, including that for persons with disability, will apply. [73]

**3.3.7. Remarks**

The IIT-D policy of tenure appointment, teaching load, research etc. is must for establishing best IIT. The retirement age should be 70 with medical fitness considerations. The IIT-B has properly assigned teaching load to research faculty. We will have to deviate from the routine service conditions for establishing challenging concept of “Industry supported Self-Sustainable IIT Research University”.

The MHRD controlled IITs have adopted regular service conditions of 6<sup>th</sup> Pay Commission and thus unable to attract global talent.

### 3.3.8. Different Techniques to Attract Reputed Faculty and Faculty Retention

#### *Best Practices*

The IIIT-D adopts following techniques to attract reputed faculty from all over world.

- The institute publishes advertisement for faculty recruitment in **International magazines**.
- It sends fliers to HODs (CSE, ECE) of all **reputed universities of the world**
- **PhD from the reputed university is the minimum qualification.**
- It follows the standard process adopted by IIIT and the standard eligibility criteria for faculty recruitment. The recruitment advertisements are put on the institute’s website as well. [7]

#### *Best Practices*

Quora website: While answering to the question “**How has IIIT-D managed to attract such an outstanding faculty?**” the Stakeholder stated that “It is an institute funded primarily by Delhi Government. So there is only so much you can do on the payment side. It is really the vision that the Director is able to articulate. Also, hard work. **Keeping in touch with a lot of PhD students and their advisors, visiting lots of campuses in India and abroad**, giving presentations on IIIT Delhi. And once they join the Institute, **make sure that they get all the necessary support** to flourish. Then they are **likely to continue at IIIT Delhi** and also **become ambassadors** of IIITD and inform their friends about the place and encourage them to apply. Today, they have faculty members who could have joined not just the new IITs but even the older IITs. [107]

#### *Best Practices*

IIIT-Delhi has organized full **selection committee meetings in the US** from 2011. This is perhaps the first time in recent past that an academic Institution from India is holding selection committee meeting in US, where the largest number of Indians graduates with PhDs in Computer Science every year. It is perhaps the only leading Institute in India to take this route. [117-119]

All the 3 IIITs (IIIT-B IIIT-D, IIIT-H) have adopted faculty retention techniques through HR departments.

#### **3.3.8. Remarks**

Attracting global faculty and faculty retention is a major challenge. More detailed information is included in my book “Strategy to Develop World Class University” (Chapter 8: Heart of WCU: The Global Faculty, pp. 186-203). [10]

### 3.4. Curriculum Development and Pedagogy

#### 3.4.1. Strategy for UG Courses

##### *Best Practices: IIIT-D*

The institute has an innovative curriculum, **starting with some engineering courses in the first year itself** to excite the students about engineering and to empower them soon with the ability to design and build systems. To encourage engineering, in the first year all students do an Intro to Engg Design course, in which they do a group project of building something involving both hardware and software. **Most of the core courses, which impart the foundations in CSE or ECE, are covered in first two years, thereby imparting basic skills in these disciplines within two years.** The second half of the BTech program largely comprises of elective courses, some of which can form a stream to provide limited specialization in some sub-area. There is also a strong focus on humanities and social sciences also – all students have to do at least 3 courses in HSS – as well as communication skills with all students doing a basic communication skills course in first year and a technical communication course in second year. Options exist for Independent study, undergraduate research, and BTech project in three categories – research, engineering, and entrepreneurship. [7]

##### *Best Practices: IIIT-D*

To prepare students to undertake **careers involving innovation and problem solving using IT**, or to undertake **advanced studies for research careers in IT** or the **domain areas**. While Computer Science focuses on the foundations of computing, IT as a discipline focuses on satisfying computing technology needs of organizations. So, in a continuum between principles and application, IT is more towards application, with the goal being to apply knowledge of computing sciences for solving problems. As foundations of IT are in Computer Science, it is feasible to have a CS-based IT program, which will allow a graduate of the program to choose a career in CS or applied aspects of computing. IIIT aims to have such a curriculum which is CS-based, and which will develop in students' skills for problem solving using engineering and research approaches, in the field of IT or some domains of IT. Most engineering programs start with general courses in Sciences and Engineering, and then migrate to specialized courses for the disciplines. **While these courses are indeed foundational for many engineering disciplines, they are not foundational for IT** - rather they can be treated as application domains (as is evidenced from the fact that most sciences and Engineering disciplines heavily use IT now). Hence, the BTech (IT) program at IIIT starts with **computing oriented courses first**, and allows the possibility of doing science courses later. Besides being better suited for an IT program, it also enables the possibility of students seeing newer applications and possibilities of relating IT with these subjects. With this approach, the BTech program can be divided broadly in two halves. The **first half** will focus on building the foundations, and will be highly structured. The **second part** is for further developing the skills and knowledge of the students in various topics - computing and non-computing. This part also provides limited specializations, and different students may follow different paths and take different set of courses in it. [110]

#### Factsheet

##### IIIT-D

- The Institute combines pioneering research with top class education. An innovative curriculum allows the student flexibility in selecting courses and projects. Students, even at the undergraduate level, get to participate in ongoing research and technology development - an opportunity unprecedented in India. As a result, a vibrant undergraduate programme co-exists with a strong postgraduate programme. [14]

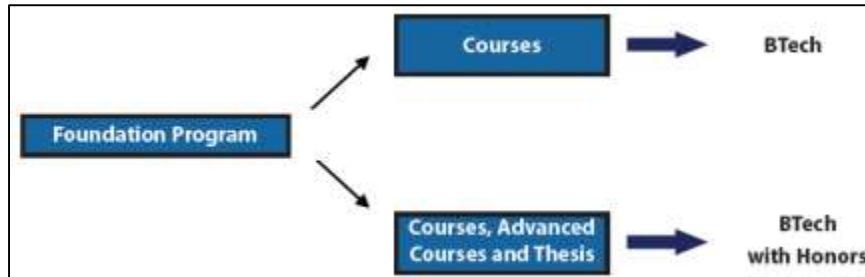


Fig. 3.17: IIIT-D: B.Tech and B.Tech with Honors program [38]

### IIIT-B

- IIIT-B has incorporated the **curricula analysis** undertaken by the IEEE/ACM Computing Curriculum, curricula in MIT and UC Berkeley, IIT Kanpur and IIT Delhi.
- Before introduction of any new courses or programmes, the proposal has to be presented and approved by the Senate. Any new course proposed in the standard “**Course Proposal format**”.
- Additionally, consultations with our Alumni, adjunct faculty, experts from the Industry (Recruitment / HR team) from industry were made. Several of IIIT-B **adjunct faculty** are **drawn from the Industry**
- **Every core course is taught by at least two faculty members. Most faculty members belong to more than one stream.**
- The course structure followed in all the programmes at the IIIT-B follow the Choice-based Credit System (CBCS).
- IIIT-B, with strength of faculty in 30+, currently offers a rich set of elective courses in addition to the core courses. [4]

### IIIT-S Chittoor

- The curriculum at IIIT is similar to the curriculum followed at IIIT-Hyderabad and other **leading institutes in the U.S.A.** Unlike regular Engineering Institutions which follow mostly class-room based teaching and grading through exams only, IIIT focus more on **problem solving, real-world projects and team based learning**. The curriculum is latest and demand hard-work from each student. The Institute combines pioneering research with top class education. An innovative curriculum allows the student flexibility in selecting courses and projects. Students at the under-graduate level will get to participate in ongoing research and technology development.
- Benchmarking: The IIIT benchmarks itself with IIIT-Hyderabad, leading IITs and other leading Universities in US in all aspects of curriculum, teaching pedagogy and research. [87]

### 3.4.1. Remarks

For finalizing the strategy for curriculum design, one must follow the best practices adopted by IIIT-B, IIIT-D and IIIT-H.

### 3.4.2. Strategy of PG Courses

#### IIT-D

- The MTech is also a credit based program, which has a thesis option as well as a scholarly paper option, catering to those students who want to pursue research oriented careers, as well as those who want to pursue industry careers. [7]

#### IIT-B

- M.Tech. programme includes a set of core courses and at the end of first semester of the programme, the students decide the “stream”. The timing of the decision after undertaking core courses gives the provision of “informed choice”. Students are allowed to add / drop any pre-registered course within the first week of the semester, providing further flexibility. [4]

### 3.4.3. Internship

#### *Best Practices: IIT-B*

In the final semester of the programme, MTech students have the **option of pursuing thesis or industry internship**. The option of MTech students pursuing thesis work is subject to faculty availability and interest match between student & faculty members. In addition to the industry-sponsored internships based out of India, there is also an opportunity to do research and project work at many foreign universities with which IITB has signed a Memorandum of Understanding (MoU). Some of the universities to which students have gone for internship in 2013 are

- HOF university of Applied sciences, Germany,
- Freie Universitat Berlin, Germany,
- The University of Nottingham, UK and
- University Of West Indies.
- Some of our students have also gone to National University of Singapore as Research Assistants during their internship tenure. The internship includes financial aid to cover travel and living expenses during the course of internship. [39]

#### *Best Practices*

### Internships

Students are encouraged to do internships at various levels. This helps them apply their classroom knowledge as well as get in sync with the current industry environment.

In the summer of 2011, many students did research internships in universities and industry.

#### **Universities**

- École Polytechnique Fédérale de Lausanne, Switzerland
- Toyota Technological Institute at Chicago
- University of Newcastle, UK
- University of Southern California, Los Angeles (Among the 10 students from India through the Viterbi-India Program)
- University of Western Virginia

IIT-D: Internship programs [38]

## Factsheet

### IIITDM-Kancheपुरam

- Many under graduate students are pursuing Graduate and Research programmes in institutes of international repute like Stanford University, Georgia Tech, Columbia University, University of California, IITM, etc. [193]

#### 3.4.3. Remarks

The IIIT-B and IIIT-H both have adopted best Internship policy. During Internship, the students get opportunity to do research and project work at many foreign universities. It's a unique concept. New IIITs need to follow it.

### 3.4.4. Revision of Courses

## Factsheet

### IIIT-D

- The curriculum is reviewed on an ongoing basis by the faculty and Senate, and adjustments are made as and when needed. New courses in emerging topics are floated as electives regularly – there is a regular defined process for doing this. **Every semester more than 50 courses** are taught, **more than 30 of which are electives**. Some electives are also offered in collaboration with industry experts. [7]
- The **senate** does all these activities and this body meets at least **four times a year**. Regular reviews are also done by the Senate, which has external members also from industry and other Institutions. **In the past 5 years, at least two significant revisions** of the BTech programs have been done. On several occasions external faculty (mainly from IIT Delhi and IIT Kanpur) had been invited to discuss the curriculum and course contents. The ECE curriculum is set up with the help of Prof Sumit Roy (University of Washington). [7]
- On a smaller scale an instructor teaching a course has enough **flexibility to incorporate new trends & ideas while teaching**. These changes are summarized in a course plan which is then reviewed in the next curriculum meeting. [7]
- The curriculum is designed by a committee consisting of faculty in the concerned discipline from within the Institute, other Institutions, and experts from industry. Feedback is obtained from a wide range of experts in the discipline (both in India and abroad). [7]
- For each course its **pre-requisite courses & concepts and learning objectives** (which are called “post conditions”) are clearly stated, based on which the **instruction plan** and **assessment plan** is designed. Periodically, new courses are introduced to address emerging areas. [7]
- Course wise **feedback** is taken from students **twice a semester**. Once before the mid semester exams and other before the end semester exams. **Individual course feedback is collected though an online portal**, where each student has to give course wise feedback. The course wise automatically generated summarization report goes to individual instructors which help them look into the student requirements and do the desirable changes. Student feedback points



are considered as a basis for rewarding the instructors who are performing well and taking corrective actions wherever desirable. [7]

#### IIT-B

- The revision of curriculum is an on-going process. All courses are reviewed at the end of every year, either through an informal consultation among the faculty members or a formal course proposal phase with the Senate. Major revisions are attempted periodically, for instance,
  - The Prabhu Committee created the Integrated M.Tech. programme in 2012
  - The Das Committee reviewed and revised the M.Tech. Curriculum in 2012- 2013. [4]

#### 3.4.4. Remarks

Every IIT must go for such revision of courses through appropriate authorities. It is even requirement of NAAC accreditation.

#### 3.4.5. Research Component: UG and PG

#### *Best Practices*

#### IIT-H

- It provides research opportunities, even to a UG student, not available anywhere else in the country. Many UG students are able to publish papers in international conferences. Some even **visit abroad** for working with partner research groups while still a UG student. [23]
- IIT-H gives heavy focus on research. You'll see 3rd and 4th year B.Tech students burning nights in the labs and running around to publish their research papers in major conferences. [21]

#### IIT-D

- Faculty members are active researchers and involve students in their research projects in various capacities. UG students can participate in research through the option of Undergraduate Research, or BTech project, which can be done under the “research” category. At the MTech level, students do a thesis, and may do projects in their courses. [7]

#### 3.4.5. Remarks

All the top three IITs have adopted this approach. It's a normal practice at most of the World Renowned universities.

#### 3.4.6. Industry Involvement in Curriculum Development

The curriculum is based on inputs from leading IT companies.

### 3.4.6. Remarks

It's routine affair. Many autonomous engineering colleges and Universities have adopted this concept. After involving industry personal in curriculum development, it is necessary that **they should be invited to teach few such topic**. It is more practical approach and adopted at IIIT-B.

### 3.4.7. Flexible Choice Based Credit System

#### Factsheet

Flexible Choice Based Credit System is available at most of the institutes.

#### IIT-D

- The institute has provision for change of programme from BTech to Dual degree, and MTech to PhD for the students of high caliber and with interest to do higher studies. [7]

### 3.4.7. Remarks

The UGC has recommended the Flexible Choice based Credit System for all the Universities. It's a complex process. It must be designed carefully and should be matched with mission and vision of the University.

### 3.4.8. Courses with Different Credits

#### Factsheet

#### IIIT-D

A course may be of 4, 2, or 1 credit. A registered student who passes a course earns the credits assigned for that course.

- 4-credit course: The course will have 3 hours of lectures per week, with a total of about 39 hours of lectures (13 weeks). In addition, one hour of 5interaction per week is expected, which may be in the form of structured tutorials. There may also be labs in the course. [7]
- 2-credit course: The course will have 1.5 hrs lectures per week for the whole semester, or 3 lectures per week for half the semester. The total lecture hours will be about 20. Intensive short-term courses of 2 credits are also possible, though it is expected that the duration of such a course will not be less than 3 weeks. A 2-credit course may or may not have tutorials and labs. [7]
- 1-credit course: The course is likely to be run as a **short course on a very specialized topic**. Such courses may also be run **during vacations**. A 1-credit course will have a total of about **10 hours** of lecture over a period of, generally, not **less than 2 weeks**. [7]

### 3.4.9. International Curriculum

#### Factsheet

##### IIIT-D

- Our programs and courses are very contemporary and in line with what is taught in the best institutions across the world. The text books used are also authored by national & international experts and published by acclaimed publishing houses all over the world. This allows us to participate in **global exchange programs**, which we are now targeting. [7]

#### 3.4.9 Remarks

More detailed information is included in my book “Strategy to Develop World Class University” (Chapter 12: Internationalization of Curriculum Design for Global Citizenship, Employability, Inclusion & Innovations, pp. 292-311). [10]

### 3.4.10. Joint and Dual Degree Programs

#### Factsheet

##### IIIT-D

There is also a joint PhD program with **QUT Australia**, where the student will have to spend time in both institutions to get a degree – stay in QUT is supported by them, while the stay in IIIT-D is supported by the Institute. [7]

Dual Degree Program / Integrated Degree Program are available at many IIITs

#### 3.4.10. Remarks

One must search appropriate international academic partner for dual degree program to extract the maximum academic benefits.

The detailed information on these topics is available in my books “Strategy to Develop World Class University” (Chapter 15: Need of Long-Term Bilateral Multidimensional Academic Collaborations, pp.364 -376) [10].

### 3.4.11. Online Open Courses (Coursera or MOOC)

#### Factsheet

##### IIIT-D

- IIIT-Delhi has evolved a system for allowing students to take a limited number of online courses for credit. Students can take advantage of the increasing amount of such courses made

available by reputed universities across the world to complement the courses offered in the institute. [7]

#### 3.4.11. Remarks

More detailed information is available in my book “Technology-Storms Redefining World Class Universities” (Chapter 8: MOOC: The Real Game Changer and Threatening the Existence of University Empires, pp. 171-182) [10]

#### 3.4.12. Interdisciplinary Courses

##### Factsheet

Interdisciplinary Courses: IIIT-H, IIIT-B and IIIT-D offer interdisciplinary courses.

##### *Best Practices*

#### 1.3 Relating Core-IT to Domains

Research is taken up not only in the core areas of IT, namely Computer Sciences & Engineering (CSE) and Electronics & Communications (ECE), but also in relating IT to other domains. The following domains are being pursued currently: Structural Engineering, Earthquake Engineering, Spatial Informatics, Computational Linguistics, Cognitive Science, Computational Natural Sciences, Bioinformatics, Power Systems, Humanities and Social Sciences, etc. (See appendix for a list.)

Besides the Masters and PhD programs, new trans-disciplinary academic programs have been started which combine core-IT with the domain areas. These are the 5-year integrated programs leading to BTech in CS and MS by Research in the domains of Sciences, Linguistics, and Humanities, respectively. These are intended to create a new synthesis between IT and the domains.

View of Dr. Rajeev Sangal, Director, IIIT-H [176]

#### 3.4.12. Remarks

More detailed information on “Interdisciplinary and Multidisciplinary courses” is included in my book (Free Download) “Washington Accord & Multi-Objective Integrated Model for Developing WCU” (Chapter 8: Interdisciplinary and Multidisciplinary Culture: Way to Develop Research University, pp. 141-166). [12]

#### 3.4.13. Bridge / Remedial / Refresher / Zero Credit Courses and Credit Transfer Facility

##### Factsheet

##### IIIT-D

- Bridge / Remedial courses are offered **prior to commencement of semester** for incoming students, and also in the December break and in the **summer semester**. [7]

- Furthermore, to help further strengthen the foundations of incoming students in some areas, the institute had started special refresher modules during the winter / summer. Some of these modules include “Introduction to C”, “Data structures and algorithms”, “Java programming”, etc. These were conducted in summers of 2013 and 2014, as well as in December 2013. [7]
- Some of these modules are treated as a ‘0’ **Credit Courses**, which show up on students’ transcripts. [7]
- **Credit Transfer Facility.** There is a provision for allowing the students **registered at other institutes / Universities to do courses / Projects** (for example at IIIT-Delhi) and transfer the credits for the award of Degrees. [7]
- The Institute also runs **Refresher courses** during vacations (summer as well as winter) to help weak students in improving their skills. **Teaching Assistants** (TA) under faculty guidance run these course. Each course has a number of TAs. They, as well as faculty members, have office hours during which students can go and meet and clarify their doubts. [7]

#### 3.4.14. Lateral & Vertical Mobility Within and Across Programmes and Disciplines

##### Factsheet

##### IIIT-D

- Across Disciplines: Branch transfer from CSE to ECE or ECE to CSE is possible after the first year of studies grades declared. A student must make an explicit request to be considered for branch transfer. Rules for branch transfer are:
  - The total number of students in CSE and ECE should remain within 10 of their strength before the transfer. [7]
  - The students eligible for **branch transfer** will be ordered in a priority list based on CGPA, and will be granted transfer in order as long as the rule about strength given above is not violated. [7]
- Across Programs
  - UG level
    - IIIT-D runs Dual Degree programs in CSE & ECE under the Dual Degree Programme. A B.Tech student can opt to migrate to dual degree program of the institute any time before the last date of Add / Drop of his / her, 7th semester of the BTech program provided the students **CGPA is 7.0 or above** at the time of applying are eligible for the program. [7]
    - In 2012, two students opted to migrate from B.Tech. to Dual Degree Programme of B.Tech and in 2013, three students opted to migrate from B.Tech. to Dual Degree Programme of B.Tech [7]
  - PG level
    - IIIT-D allows **migration from both M.Tech to PhD and PhD to M.Tech.** In addition to above a PhD student may be granted additional M.Tech degree provided he/she fulfills requirements for the same. Many of the students eventually migrate to a PhD program after getting exposure to the rich research led course & project. On the other hand, PG committee may recommend PhD students to migrate to M.Tech program if they are **not found to be capable** of pursuing a research intensive PhD program. [7]
    - Over the years, 20 students of MTech have migrated to PhD. [7]

### 3.4.15. Care for Advanced as well as Slow Learners

#### Factsheet

#### IIIT-D

- For **advanced learners**, the Institute offers an Honors program – this program is available only to students who have a CGPA of 8.0 or above. In the Honors program, the student has to do 12 credits extra, and has to do a BTech Project. In addition, the university encourages, UG students to focus on select areas of interest and develop research skills. Various avenues have been provided to achieve this. These options are limited to advanced learners since a student needs to have a CGPA of 7.5 or more to register for them. Students may choose any of these options in their 3rd and subsequent years:
  - BTP- BTech project
  - IS - Independent study
  - IP - Independent project
  - UR - Undergraduate research. [7]
- The university provides the following support services for **slow learners**:
  - Help groups, comprising small numbers of learners who meet weekly (once or twice) receive help from student tutors, selected from good-performing senior students. Help is provided for the courses which the learners are currently studying.
  - Guidance sessions on effective learning habits and techniques – these are also conducted by good-performing senior students. [7]

#### 3.4.15. Remarks

This feature is missing in most of Indian Universities. Along with this, one more feature of Flexible Choice-based Credit System namely “Learn at Your Own Pace” can be considered.

### 3.4.16. Nurturing Creativity and Innovation

#### Factsheet

#### IIIT-D

- Students at both UG and PG levels are provided numerous opportunities for innovation via **internships, projects, undergraduate research, BTech project, course projects, independent study courses, online courses and other initiatives**. Faculty members have the option of offering courses on special topics, which can be of lesser duration (1 month / 2 months) to educate students about innovative advancements in science and technology. [7]
- In many courses, students are encouraged to come up with innovative solutions to existing problems. That ensures that the work done has a practical meaning, and hence the solution could be deployed and/or commercialized after initial start. The ideas for these projects come from students and the projects are self-sustaining. Guidance and financial support are provided, if required. [7]
- The Student is also encouraged to register for following in their third and subsequent years:

- BTP- BTech project
- IS - Independent study
- IP - Independent project
- UR - Undergraduate research.
- SP- Scholarly Paper
- MTT- M.Tech Thesis [7]
- Institute gives out Best BTP awards in different categories – research, engineering, and entrepreneurship, encouraging and **rewarding innovation** in these categories. A best M.Tech Thesis award is also given. [7]
- In the first year, there is an Intro to Engineering Design course in which students have to do group projects – this is mandatory for all students. Each year about 40 such projects are executed. Most advanced courses have course projects, which all enrolled students have to do – sometimes students hold poster sessions for these courses in the end to show their projects. In addition, students are permitted and encouraged to undertake BTech project as part of the undergraduate degree. There is also the scope for independent project (IP) for credit at both UG and PG levels. [7]
- All such projects are guided by faculty. For any thesis, including BTech thesis, external co-supervisor is permitted. In MTech and PhD levels, there is a strong participation of **external co-guides**, with **about 20** such thesis being done which have external guides **from industry** (e.g. ST Microsystems, Infosys, and TCS). [7]
- Innovations in the BTech (IT) Program. Many new concepts are employed: starting of CS courses from 1st semester, and doing Sciences later as application domains; finishing much of core CS by 2nd year, allowing specializations and long duration projects to be undertaken in last 2 years; concept of streams in CS areas as well as application areas in last 4 semesters to allow limited specializations as well as interdisciplinary possibilities; independent study options; option to graduate with Honors; etc. [71]
- Changes in MTech program. Have both thesis and **non-thesis options** (many established Institutes do not have both options), with-assistantship and without-assistantship options, possibility of having specialization and get a degree “MTech in CS with specialization in <sub-area>” [71]
- Changes in PhD Program. Many of the changes were based on a survey done of UG students on what they will need to do PhD in India. Some changes include: Focusing on the area early to reduce the initial “area selection” time; leveraging technology (e.g. video conferencing) and building guidelines to reduce thesis defense time (in most institutes thesis review can take up to 1 year easily). [71]

#### IIIT-H

- One of the best things at IIIT-H is the environment. From the very beginning of **first year of B.Tech, students get involved in hardening their programming skills**. By **second year they're active in online programming contests** like SPOJ, TopCoder etc. Many IIIT students have been to World Finals of ACM ICPC, the largest programming contest in the world. [4] [7] [22]

#### IIIT-BH

- **From Problems to Solutions -Many Languages, One Grammar:** Puzzles have always beguiled everyone. It not just tickles our rationality but stretches our thinking capacity too. Puzzles have always had a positive impact on the human intelligence. Puzzles appear straight and simple but requires an innovative mind to solve. IIIT Bhubaneshwar inspires its students

to become a mark of excellence and strength of competence. Innovation isn't an option, but a definite choice to move one's career to a well-defined path. Towards Innovation by Choice. [46]

### 3.4.17. Teaching-Learning Innovations

#### Factsheet

##### IIIT-D

- Faculty members prepare a “course summary” in the end in which they share practices they tried and its impact. These they also discuss with other colleagues through “**best practices**” sessions that are organized internally within faculty. Faculty themselves try to **assess the impact** – many of them have collected data and have written teaching research papers/reports on their practices. A feedback from students is also obtained about the same. [7]
- Institute recognizes and rewards excellence in teaching through various methods. First, based on student feedback, teaching excellence letters are issued to that faculty who excel. Second, based on teaching performance some “professional grant” is given each year. Institute has also recently instituted “teaching excellence award by graduating batch”, which will be given to faculty members based on their contribution during the entire stay of a batch. [7]

#### 3.4.16. and 3.4.17. Remarks

Very detailed information is available in my 650 pages book (Free Download) “Innovation - Growth Engine for Nation - Nice Buzzword but Often Misunderstood”. [11]

### 3.4.18. Learning Management System

#### Factsheet

##### IIIT-B

- IIIT-B has always used a software system called the **Moodle** as the Learning Management System (LMS) for all course-related communication such as faculty members uploading course outlines, reading materials, homework assignments, quizzes, grades, etc. and students can take online examinations, submit homework, etc. through this platform. [4]

#### 3.4.18. Remarks

The detailed information on “Technology and Education” is available in my book namely “Technology-Storms Redefining World Class Universities”. [10]

### 3.4.19. Student-Centric Learning

#### Factsheet

##### IIIT-D



- Project based learning - this is a common practice in most advanced courses. In this group projects are done by students on using advanced technologies and methods. [7]
- Regular Assignments and continuous assessment. All courses have regular assignments (every 1-3 weeks), which are assessed, and which count towards the final grade. This ensures ongoing learning as well as assessment. [7]
- Active Learning. Most faculty members use active learning techniques – engaging the student in the class itself through short exercises and interventions, as well as outside the class through assignments, projects, presentations, etc. [7]
- Peer learning – many courses allow group work and group projects, enhancing group learning.
- Bookend lectures – most faculty follow this style of lecturing to ensure better learning outcomes. In this style, each lecture starts with objectives of the lecture, and ends with a summary. During the lecture, some active learning exercises are done in the class after every 15-20 minutes. [7]
- Technology related clubs – there are some clubs like programming club, robotics club, game development club, which develop important technical skills in an informal setting. [7]
- Self-growth and community work – All UG students have to do 2 credits of self-growth in which they develop some non-academic skill (like a hobby, a foreign language, sports,...), and 2 credits of community work in which they have to contribute to the community – most do it by working through NGOs. [7]
- Independent study – a student can take up to 4 credits of independent study to gain knowledge and proficiency in some specialized topic in which the Institute does not offer regular courses. [7]
- Under Graduate research – through this a UG student can directly participate in research and earn credits for the work. [7]

#### 3.4.19. Remarks

The most of the Universities are still following Teacher Centric Learning, which is suitable for outdated mass education system (military style or factory model style of industrial era). All most every World Class University is following Student Centric Approach.

#### 3.4.20. E-Learning

##### Factsheet

##### IIIT-D

- Since the university specializes in IT, extensive use is made of e-learning resources by individual instructors. Also, the university permits and encourages students to undertake on-line courses for credit (with proper review and approval). Faculty members can, and do, use online resources and lectures as part of their courses. They can also tape their lectures and put them online. Many faculty members use an online learning system developed internally – Backpack – on which they post their presentations and notes, as well as assignments etc. Piazza is also used for online discussions for courses. [7]

### 3.4.20. Remarks

The detailed information on “Technology and Education” is available in my book, namely “Technology-Storms Redefining World Class Universities”. [10]

### 3.4.21. Open Source Community

#### Factsheet

#### IIIT-D

- We do not have any designated group but many faculty members are active followers and users of open source software material. Many use MOOC courses like the ones provided by EdX and Coursera, and for most of our software needs, we first explore open source options. Our IT team also explicitly explores open source options for our use. [7]

### 3.4.21. Remarks

The detailed information on “Technology and Education” is available in my book, namely, “Technology-Storms Redefining World Class Universities”. [10]

### 3.4.22. Learning Beyond Classroom (LBC)

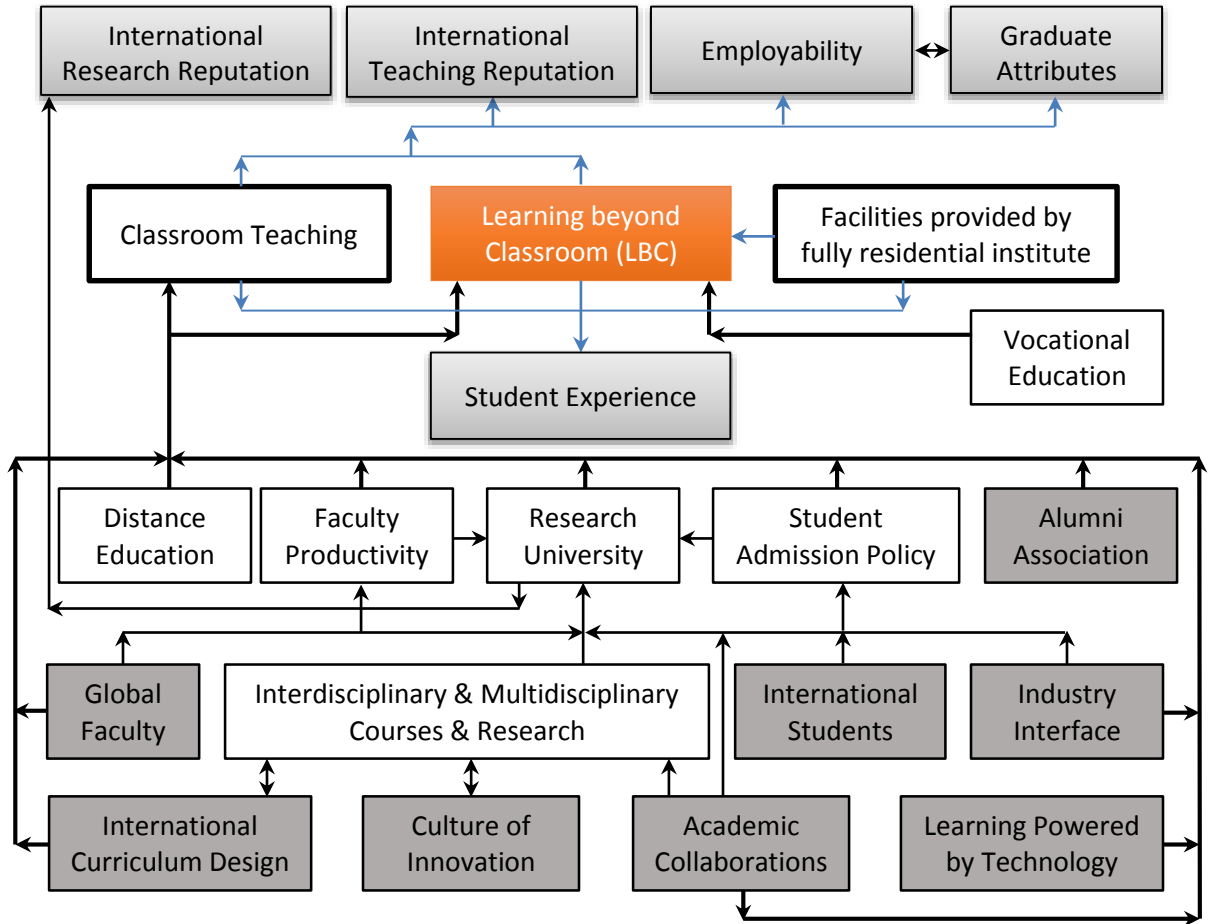
#### *Best Practices: IIIT-D*

- Orient Traditional Classrooms Into 24x7 Learning Places: Required assignments are taken home by the students and hence they can work on the assignments whenever they like (either at home or in the laboratories which are kept open 24x7). This practice also establishes some kind of curiosity with students, since the equipment can be used to do other things as well (apart from the assignments).
- Many labs, particularly the computing labs are open 24x7, so is the main study area in the library. Student hostels and common spaces have internet facility available to them 24x7, allowing them to access course websites as well as other learning material at any time.
- The plan of classroom lectures to be live telecast is under process. Also we plan to webstream our lectures so that they are available to all students at their convenience. [7]

The “Student Experience” is vital aspect of World Class Universities and solely depends upon Classroom Teaching, Learning beyond Classroom (LBC) and facilities provided by fully residential institute. The employability depends upon LBC and Classroom Teaching.

The Indian Institutes and Universities are mostly Teaching-Universities and normally are bothered about Classroom Teaching during office hours. The LBC activities are conducted at very small scale and mostly used as a marketing tool i.e. organize events for branding through newspapers.

In addition to this, for affordability, the institutes normally reluctant to spend on LBC activities and facilities of the institute, which hamper employability, student experience and in turn brand name and reputation of the institute or university. Many universities have Residential Campuses but LBC component is missing. These missing components can drastically reduce the employability, research revenue and revenue generation capability of the institute, sometimes below 40%.



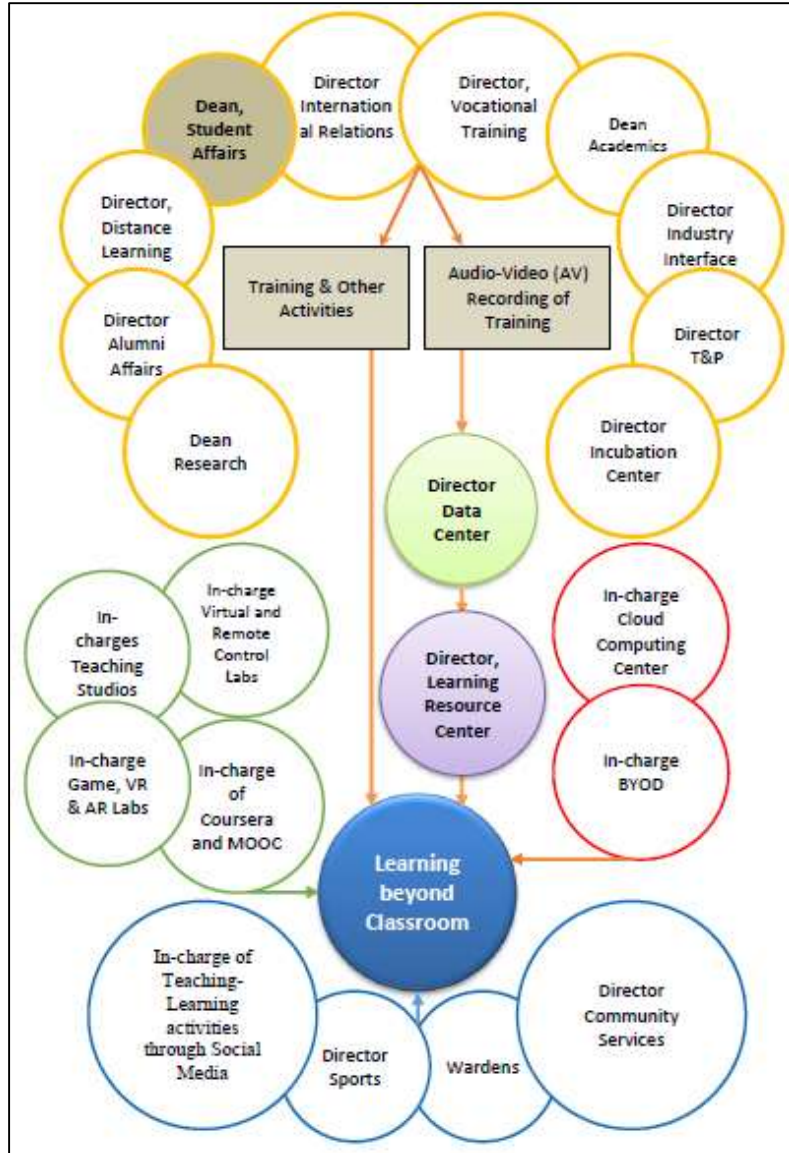


Fig. 3.18: Learning Beyond Classroom (LBC) Activities [12]

### 3.4.22. Remarks

More detailed information about LBC activities has been covered in my book (Free Download) “Washington Accord & Multi-Objective Integrated Model for Developing WCU (World Class University)” (Chapter 6: Learning beyond Classroom (LBC), Student’s Experience and Employability, pp. 97-128) [12]

### 3.4.23. Adopting Excellent Evaluation Process

#### Factsheet

IIIT-B

- IIIT-B has been using an e-Examination Hall to conduct examinations online for its own internal courses too since 2009. [4]
- **E-Exam Pad:** The students use tablet type e-Exam pad to write the exams for subjective type question, as if writing on paper. The answers script uploaded to a cloud and examiner can check the answer script. It is double blind folded, as examiner does not know the students name while correcting the answer scripts. A student can see his/her answer scripts on his computer. A faculty member can correct the answer on a computer, which saves risk of carry or loss of the answer scripts. [4]

IIIT-D

- Each course has a well-defined learning outcome, called the **post conditions**. The instruction and assessment plan is consistent with the **learning outcomes** of the course. All assessment is internal and rigorous. The Institute follows the best practice of **continuous evaluation** where some assignment or test or quiz is given regularly every one to two weeks, and all these assessments **contribute towards the final grade**. In advanced courses there are often larger group projects which develop enhanced problem solving capabilities as well as teamwork capability. Students are shown the result and comments of each assessment and if there are any errors they can represent to get them rectified. Overall, the assessment system uses multiple instruments for evaluating students’ learning, and is **fully transparent** with students having **clear visibility** in how they are progressing. [7]
- No separate Office of Controller of Examinations is required. The Academic Section, which is headed by Dean (Academics), and others members of the team are Academics In-charge and Assistant Managers & Jr Assistant Managers directly handle all examination-related issues. [4] [7]

IIT-H

- **Self-evaluation form for new students.** This form is to help you evaluate whether your goals and aspirations match with institutional goals of IIIT-H. This is for your own use in evaluating whether you should seek admission to IIIT-H. Do not mail it to IIIT-H. [47]

**Self Evaluation Form**

Matching your profile with IIIT-Hyderabad

June, 2013

This form is to help you evaluate whether your goals and aspirations match with institutional goals of IIIT-H. This is for your own use in evaluating whether you should seek admission to IIIT-H. Do not mail it to IIIT-H.

Mark answer to each question by selecting only one choice.

SECTION-I Admission to BTech in CSE or ECE

**Life long learning**  
Computer Science and Electronics & Communications are fields where advancements are rapid. They require long hours of study and life long learning because new tools and technologies come at a rapid pace.

**Fill Your Choice**

A. How would you rate yourself in putting in long hours of work during undergraduate study? Answer 1 to 5 as your choice:

1. Strongly willing  
2. Willing  
3. Neutral attitude – will do only if required  
4. Not willing  
5. Not willing at all

\_\_\_\_\_

B. Would you be prepared for life long learning, i.e., learning new technologies as old ones become obsolete even before your studies are over?  
(1. Strongly willing ... 5. Not willing at all) \_\_\_\_\_

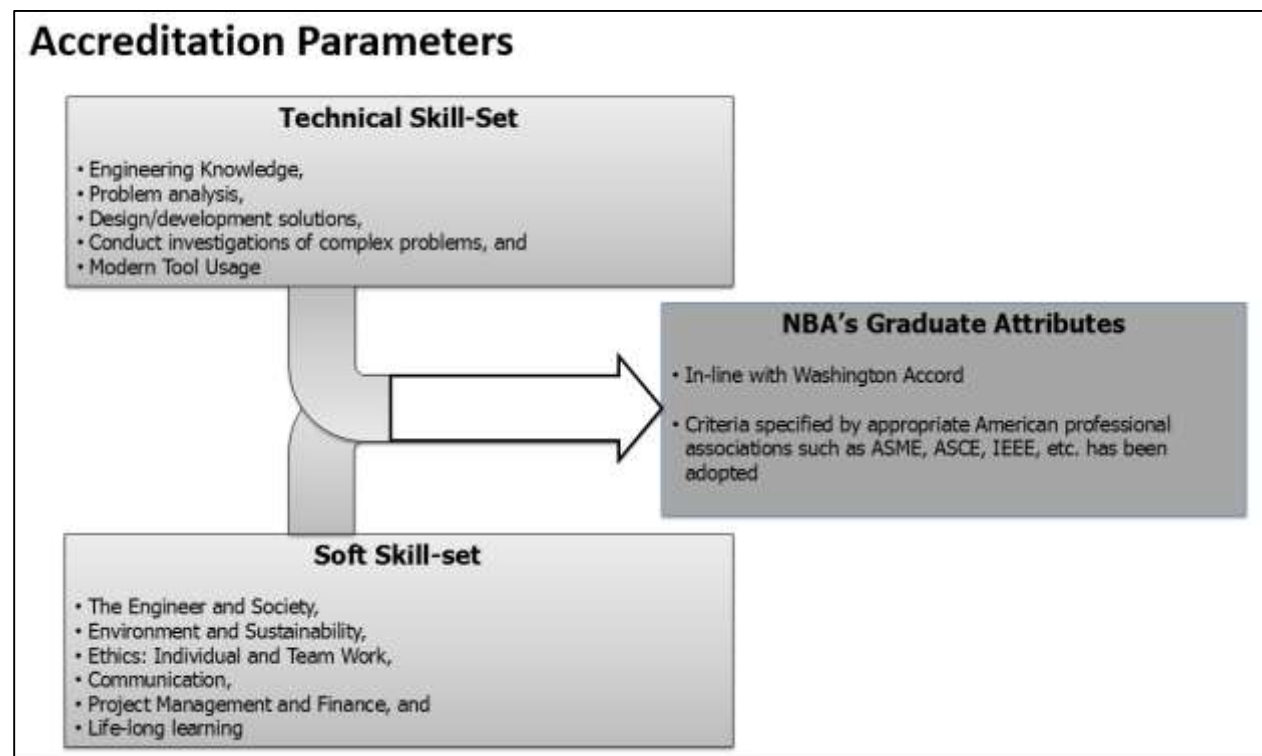
Fig. 3.19: IIIT-H: Self-evaluation form for matching new student’s profile with institute [47]

### 3.4.23. Remarks

Academic freedom is necessary for designing better evaluation strategies. This is necessary for nurturing better innovative brains and globally employable manpower.

### 3.4.24. NBA Based on Graduate Attributes & Washington Accord

After the Washington Accord (13 June 2014), the NBA Accreditation provides International Degree Equivalence. Thus all the processes included in NBA accreditation must be incorporated. Though NAAC accreditation is mandatory for the University, the Technical University, like IIIT, should also go for NAB Accreditation.



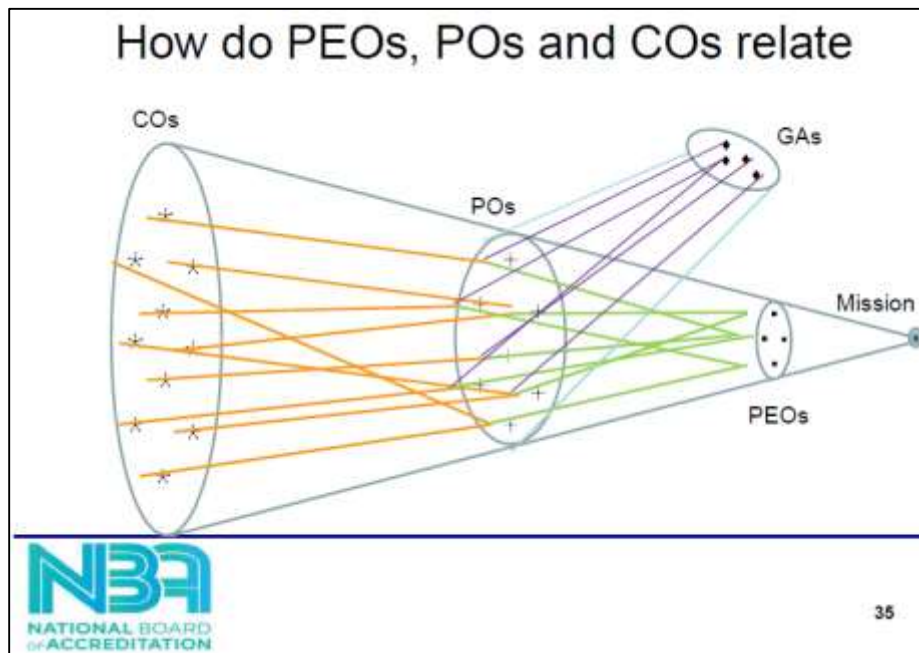
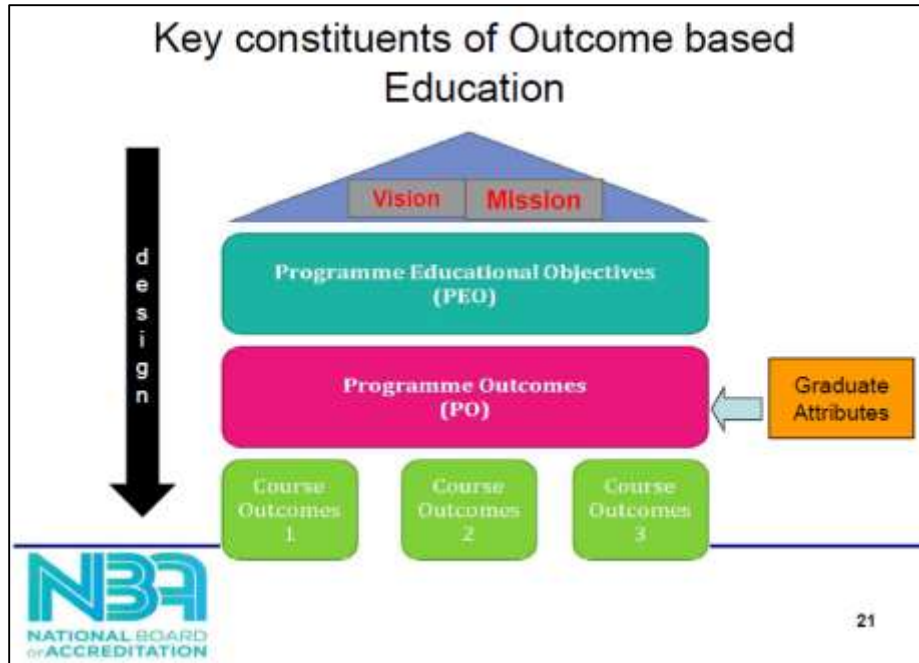


Fig. 3.20: NBA: The Outcome based Accreditation [111-113]

3.4.25. Innovation

**Factsheet**

IIIT-D

- Students at both UG and PG levels are provided numerous opportunities for innovation via internships, projects, undergraduate research, BTech project, course projects, independent study courses, online courses and other initiatives. [7]
- Faculty members have the option of offering courses on special topics, which can be of lesser duration (1 month / 2 months) to educate students about innovative advancements in science and technology. [7]

### 3.4.26. International Students for Degree and Non-Degree Programs

#### Factsheet

##### IIIT-D

- **Ten supernumerary seats are reserved for foreign nationals** for admission to B.Tech programs. Apart from above, there is a provision to allow foreign nationals to do some courses/project as non-degree students for a semester. The **credits** earned are allowed to be **transferred** to their institutes. In 2014 we took nine students through DASA program. There is a designated faculty coordinator looking into all this concerning international affairs of students. [7]

#### 3.4.26. Remarks

More detailed information is included in my book “Strategy to Develop World Class University” (Chapter 07: International Students: \$100 Billion Market, pp. 138-185 and Chapter 12: Internationalization of Curriculum Design for Global Citizenship, Employability, Inclusion & Innovations, pp. 292-311). [10]

Dr. Pankaj Jalote, Director IIIT-D has given very detailed analysis on many important issues related this topic at his interesting blog at WordPress. It is worth reading. [27]

### 3.4.27. Guest Lecturers

#### Factsheet

##### IIIT-D

- The university organizes a weekly seminar which is addressed by an expert (usually external to the university). No other classes are scheduled in the seminar slot so that all students are free to attend the seminar. In addition to the weekly seminar, there are occasional seminars. [7]

All the IIITs conduct hundreds of events and guest lecturers. Visit IIIT-B, IIIT-D LinkedIn pages [58] [60]

### 3.4.28. National or International Exposure and Faculty Development

#### Factsheet



#### IIIT-D

- IIIT-D invites distinguished visitors and conducts various seminars. The aim of inviting distinguished visitors to IIIT-D is to provide opportunity to the faculty to strengthen the collaborative research and enhance their visibility both in academia and industry. Many distinguished visitors from academia and industries visit IIIT-D that serves as a venue for exchanging research ideas. [7]
- The institute conducts workshops regularly – major workshops every few years, and smaller, in-house workshops to share experiences. [7]
- The institute had conducted Indo-US workshop in 2010 and 2012 on Effective Teaching in which external experts from US were invited and who conducted these sessions. The previous session was taped and is being converted into a resource for all incoming faculty. [7]

#### *Best Practices: IIIT-D*

- Faculty is encouraged to visit other institutions and industry **during the vacation periods** – and most do. In a given summer, more than half the faculty visit some industry or university. [7]
- Most of the faculty had their Higher education from abroad. During vacation, they keep visiting foreign universities for further research work. [7]

### 3.4.29. Collaboration and Curriculum Development

#### Factsheet

#### IIIT-D

- Curriculum development.
  - SAP offers a course on Testing at IIIT-Delhi named as Secure Coding & STTE.
  - IBM faculty offered course on Mining. [7]
- Internship
  - We have partnership with ST Microsystems for VLSI and Embedded System program, all the students do a summer program in ST where they were taught by ST faculty and use their facilities and tools. [7]
- On-the-job training
  - The students after receiving Job offers from the companies do on-job-training for a period of 2 to 3 months. [7]

### 3.4.30. Study of Domains and Communities for Innovation using ICT

#### Factsheet

#### IIIT-D

The course is planned for summer semester after 2nd Year as the students have done almost all the core courses by then. The course will begin with students studying some reports/case studies of innovative use of ICT for solving various problems – this is to set the context and get their imagination going. There may be some material given on high-level view about capabilities of

technologies like mobile computing, image processing, etc which are more likely to be used in domains. The course is intended to provide an immersive learning opportunity. Unlike regular internships where students often follow pre-determined plans, projects or study known problems, it is expected that students in this course will act as highly-interactive observers. Instead of trying to solve known problems, the task is to understand the workings and **identify problems within the domain**. Studying the relevant literature of the domain is an essential component of this experience. Once a set of problems has been identified, students will attempt to provide some ICT-based solutions. Solutions may be based on data collected through surveys or other methods, and include specific plans for UI design or technology interface. At the end of the course, students are required to submit a report detailing their understanding of the domain/community, issues or problems identified, and proposed technology interventions/systems that can help and how. They will present their report to the class. [7]

### 3.4.31. Teaching Assistantship (TA) or Research Assistantship (RA)

#### Factsheet

##### IIIT-D

- MTech students gets stipend of Rs.8000/- per month. A student on assistantship is required to do 10-15 hours of academic work, e.g., teaching assistantship for a course or lab-in-charge. A students on assistantship have to work with reduced load (at most 4 credits equivalent per semester), and are required to spend at least four semesters. M. Tech candidates may indicate their choice for assistantship during admission. During admission and thereafter, the PG. [7]
- Financial assistantship is available for some PhD students in the form of teaching assistantship or research assistantship. Teaching assistantship. The students under this plan are expected to help the instructors in various courses for the smooth running of the course. Research assistantship. The students under this plan are expected to help the faculty members in various research projects. They may be assigned limited academic duties. Currently, the stipend in first year is Rs.22,000 per month; 2nd to 4th year it can go up to Rs.25,000 per month. A PhD student is not eligible for assistantship or scholarship after four years. [7]

### 3.4.32. Language Issue

#### Factsheet

##### IIIT-D

- Based on the feedback of the faculty and companies that visit us for recruitment, IIIT Delhi recognizes that communication in English is a major issue with Indian engineering students in general. We have three courses – **COM 101 Communication Skills**, **COM 201 Critical Reading** and **COM 301 Technical Communication** - as part of core courses to help students develop their communication skills. [7]

### 3.4.33. Sports & Extracurricular Activities: Two Points Credit

#### Factsheet

## IIIT-D

- Two point's credit: Students are encouraged to participate in sports & extracurricular activities, we have a provision of giving 2 credit to those students who are engaged in self-development like painting, dancing etc.
- Clubs: IIITD have many students based clubs which are completely managed by the students like music club, Dance club, Astronomy club. Participation in these clubs is encouraged and is **mandatory for junior students**.
- Sports officer: one full time sports officer is hired for the student's engagement in sports activity. [7]

### 3.4.34. Coding Culture: Inclusion of Competitive Programming in Curriculum

#### *Best Practices*

##### Initiatives taken by IIIT Delhi to promote programming

###### Inception of FooBar, a student-run programming club of IIIT Delhi

In order to further carry out its mission to motivate budding engineers to become outstanding problem solvers, a vibrant student programming club '[FooBar](#)' was established in September 2013. The club's aim is to promote and improve the overall programming skills of students in IIIT Delhi and their performance in prestigious contests like [ACM ICPC](#) (the 'Olympics of Programming'). The club brings interested people together, so that they may hone their programming skills.

FooBar has provided various opportunities for student programmers to grow by organizing programming contests like ProSort, ProSort Junior, and ProCon. It has also started [CodeClasses](#) - a series of lectures to help them get started with competitive programming. These lectures focus on useful and important concepts and problem solving strategies, with nifty tricks thrown in here and there. At least one session (contest/CodeClass) is organized every week. In addition, it also conducts some sessions to help students prepare for the placements.

FooBar is also associated with Directi/Codechef, HackerRank and HackerEarth.

###### Inclusion of Competitive Programming course in winter and summer semesters

IIIT Delhi further strengthened the culture of programming among its students by offering a [Competitive Programming Course](#) in its [Winter Semester 2014](#). The objective was to improve students' ability to solve problems using knowledge of programming, algorithms and data structures as well as their preparedness for participating in programming contests. The 2-credit Competitive Programming Course was offered to its 3<sup>rd</sup> and 4<sup>th</sup> year B.Tech students. In this course students had to primarily participate in coding contests, discuss problems and solution approaches in class and read material that helps do better in the contests. With its success, a longer 2 credit Competitive Programming summer semester course was started in May 2015.

The summer semester course was a great success, and saw many students enrolling. The overall increase in participation and improvement in performance of IIIT-Delhi students in Codechef Long Challenges as compared to previous years is an indication of how this course helped promote competitive programming.

Inclusion of Competitive Programming in Curriculum of IIIT-D [179]

*Best Practices*

The screenshot shows a Quora page with the following content:

**Quora** Ask or Search Quora Ask Question

Indian Institute of Information Technology, Allahabad (IIIT - A) +2

### How was the coding culture established at IIIT Allahabad?

IIIT A has awesome coding culture. How was it started? How you motivated people for coding?

IIITs are generally very IT focused institutes and they do not teach other subjects such as chemistry, physics (just in 1st year), civil workshops, engg drawing, etc. So there is a more of programming focused culture in general from the very 1st year. Then there is an ongoing programming contest trend that is passed on by every senior batch to the next batch (seniors conduct programming contests within the college). This is probably because mostly all students go to software companies where they have programming jobs, so there

IIIT-A: Coding Culture [194]

In IIIT-H the dominating portion of the most courses are coding assignments plus lab tests as well as a few of them being totally based on programming & not to mention programming workshops for 1st year students. [195]

*Best Practices*

The screenshot shows an article with the following content:


### Promoting Coding Culture In Your Campus


Are you looking for a job or an internship in top-notch software companies like Google, Microsoft, Amazon or Flipkart? Do you want to create something that helps transform the world for good? Do you have an online business idea that you want to bring to life? All that is possible if you can code well and inculcate a coding culture in your campus.

In most top tier institutes in India, the coding culture is promoted by the "seniors". They are already working for an established programming club: they organize contests, mentor their "juniors", participate and win the regional ACM ICPC, and sometimes go on to represent their university in the World Finals.

These role models instill pride among the students who start emulating them. In the process, they do well themselves, and become role models for their "juniors". The virtuous cycle goes on. Promoting coding culture is simply fueling this cycle.

*Best Practices*

 Ask or Search Quora Ask Question

Association for Computing Machinery Google India +7 

## How does IIIT Hyderabad produce so many world class programmers every year?

Competitive coding is very prevalent and there are so many people solving problems on SPOJ and TopCoder.

Almost every year there is a team from IIIT Hyderabad that qualifies for the ACM ICPC World Finals. Once there were two teams which qualified in a single year!

Every year there are some 8-10 people hired by Google and Facebook. Some get hired by both!

But since we are on quora, let me elaborate. We have a very strong programming culture at IIIT-H.

Starting from the freshman year, we have a Computer programming course in the first semester, and data structures in the second semester. Both of them are programming heavy courses, where students receive regular assignments, and are required to submit that on an internal online judge (which is pretty much exactly similar to SPOJ in format). Mostly your grades depend on how well you do in these assignments. This gets baby-programmers started.

The two courses, that I mentioned, are generally considered prestigious of sorts at IIIT-H, that is if you are a super-star in these - you generally have a good standing amongst students. So students generally look at ways to improve their skills - and that's where TAs/seniors kick in. They ask them how to improve their programming skills - and are promptly told to head towards SPOJ/Codechef etc. along with example of students which used to do well on these online judges, and are now in a well to do position at Google/Facebook (yes - these two are by far the most popular). This answer alone is enough to motivate at-least half of the batch to go and at-least have a go at SPOJ/Codechef (or other such sites).

In IIT's, the culture in first year is to get herded by your seniors to dance, debate & drama and to cheering hostels in each & every competition & sports matches (even to poker matches), you can say our equivalent of programming workshops. Even in later years we don't care about coding unless a deadline arrives. Being a CS major you will already feel like an outcast in IIT, by trying to be a coding nerd you don't want to become outcast among outcasts. I know many people here who are just naturally super genius in algorithms, maths & puzzles solving but don't give a fig about coding. Very few bother but give up after early hiccups of compilation error & debugging. Those who get through that and are able to find people like them end up being the "Proof" that they can easily excel at world level in coding.

**Motivation & incentive :** IIITH being a totally CS oriented school with emphasis on programming the race there is often decided by ones coding skills & reputation and no one wants to be the slowest sheep in the flock. With best coders getting the best packages every one is trying to get the pole position. Internal race b/w the guys result in a competitive environment similar to that of the coding sites which is a another plus at IIITH.

### *Best Practices*

College plays a very important part in the way in sculpting a computer programmer. Be it the faculty that educated the programmer, to (or) the peer group that bolstered them to learn and build new things, to (or) the infrastructure that provided them with the facilities to program their ideas to reality; the role of the college possibly one of the most important deciding factors in the quality of a programmer.

India has grown into being a hotbed of programmers and in a few years' time, it will be home to the largest number of programmers in the world. India's vast engineering education system comprises of some world class institutes. Thousands of students strive to land a seat in these colleges in the hope of superior programming education. There are quite a few of these colleges in India.

Here's a list of 5 colleges which have been rated the very best for programming in India –

#### **IIIT Hyderabad**

Some Indian students have gone so far as to calling IIIT H the Mecca of computer science in India. Their stellar performances at ACM ICPC has earned them a niche name in the world of computer sciences. A unique aspect to this college is its low intake of students, hence ensuring more focussed training.

How does IIIT Hyderabad produce so many world class programmers every year? [195] [196] [197]

### 3.4.34 Remarks

The “Coding Culture” is the main attraction of Many IIITs. It has enhanced the Cut-off, Campus Placement as well as Brand Name of these institutes. The coding culture was once the glory of one of the IIIT, which is fading due to some poor quality teaching and administrative problems. The institute needs to make sure it retains the coding culture if it has to keep attracting good quality students.

Few tips for establishing coding culture

- Set up a programming club
- Learn in a group
- Work on a personal side-project or an open source project
- Self-Learning
- Find an online mentor
- Inculcate the habit of reading
- Summer Internship [196]

Before establishing the “Coding Culture”, one must understand the difference between “Education” and “Training”. For more detailed information, please refer Chapter 9 (sections 9.2 and 9.3) of my book namely, “Washington Accord & Multi-Objective Integrated Model for Developing WCU”.

## **Chapter 4: Issues, Which Need to Be Focused Before Commencing Classes (Part II)**



## 4.1. Revenue Generation & International Academic and Industrial Partnerships

### 4.1.1. MOU with Corporations

#### Factsheet

##### IIIT-B

Year	Number of MoUs signed with corporations (non-cumulative count of MoUs signed in the corresponding year)
2009	10
2010	14
2011	17
2012	26

Table 4.1: IIIT-B: Number of MOU per year [4]

##### IIIT-A

Collaborations with Industries	
The Institute is also actively involved with some of the major industrial & business houses & organizations.	
1. Maple Leaf India Pvt. Ltd., New Delhi	9. Indian Oil Corporation, Faridabad
2. M/s. Corinex, Canada	10. Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow
3. Construction Industry Development Council (CIDC)	11. Akruiti Citygold Institute, Mumbai
4. Tata Consultancy Services (TCS), Mumbai	12. Microsoft
5. Artificial Limb Manufacturing Corporation (ALIMCO), Kanpur, Govt. of India	13. IBM
6. FORTIS Hospital, Noida, Uttar Pradesh	14. Battelle Memorial Institute, USA
7. Indian Space Research Organization (ISRO), Bangalore	15. NIKSUN India
8. Zensar Technologies Ltd., Pune	16. Rivers Company, UK
	17. Biomedical Foundation, Canada

Fig. 4.1: IIIT-A: Collaboration with industries [21]

##### IIIT-BH

- Industry collaborations have been the centre of focus for any successful IT based institute. We believe in collaborations that genuinely help our students to get acquainted with modern industry trends. IIIT Bhubaneshwar is proud to tie up with two global giants, IBM and Capgemini. [101] [102]

### 4.1.2. MOU with Renowned Universities

#### Factsheet

##### IIIT-BH

- We have MOUs signed with two Universities, University of North Texas and National University of Singapore. These tie ups will focus on academics, research and many joint projects. [46] [101]

##### IIIT-A

Under the terms of the Memorandum of Understanding (MoUs) with the following Institutions, the Institute has developed program of interchange of students for Academic activities. Thus, the students and teachers of the Institute has commendable outreach to other Institutions for exchange of Academic knowledge.

- Carnegie Mellon University, Pittsburgh
- California University, Riverside, USA
- State University of New York, Buffalo
- Massachusetts Institute of Technology, USA
- Gwangju Institute of Science & Technology (GIST), Korea
- Canberra University, Australia
- EPFL Louisiana and ETZ Zurich, Switzerland
- Aalborg University, Denmark
- Russian New University (RosNOU), Moscow, Russia
- University of Michigan, USA
- Caledonian College of Engineering, Muscat, Oman
- IIT-Kanpur, IIT-Mumbai and IIT-New Delhi
- Information Security Research Consortium jointly signed by USA, China, Japan, Russia, Germany, Israel, India, RosNOU-Russia
- University of Dundee, Nethergate, Scotland, UK
- Moscow Institute of Physics and Technology ( State University), Moscow, Russia.
- Center for Teleinfrastructure (CTIF), Aalborg University, Denmark.
- Asian Institute of Technology, Bagkok, Thailand
- The Southern Taiwan University, Taiwan
- The University of Lincoln, U.K.
- Erasmus MC: University Medical Centre, Rotterdam, Netherland.
- The Erasmus University, Rotterdam, Netherland
- University of Abertay Dundee, Scotland
- The Queensland University of Technology, Brisbane, Australia
- Putera Sampoema Foundation (PSF), Jakarta

Fig. 4.2: IIIT-A: MOU with foreign Universities [21]

#### IIIT-B

- The National Science Foundation (US federal agency supporting research and education in the field of science and engineering) and the Massachusetts Institute of Technology selected IIIT-B as one of the eight institutes where students could spend a year as part of their PhD programme. The two other institutes selected in Bangalore were the prestigious Indian Institute of Science and the National Centre for Biological Sciences. [57]

#### IIIT-D

- Close on the heels of signing a pact for cooperation with Australia’s Queensland University of Technology (QUT), IIIT-D has joined hands with Korea University’s Graduate School of Information Security (GSIS) and University of Nebraska-Lincoln to carry out educational exchanges and strengthen mutual relationships. The Memorandum of Understanding with University of Nebraska-Lincoln (UNL), inked by IIIT-D Director Prof. Pankaj Jalote and Chancellor Harvey Perlman of UNL in June 2014, is intended to facilitate academic collaboration between the partner institutions. [100]

#### IIIT-Kancheepuram

- University of Geneva, Italy,
- University of Catania, Italy
- Nagaoka University of Technology, Japan
- HITACHI, Japan

#### 4.1.1. & 4.1.2. Remarks

The signing MOU is easy job but keeping it live is difficult. I mean, fruitful and long lasting relationship between two institutes is important. The best example is ISB Hyderabad, which has academic association with three of the world's leading business schools - Kellogg School of Management, The Wharton School and London Business School. With the help of this long lasting association, they have become top ranking B-School of the world.

More detailed information on ISB is included in my book (Free Download) “113 Difficulties in Developing World Class Universities” (Chapter 12: Solution Space 04: Learn a Lesson from B-School ISB, pp. 257-264). [9]

#### 4.1.3. Industry Partnership

In India the industry supported research scenario is not good. The new Act namely “Industry Inertia & Corporate Social Responsibility: Section 135 of Companies Act 2013” may change the scenario.

**Section 135 of the Companies Act, 2013** stipulates that companies with a net worth of Rs 500 crore (\$100 million) or more, or turnover of Rs 1,000 crore (\$200 million) or more, or a net profit of Rs 5 crore (\$1 million) or more during the past three financial **years must spend at least 2 percent of their average net profits** from the three preceding years on CSR, or corporate social responsibility initiatives. According to Union Minister of State for Corporate Affairs Sachin Pilot, **this stipulation makes India the first country in the world to legally mandate corporate spending on social welfare.** [218]

#### *Best Practices*



IIIT-B: Industry Interface [63]

#### Factsheet

#### IIIT-D

- Read the wonderful article by Pankaj Jalote, on “Challenges in Industry-Academia Collaboration” [99]

**Best Practices: IIIT-D**

**IIIT-B**

- The Institute must have a large set of linkages with industry in general and the IT industry in particular. Infosys, HP and ICICI initially gave a grant of **Rs 1 crore each** to become initial **patron members** of IIIT-B. [53]

**IIIT-H**

- Yahoo! India Research & Development has partnered with the Indian Institute of Information Technology (IIIT), Hyderabad, to accelerate research and development in cloud computing. [105]
- The Power Systems Research Center, for instance, tied up with leading companies that include ABB, the world’s largest builder of electric grids, US conglomerate General Electric Co., Indian electric equipment maker Crompton Greaves Ltd, and the Electrical Research and Development Association. [33]

4.1.4. Sponsored Chair Professors

**Factsheet**

**IIIT-B**

Chair Professorships of IIIT-B is supported by Daimler Chrysler in Automotive IT, ICICI, HP, Canara Bank, Bank of India, iFlex, STPI and Infosys Foundation.

**Best Practices**

Chairs instituted by the university:		Chairs
School / Department –		Department of Information Technology
HP	Chair Professorship	
ICICI	Chair Professorship	
Canara Bank	Chair Professorship	
SAIL	Chair Professorship	
Bank of India	Chair Professorship	

IIIT-B Chair Professors [4]

**Best Practices**

**IIIT-BH**

- Infosys donated Rs. 1 Crore for instituting a chair Professor [103]

4.1.5. Industry Funded Labs

*Best Practices: Industry Supported Labs*

IIIT-B

- Siemens Vision Lab
- Honeywell Automation / Control Lab
- Intel Planet and Community PC Lab
- HP IMS Lab
- HP Cluster Computing Lab [4]

IIIT-H

- TCS to set up “FC Kohli Center on Intelligent Systems (KCIS)” at IIIT Hyderabad. Rs 20 crore investment to create new R&D Center in New Technologies. The vigorous research at KCIS will have the potential to impact the society deeply through forefront research, innovative products, and start-ups.
- Several corporates have participated in offering cutting-edge courses or in setting up laboratory facilities at the institute. This provides an avenue who have involved with us in this manner are, among others, Portal Players, Progress Software, Nvidia, GE, Pramati Technologies, IBM, Microsoft, and Intel.
- IIIT-H has set up a state-of-the-art embedded systems laboratory, as part of the institute’s Center for VLSI Design and Embedded System Technologies (CVEST). The lab was set up in collaboration with NXP Semiconductors. [104]

4.1.6. Endowed Scholarships

*Best Practices*

There are many endowed scholarships at IIITB from Government of Karnataka and many corporations/banks. The Institute has a special scholarship in the form of Director’s Merit List every semester. The record of scholarships distributed in the past four years is as follows

Name of the scholarship	Number of scholarships given out			
	2009	2010	2011	2012
Director’s Merit List	32	22	34	33
ABB	5	5	4	3
Infosys	5	5	5	5
Intel/Soc Gen	5	3	2	2
GoK	2	2	2	2

IIIT-B: Scholarships [4]

*Best Practices*

IIIT-B

- Companies like GE, HP, Huawei Technologies, Bank of India, Infosys, Siemens, Intel, Motorola, ABB, Nokia, HP and Microsoft etc., have supported research activities through **endowed scholarships** and **fellowships** to support students.

IIIT-D

- The total strength of its PhD scholars have crossed 80 now (in Aug 2014). Many of the PhD scholars been granted prestigious fellowships such as the 3 Prime Minister's Fellowship for Doctoral Research, IBM, and 12 TCS Fellowships. It also has a joint PhD program with QUT Australia, where PhD students will spend approximately equal time in the two Institutions, will have joint guidance from faculty from both the Institutes, and will be granted joint degree. [16]
- Four of our young faculty members are the proud recipients of the DST's Inspire fellowship, while another one has been honored with Adobe's Excellence in Research Award. [7]

IIIT-H

- Fellowships and travel grants: In addition, Microsoft Research, GE, SAP Labs, Infosys, and other companies have been providing fellowships and travel grants to research students. [29]

4.1.7. Sponsored Courses

**Factsheet**

IIIT-B

- Sponsored M.Tech.



Fig. 4.3: IIIT-B: Sponsored MTech program by Samsung [63]

- IIITB has invited applications for admission to Special Training Programme (STP) conducted in **collaboration with Infosys Foundation**. The STP programme itself has been designed with focus on developing strong problem-solving, programming and software development skills to culminate in a Post-Graduate Diploma in Software Development (**PGDSD**) of IIITB. [79]

4.1.8. Project Research Grants

**Factsheet**

IIIT-B

Funded Projects 	
<ul style="list-style-type: none"> <li>• <b>Government of Karnataka</b> <ul style="list-style-type: none"> <li>- CEEMS Lab,</li> <li>- Kanaja,</li> <li>- ESDM Center,</li> <li>- Center for Online Educational Content for Schools</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Industry-Sponsored</b> <ul style="list-style-type: none"> <li>- Infosys Foundation</li> <li>- Microsoft</li> <li>- Nokia Research</li> <li>- Intel, Thinksoft,</li> <li>- EMC</li> </ul> </li> </ul>
<ul style="list-style-type: none"> <li>• <b>Government of India</b> <ul style="list-style-type: none"> <li>- DST,</li> <li>- TIFAC,</li> <li>- DG Shipping,</li> <li>- UDAAN Project,</li> <li>- DietY,</li> <li>- OAES</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>International Research collaborations</b> <ul style="list-style-type: none"> <li>- Lund University (Sweden)</li> <li>- Wallenberg Foundation (TFDI),</li> <li>- National Science Foundation, USA</li> <li>- University of Aberdeen, University of Amsterdam</li> </ul> </li> </ul>

Fig. 4.4: IIIT-B: Funded Projects [63]

SUMMARY OF THE PROJECTS FROM 2009-2012		
Sl. NO	Name of the Sponsorer	Amount Sponsored
1	Nokia Research Grant	2,322,551
2	Infosys Ltd	2,250,000
3	Department of Information Technology	34,759,466
4	European Union	4,273,075
5	MHRD IIT Kharagpur	2,400,000
6	Honeywell Technologies	400,000
7	Ministry of Defence	150,000
8	ThinkSoft Global Services Ltd	540,500
9	KBITS GOK	85,000,000
10	Ministry of Shipping	34,200,000
11	Karnataka Jnana Aayoga	10,000,000
12	Intel Technologies Ltd	3,079,445
13	Microsoft Research Lab Pvt Ltd	4,000,000
14	Lund University	2,222,729
15	MHRD through IIIT Hyderabad	1,950,000
<b>TOTAL</b>		<b>187,547,766</b>

Table 4.2: IIIT-B: Project funding details [7]

Year	Government Project Funding (in Rupees)	Industry Project Funding (in Rupees)	Funding from Other Academic Organizations (in Rupees)	Total
2009-12	168,459,466	16,865,571	2,222,729	<b>187,547,766</b>
	89.82%	8.99%	1.18%	

Table 4.3: IIIT-B: Project funding classification [7]

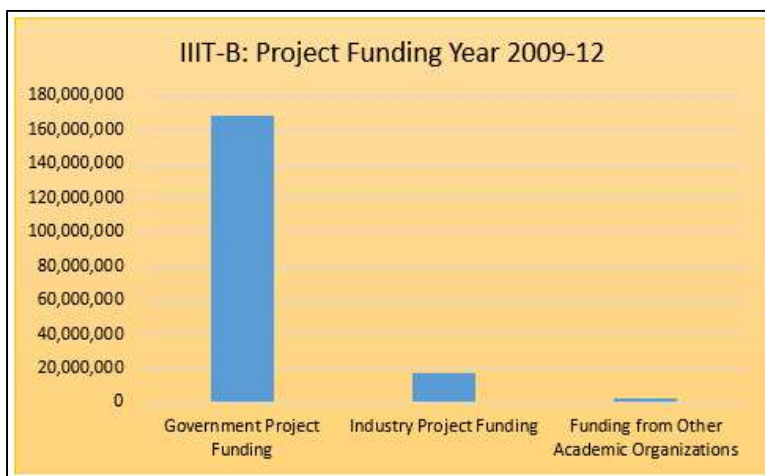


Fig. 4.5: IIIT-B: about 90% Government funding [4]

#### IIIT-D

- In the previous year alone 17 proposals of faculty members have been approved for funding by various agencies for a combined R&D project funding commitment of Rs. 3 crore with top funding agencies being DST, Deity and Media Lab Asia.
- Based on the soundness of approach, the institute has received research projects from institutions like DIT, DST, Nokia, SAP, Microsoft, IKSL, TCS etc. [38]

Year	Government Project Funding (in Crore Rupees)	Industry Project Funding (in Crore Rupees)	Funding from Other Academic Organizations (in Crore Rupees)
2014-15	1.69	00	00
2013-14	1.9	0.19	0.07
2012-13	3.99	00	00
2011-12	0.32	00	0.09
Total	7.9	0.19	0.16
	<b>95.75%</b>	<b>2.3%</b>	<b>1.93%</b>

Table 4.4: IIIT-D: Project funding classification [7]



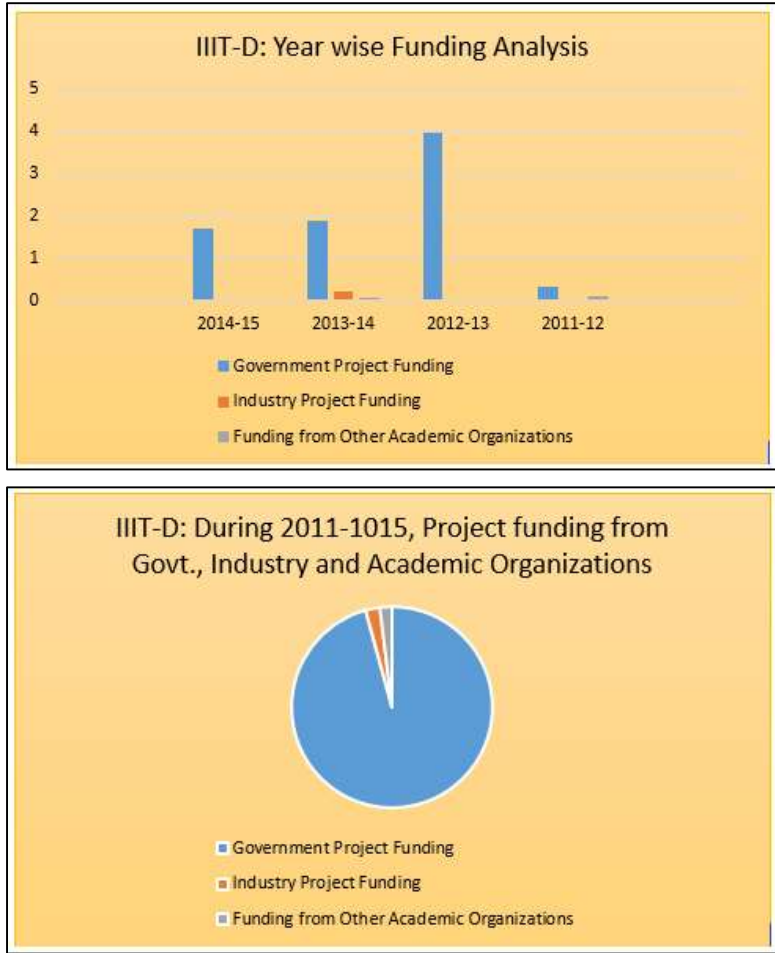


Fig. 4.6: IIIT-D: About 96% government funding [7]

### IIIT-H

- Sponsored research: A team of students and faculty members executes projects at the Institute in collaboration with the company that sponsors the project the project. Microsoft (Redmond and Bangalore), Nokia, Satyam, Philips Research, IBM, Google, CA, TCS and HP Labs are some of the companies that have engaged with the Institute under this model in the past three years. [29]
- Nurture-an-area: This is a unique engagement model through which a company can fund research in a broad area of their interest, with a few desirables as goals. A team of research students, UG students, and faculty carry out the open research. The results include the team trained in the relevant areas as well as specific intellectual property generated in the process. Infosys, Yahoo, Nokia and Rediff have engaged with the Institute under this model in the past. [29]

### IIIT-Gwalior

- Total 35 research projects (17 completed and 18 ongoing) are listed at website. Out of these projects, 33 projects are funded by government agencies. [86]

#### 4.1.9. Funds for New Construction

*Best Practices: IIIT-H*

- The Tata Group will support the IIIT-H, by constructing a new academic block.

#### 4.1.10. Library Funds

*Best Practices: IIIT-B*

- In appreciation of the free grant worth Rs. 3 crore from Infosys, IIIT-B has named the Library as the Infosys Library.

#### 4.1.11. Venture Capital Funds for Incubation Center

*Best Practices: IIIT-B*

- The International Institute of Information Technology-Bangalore (IIIT-Bangalore) and Peesh Venture Capital (PVC), a NASSCOM investment partner, have entered into a strategic partnership to accelerate and fund India's Internet of Things & Mobile App start-ups. PVC is currently investing out of PVC II, a \$50 million (INR 310 Cr) fund focused on early stage investments in Ad Tech, E-Commerce, Gaming, Education, Mobile Apps, Enterprise Software, Wearables and Internet of Things (IoT). The goal of this public-private partnership is to produce successful, world-class Indian mobile app companies by combining IIIT-Bangalore Innovation Centre's incubation facilities and knowledge ecosystem with PVC India-focused Rs 310 crore venture capital fund that invests in passionate entrepreneurs with disruptive ideas. [47]

#### 4.1.12. Alumni Funding

##### **Factsheet**

##### **IIIT-H**

- The alumni fund was set up in 2006 as a modality for alumni to have a direct hand in helping the Institute grow. The fund has been used to provide tuition support for meritorious student in financial need. The total money raised from alumni and caution deposit donations is ~ Rs 43lakhs. This includes Rs. 15 lakhs worth of loans recovered. [56]

#### 4.1.13. Revenue Generation through STTP, Skill Development and WILP (like BITS Pilani)

Through short term training programs many world renowned universities generate huge revenue. IIITs also following this technique. More detailed information on this topic is included in my book “Funding Techniques of World Renowned Universities”. [10]

#### Factsheet

#### IIIT-B

- Udaan 2013: Skill Development program



Fig. 4.7: IIIT-B: Skill Development Program [63]

- Short Term Courses for Industry and Academic Institutes: Recently IIIT-B launched “Analytics Essentials” a foundational certification course in Business Analytics.



Fig. 4.8: IIIT-B Training Programs with 70K fees [50]

- The IIIT-B has set up a centre that promises help to students get jobs and hone their skills. The institute, launched by the **Bangalore Skill Development and Employability Centre**, in

association with TalentSprint, a company that grooms professionals for the Information Technology (IT) and the Banking, Financial Services and Insurance (BFSI) industries. [77]

- **HP Education Services** and the International Institute of Information Technology-Bangalore (IIIT-B) on Friday announced the launch of a new **IT infrastructure certificate programme** for undergraduate students in the country. The new programme will help students to explore job opportunities in the growing **infrastructure management industry**, the company said. [78]
- **WILP, Skill Development and Samsung:** Samsung has announced today that its R&D Institute in India, located in Bangalore, has entered into an agreement with the IIIT-B with the objective of fostering collaboration between the two institutions to promote academic and research interactions for **industry-centric knowledge** and **skill development**. The agreement was signed by Professor S. Sadagopan, Director of IIIT Bangalore and Dr. Jason Dongwon Kwak, Managing Director, SRI-B. As per Samsung, IIIT Bangalore would run educational programs to meet the human resources development needs of Samsung leading to specific degrees of IIIT-B through its **Work Integrated Learning Programs (WILP)**. These programs will have the same standards as those offered on-campus, and will be equivalent to the corresponding degrees offered on-campus. [75]

#### IIIT-H

- IIIT-H got the project “Enhancement of quality of IT education in engineering colleges” from Ministry Communication and IT, Government of India. [80]
- **EnhanceEdu**, a division of IIIT, works towards empowering individuals and communities by enhancing the quality of education. To actualize this goal we have come up with a framework which involves training faculty members of engineering colleges through our Teacher Training Program (TTP), training students at engineering colleges through Certificate in Information Technology (CIT) course and conducting workshops on current and needed topics. EnhanceEdu is established to enhance the quality of education in engineering colleges and to make their graduates industry ready. We accomplish this goal, through our teacher and student training courses, workshops and collaborative activities. We constantly update our knowledge and skills to keep our offering useful and relevant. [98]
- International training program



Fig. 4.9: IIIT-H: International training program with 30K fees [49]

#### 4.1.14. Industry Institute Interactions without Financial Benefits

##### Factsheet

##### IIIT-DM Jabalpur

- An MOU with Kanagawa Institute of Technology, Japan.

- Students of ECE have been pursuing six month internships in many companies and reputed research institutes like Samsung, Siemens, TCS, CEERI Pilani, RRCAT Indore etc.

Sixty students, five each in June 2008, December 2008, June 2009 along with fifteen students each in June 2010, May 2011, May 2012 visited Japan for short durations under JENESYS programme. Their visit was fully supported by Japan Government. This exposure visit of students helped them in understanding the contribution of Japan in the Industrial development along with its cultural heritage.

Fig. 4.10: IIIT-DM Jabalpur collaborative activities [82]

IIIT-H

- A collaborative program allowing AUP’s Computer Science students to work at the Cognitive Science Lab of the International Institute of Information Technology, Hyderabad (India) to complete a “technology and social engagement” project. While at the Cognitive Science Lab, students will work under the guidance and supervision of researchers at the lab and they will have ample opportunities to learn and exchange about the research performed there. [106]

4.1.15. Faculty Consultancy

**Factsheet**

IIIT-B

- The revenue generation from consultancy is still small as IIITB is still in the growth phase and yet to achieve its critical mass in several areas.

Year	Consultancy assignments
2010-2011	GoK, HP, IBM, Nokia, Web18, Institute of Nautical Sciences, Infosys, QSO
2011-2012	GoK, Robert Bosch, IBM, HP, Web18, LG Soft
2012-2013	GoI, GoK, HP, Microsoft, IBM, MindTree, HP, Tata Power

Table 4.5: IIIT-B: Consultancy Assignments [4]

IIIT-D

- The areas of consultancy are Computer & Electrical Science and the revenue earned for the last four years is Rs.24 Lakh. [7]

**4.1. Remarks**

The detailed information on these topics is available in my books “Strategy to Develop World Class University” (Chapter 10: Two Way Industry University Interface: Collaboration to Partnership, pp. 250-264 and Chapter 15: Need of Long-Term Bilateral Multidimensional Academic Collaborations, pp. 364-376) and “Funding Techniques of World Renowned Universities” (Chapter 6, Section 5, pp. 52-61) [10]

## 4.2. Research

### 4.2.1. Patents and Research Papers in High Impact Factor Journals

#### *Best Practices*

well laid out and approved by the Board of Governors of the Institute. The list of patents received by IIITB faculty, students and alumni, over the years is as follows, with Patent/Copyright Data as on 31.03.2013:

Sl.No	Inventors	Title of the Patent/Copyright Innovation	Countries where applied	Ref. No.	Current Status
1	G. N. Srinivasa Prasanna and others	The Game of Inverse Chess	India USA European Union (EU)	901/CHE/2005 07/07/2005 11/094, 058 07/01/2008 06780524.2-2318 07/02/2009	Granted patent no. 8,302,969
2	G. N. Srinivasa Prasanna and others	Motion control using electromagnetic forces under examination	India USA EU	1460/CHE/2005 12/10/2005 10/552, 379 7/10/2005 04749677.3-2207 7/10/2005	Granted 3 Patents. No. 7348754, 7733050, 8299741
3	Atul Shukla, B.N. Vikram	Kollabia	India (copyright)	8228/2011 7/11/2011	Copyright Registered
4	R.K. Bera	Listing and modifying groups of blocks in the editing of a document.	USA	US 8,122,349 February 21, 2012	Granted patent no. 8,122,349
5	R.K. Bera	Determining the equivalence of two sets of simultaneous linear algebraic equations	USA	US 7,836,112 November 16, 2010	Granted patent no. 7,836,112
6	R.K. Bera	Restructuring computer programs	USA	7,934,205 April 26, 2011	Granted patent no. 7,934,205
7	R.K. Bera	Editing of a file by multiple authors	USA	7,954,043 May 31, 2011	Granted patent no. 7,954,043

From 1999 to 2013, IIIT-B got 7 patents [4]

#### Factsheet

##### IIIT-B

- IIIT-B got 7 international patents till 2013
- IIIT-B could publish, in an average, 49 research papers per year.

IIITB does not publish its own journal. IIITB faculty members actively publish in premier journals and top-tier conferences. The publication count is as follows:

Year	No. of Publications
2008	37
2009	61
2010	51
2011	51
2012	44

The count of the theses submitted as part of the M. Tech., M.S. by Research, and Ph.D. programmes at IIITB over the past four years is as follows:

Year	Number of theses submitted as part of programme		
	M.Tech.	M.S. by Research	Ph.D.
2009	15	0	0
2010	6	6	0
2011	15	1	2
2012	13	4	0

Table 4.6: During 1999-2013, only 4 PhD students have graduated from IIITB [4]

**1.1 Total Journal and Conference Publications**

Table 1.1 IIIT-B University Journal and Conference Publications Statistics across Databases

Description	Input	Scopus	IEEE	Google Scholar	WOS	Total
No of Journal Publications	86	36	15	85	0	130
No of Conference Publications	224	145	132	229	0	316
Total No of Publications	310	181	147	314	0	446

Table 4.7: IIIT-B Research publications [4]

**Publications - Last Six Years** 

- Journals and International Conferences: more than 130 in the last six years and more than 320 since 1999.
- Books: 10
- Books Chapters: 5
- Books Edited: 7
- Patents: 3 granted, 8 PCT filed



Fig. 4.11: IIIT-B Research publications [63]

### Scopus Analysis

- There are 279 papers of our faculty indexed by Scopus in the last nine years.
- Among the Indian Institutes of Information Technology, the best performance in terms of *p*-index values ( an index based on number of papers published and citations) ,
- (6.55) is shown by IIIT, Bangalore,
- IIIT, Hyderabad (6.21);
- IIIT,Pune (2.74);
- IIIT, Allahabad (2.70);
- Atal Bihari Vajpayee IIIT and Management,Gwalior (1.30),
- Pandit DwarkaPrasad Mishra IIIT, Design and Manufacturing,Jabalpur (0.97).

( As reported in "Ranking of Indian engineering and technological institutes for their research performance during 1999–2008" Gangan Prathap and B. M. Gupta, *Current Science*, vol 97 no. 310<sup>th</sup> August 2009)

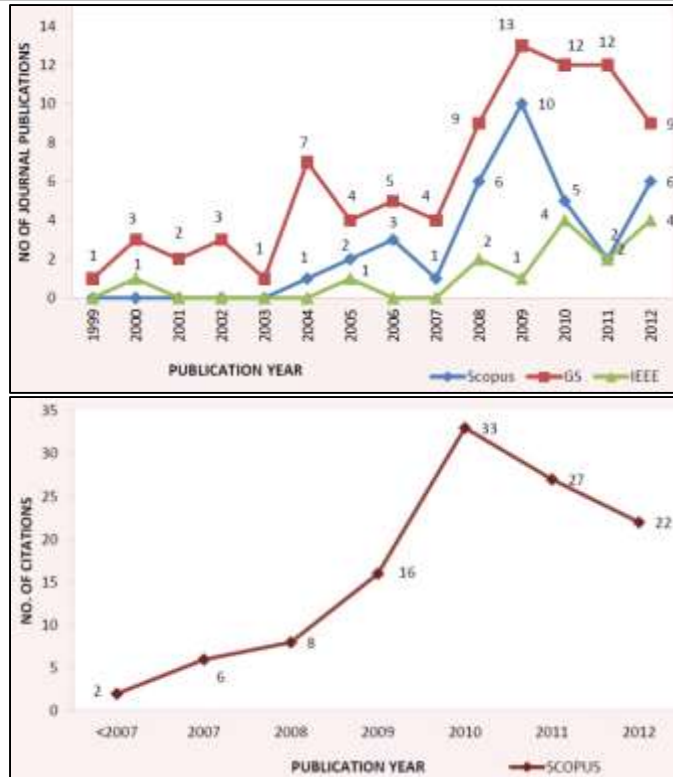


Fig. 4.12: IIIT-B: Research Analysis [4]

#### IIIT-D

- Research remains the key focus of the institute. The Institute has already established one of the strongest Ph.D. programmes in Computer Science in the country, as well as a strong PhD program in ECE. The total strength of its PhD scholars have crossed 80 now (in Aug 2014). Many of the PhD scholars been granted prestigious fellowships such as the Prime Minister's Fellowship for Doctoral Research, IBM, and TCS Fellowships. It also has a joint PhD program with QUT Australia, where PhD students will spend approximately equal time in the two Institutions, will have joint guidance from faculty from both the Institutes, and will be granted joint degree. [7]



- The Institute has tied up with Australia’s prestigious Queensland University of Technology for collaborative PhD programme and also sent a proposal to National Research Development Centre for opening University Innovation Facilitation Centre. The institute has future plans for joint collaboration with other universities in interdisciplinary research. [7]
- Institute encourages joint guidance of thesis, and encourages faculty members from different disciplines to guide them together. Its research groups and centers are devoid of department boundaries and can have members from different disciplines, who can jointly guide thesis and projects. The faculty has joint research projects under Indo US, Indo French Collaboration. [7]

#### 4.2.1. Remarks

To generate 40% revenue, the IIITs need to develop very strong industry oriented research culture. On this topic, the details are available in my book “Strategy to Develop World Class University” (Chapter 11: Need of Research University Involved in Teaching, 265-291). [10]

#### 4.2.2. Research Funding from Government

##### *Best Practices*

Nearly 30 R&D projects received by IIIT-D faculty members from prestigious agencies such as DRDO, DST, and DeITY, with a total funding commitment of about Rs 8 crores.

IIIT-D got Rs. 8 crore funding [16]

#### 4.2.2. Remarks

I observe that, as compared to industry, the IIITs are fetching more funds from Government funding agencies. For survival of IIITs, the industry should become major source of funding. More detailed information is included in my book “Funding Techniques of World Renowned Universities”. [10]

#### 4.2.3. Research Programs

##### **Factsheet**

IIIT-B

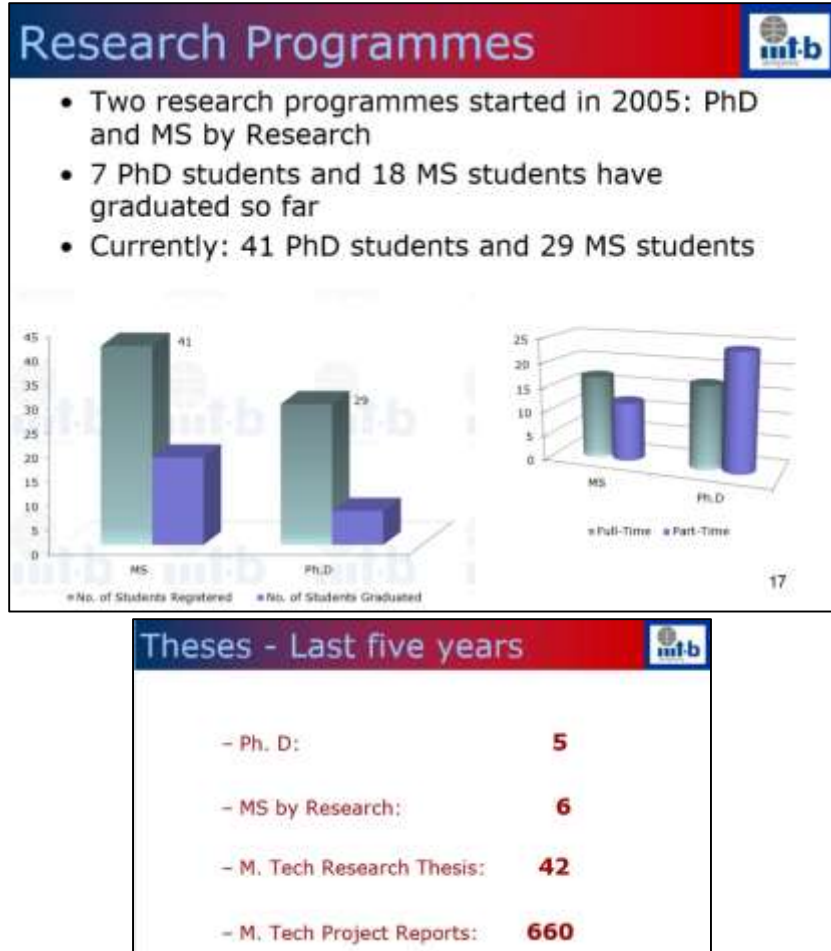


Fig. 4.13: IIIT-B: Research Programs (2015) [63]

### 4.2.3. Remarks

The detailed information on these topics is available in my books “Strategy to Develop World Class University” (Chapter 11: Need of Research University Involved in Teaching, pp. 265-292) [10]. In addition to this more detailed information is included in my book (Free Download) “Washington Accord & Multi-Objective Integrated Model for Developing WCU” [12].

### 4.2.4. Research and PhD Research Exchange Programme or Collaborative PhD Program

#### Factsheet

#### IIIT-H

- The institute announces a **Research Exchange Programme** to promote world-class research at the institute through research collaboration with several leading institutions world-wide. The programme is meant for the top students with an unstoppable yearning for research. Applicants should have excellent academic credentials and/or proven research orientation. In addition,

they should demonstrate a desire to make a difference through cutting-edge research work. [83]

- Highlights of the programme:
  - Students are initially admitted to the Ph.D. programme of the institute.
  - They can complete their Ph.D. at the institute while spending time with another research group at a partner institution.
  - They can, optionally, join the collaborating group for a Ph.D. from a partner institution by securing admission into such a programme. This is to be done after completing a Masters degree from the institute.
  - Students of the programme spend approximately equal time at the institute and the collaborative group in either case. The exact proportion and schedule will be decided by the requirements of the groups involved.
  - Financial support is guaranteed at both ends by the programme. [83]
- Current Status: The programme was started in 2003. We admitted 8 new students into it then. Two graduate students at CMU also joined the programme. Current status is:
  - Four students are currently working at the Carnegie Mellon University in the areas of Speech Recognition, Information Retrieval, Bioinformatics, etc.
  - One student spent the Fall 2003 semester at CMU. He teaches a course and conducts research at the institute now.
  - Two graduate students of CMU are spending six months at IIT starting Jan 2004. They teach courses on Robot Building and Wireless Communications at the institute.
  - One student spent the summer 2003 as an intern in the Vision group of Microsoft Research at Redmond.
  - One student has gone to University of Pennsylvania in Jan 2004 to work on Natural Language Processing [83]

#### IIT-D

- A strong focus on the PhD program – it has instituted various policies to build a strong PhD program e.g. higher stipend for PhD scholars, international and domestic travel support, high degree of freedom and respect, opportunities to work with International faculty through the collaborative program, etc. [71]
- IIT-Delhi has also started a collaborative PhD program focusing on explicit collaboration between IIT-Delhi and some globally renowned labs and universities. PhD scholars (except Sponsored candidates) have the option of joining this program during the course of their PhD. In addition to the features of the regular PhD program, other salient features of the collaborative PhD program are:
  - A student will be admitted to the PhD program at IIT-Delhi, and the degree will be granted by the same.
  - Interview for admission may be done jointly by IIT-Delhi and the partner group.
  - The main supervisor of the PhD scholar will be from IIT-Delhi; there may be a co-supervisor from the partner group.
  - After completing the course work at IIT-Delhi, the student may spend 3 months to 1 year with the co-supervisor at the partner group/institution for dissertation research. While the scholar is at the partner group/organization, the stipend will be paid as per their norms. [84]
- Overseas Research Fellowships: Another attractive feature is the option to apply for an ORF to spend up to six months abroad working on ongoing collaborative projects between IIT-D

faculty and foreign institutions/universities. These fellowships are awarded competitively. All PhD scholars (except Sponsored candidates) are eligible for ORF. IIIT-Delhi plans to provide about 20 ORFs annually for the first few years. [84]

### *Best Practices*

#### IIIT-H

- IIIT-H has made collaborative arrangements with research groups in several top-class universities in the world. These include:
  - Carnegie Mellon University
  - University of Illinois, Urbana-Champaign
  - University of Pennsylvania
  - University of California, Berkeley
  - Massachusetts Institute of Technology
  - University of Washington
  - University of New South Wales
  - Brown University [83]

#### IIIT-D

- For participating in research collaborations the current PhD students have visited
  - Hong Kong Polytechnic University
  - University of Alabama-Birmingham
  - University of Maryland-Baltimore County
  - West Virginia University. [84]

#### 4.2.4. Remarks

For fulfilling this objective, one must search appropriate international academic partner like ISB Hyderabad.

#### 4.2.5. Proactive Mechanisms for Smooth Implementation of Research Schemes / Projects

##### **Factsheet**

#### IIIT-D

- Advancing funds for sanctioned projects: The Institute provides advance up to Rs.5 Lakh as a support to the Faculties who are awarded with project so the works of the research can be continued until the funds are received from the external funding agencies.
- Providing seed money: The Institute provides Rs.5 Lakh as Initial Grant to the newly joined Faculty to purchase Equipments for research works and also Rs.2.5 Lakh as Professional Development
- Account over and above the Initiation Grant.
  - Simplification of procedures related to sanctions / purchases to be made by the investigators: The Faculties are delegated with financial power up to Rs.50 K which they can use to sanctions/ purchase of equipments of their own by following the GFR

rules and above that the purchase policy of the Institute is followed which is also a simple procedure. The approval can be taken over Emails which again smoothens the process.

- Autonomy to the principal investigator/coordinator for utilizing overhead charges: The overhead earned from the projects are transferred to the Professional Development Account of the Faculty /Researcher so that it can be used for research work at the discretion of the Individual Researcher/Faculty
- Timely release of grants: The Institute take maximum three days to process any claim and timely release of any grant.
- Timely auditing: Once in every year the Institute conduct its Statutory Audit and also conduct quarterly internal audit.
- Submission of utilization certificate to the funding authorities: The submission of Utilization certificates are done immediately to the Funding Agencies whenever it is required with top priority. Also IIITD has developed an **ERP tool for research**. [7]

#### 4.2.6. Adjunct Faculty and Research

##### *Best Practices: IIIT-D*

- All Adjunct faculty are evaluated by a standing committee, and each faculty has a designated research group or individual as a host. They are required to submit a report of the work.
- Faculty members are encouraged to promote this and encourage their **collaborators in industry and across the world** to become **adjunct faculty** at IIIT-Delhi. This has resulted in about 15 Adjunct Faculty, most eminent faculty and researchers in industry. [7]

#### 4.2.7. Post-Doc Research

##### **Factsheet**

##### IIIT-D

- One student has been awarded Post-Doctoral Fellowship in IIITD. [7]

#### 4.2.8. Financial Support for Research Publications and Patents

##### **Factsheet**

##### IIIT-D

- The Institute sponsors one foreign travel for the PhD Scholar to present paper beyond providing contingencies for research works.
- UG and MTech students are also provided partial support for presenting papers.
- Support for projects also comes from the support provided to faculty members. [7]

- The Institute always welcomes its Faculty to file for patents. It has also entered into an MOU with Intellectual Ventures through which any faculty member can patent an idea on a royalty basis. As of now one patent has been filed. [7]

#### 4.2.9. Research Budget

##### Factsheet

##### IIIT-D

On an average **5 crores** is earmarked for research. The Total Expenditure is Rs. 21 Crore (2014)

- Establishment (47%)-Rs.10 Crore
- Exp. on Research Projects (17%)-Rs.3.50 Crore
- Electricity and Power (11%)-Rs.2.27 Crore
- FMS (07%)-Rs.1.40 Crore
- Security (04%)-Rs.0.87 Crore
- Others (14%)-Rs.2.96 Crore [7]

#### 4.2.10. Research Moto

##### *Best Practices*

##### **2. Applications of Research**

##### **2.1 Research Applied to Industry and Society**

The goal of research at IIIT-H is not just to publish papers; but, more importantly, to impact industry and society by developing new technologies. Presence of research groups with critical mass and critical continuity makes it possible to take the suitable research at the Institute and convert it into field prototypes or technologies. This involves work on solving the, so called, last mile problems as well.

##### **2.2 Incubation and Entrepreneurship**

With institutional support for incubation being made available for budding entrepreneurs, several companies have been incubated based on the intellectual property (IP) developed at IIIT-H.

##### **2.3 Technology Achievements**

IIIT-H has developed several technologies with industrial and social impact. Many of them have been transferred to industry either to existing companies or to newly incubated companies. Some examples are given below.

Technology which allows images from flying aircraft to be combined (mosaiced) has been developed and transferred to a user agency. So also, the technology for text to speech on hand held devices (including cell phones) has been transferred to device manufacturers. Technology has also been developed to assist the doctors in rapid detection of retinal degradation based on processing of retinal images.

A major incubated company based on NLP and search technology developed at IIIT-H is providing search capability in 30 human languages, half of which are spoken in Europe and Arab speaking countries. Another one is based on speech synthesis technology, etc.

E-Sagu, a technology with social impact, allows farm advice to be given to farmers using IT. It was developed and demonstrated over 1000 farms running in several districts of AP for several years.

Machine translation technology developed by IIIT-H led consortium (and funded by Ministry of IT) has been deployed for use over the internet. This covers 4 language pairs providing automatic translation among Indian languages. 12 more pairs are expected to be released in stages [3].

Views of Dr. Rajeev Sangal, Director, IIIT-H about Application of Research [176]

### 4.3. Global Employability & Placement

#### *Best Practices*

International Institute of Information Technology-Hyderabad, or IIIT-H, was in news recently for charging IT companies planning to hire candidates from the campus. IT firms had to shell out 8 % of the total annual package received by the candidate. And despite a few exemptions of Indian firms, 28 top IT firms from across the globe not only paid the fee, but also hired 105 best candidates from the campus. This shows growing prominence of IIIT-H in India.

IIIT-H: Charging IT Companies for Campus Placements [198]

#### 4.3.1 Campus Placement

##### Factsheet

##### IIIT-A

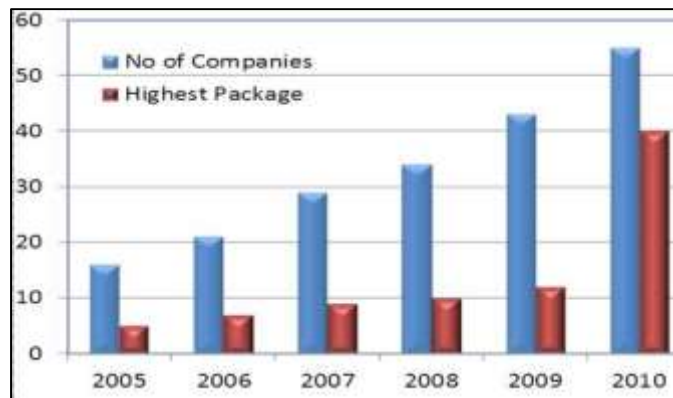


Fig. 4.14: IIIT-A: Placement details [67]

##### IIIT-H

- At the IIIT-H, however, it is the students who decide which company must come on Day One and on the subsequent days. No prizes for guessing who made it on day one. Microsoft, Google, FaceBook, LinkedIn and Amazon have topped the list of favorite choices for the students. [59]
  - IIIT-H: Below are program wise statistics in Placement 2014 (Average Salary)
  - B Tech (CSE) = Rs. 10.30 lac (Domestic);
  - B Tech (ECE) = Rs. 6.52 lac
  - Offshore Companies = \$ 150,000
  - MS by Research (CSE) = Rs. 9.32 lac
  - MS by Research (ECE) = Rs. 9.00 lac
  - M Tech (CSE) = Rs. 9.54 lac
  - M Tech (CSIS) = Rs. 7.72 lac
  - M Tech (VLSI) = Rs. 7.58 lac
  - M Tech (Bioinformatics) = Rs. 3.66 lac
  - M Tech (CASE) = Rs. 3.00 lac [23]



Fig. 4.15: IIIT-H Placement Ranked Ahead of IIT's [199]

IIIT-Kancheepuram

- About 20% of final year UG students have been admitted to the World's Best Universities [193]

IIIT-D

- IIIT-D has witnessed an excellent placement record since its first B.Tech batch graduated in 2012. Companies like Adobe, Citrix, Google, IBM Research, Informatica, Infosys Labs, KPMG, Microsoft, Opera Solutions, PayPal and TCS Research have visited our campus for recruitments. Our students have received an **average package of over Rs 8 lakh per annum**, with the highest Indian salary being Rs 16.5 lakh per annum. Three startups have also been started by the graduating students. About **10% of our students are going for higher studies** abroad – most with Fellowships. This is a remarkable figure, probably close to what the premier Institutions in the country achieve. [7]

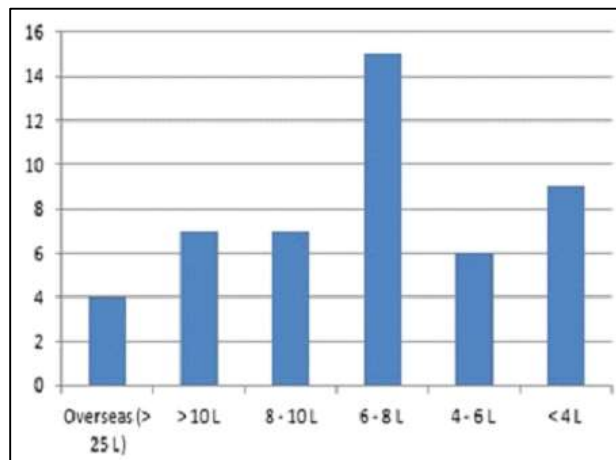


Fig. 4.16: IIIT D: Placements 2011-2012 Details [68]



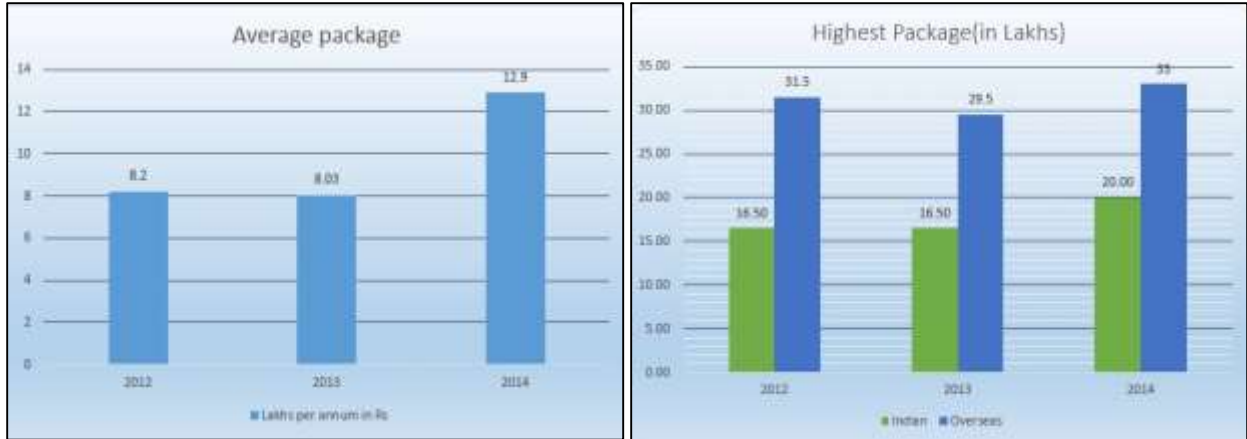


Fig. 4.17: IIIT-D: Average and Highest Package [69]

### 4.3.2. Global Employability

#### Factsheet

##### IIIT-B

- Our institute has tied up with Radix Learning, for a professional certification programme ‘Yogyata’ aiming to enhance employability for the IT sector. Yogyata is offered as a blended-learning programme including classroom lectures, web-based, multimedia-enabled, self-learning courseware, Actionable Learning modules, synchronous and asynchronous online mentoring and collaborative learning. [24]

##### IIIT-D

- There is a set of courses which focus on developing, besides deep understanding of concepts, solid hand-on skills for design and development. Such courses also specify in their learning objectives the skills the student is expected to build as a result of the course. Feedback of companies invited for placement of graduating students is used for modifying the curriculum and course delivery. [7]

##### IIIT-H



Fig. 4.18: Student of IIIT-H got 1.5 crore package [52]

### 4.3.3. Strategies of IIIT-D

The IIIT-D has adopted unique strategy for developing student’s skillset and enhancing placement.

*Best Practices*

**Benefits in the larger scheme of things**

The level of programming skills at IIIT Delhi has definitely gone up by the inclusion of competitive programming in their B.Tech and M.Tech curriculum. This had led to more students becoming well acquainted with major programming languages as well as language-agnostic skills like data structures and algorithms, problem solving strategies and debugging. By being exposed to so many contests, students have learned to write efficient and correct code in the first attempt. This prepares them well for a high level job in the industry, as companies look for exactly these type of candidates. Hence unsurprisingly the placements have also improved. Big players like Google, Microsoft, IBM, Amazon, Works Applications, Directi hire students through [campus placements](#). The initiative has been the key in providing a three-way benefit to the students, the Institute, and the recruiters.

Placement of IIIT-D enhanced by the inclusion of competitive programming in BTech and MTech courses [179]

*Best Practices*

**February 10, 2013**

**Desired Skills/Capabilities in Graduating CSE Students for a High-End Engineering Career**

jalote BTEch Program, Higher Education, IIIT-Delhi, Teaching 3 Comments

At IIIT-Delhi, objectives of BTech program are to develop graduates for careers in high-end engineering professions and research. (We want to emphasize on "high-end engineering careers" as the vast majority of software careers in India need moderate expertise in computer sciences – as demonstrated by the fact that many large software companies take engineers from any discipline and make them suitable for their work after a couple of month's training. As at IIIT-Delhi we have a rigorous program in CSE, we believe that it should be to prepare the students for more cutting-edge work in technology and product companies, research, and innovation and entrepreneurship.)

Blog of Dr. Pankaj Jalote, Director IIIT-D [180]

**4.3. Remarks**

Other IIITs need to follow the strategies of IIIT-H, IIIT-A and IIIT-D, which are based on "Coding Culture".

The detailed information on these topics is available in my books "Strategy to Develop World Class University" (Chapter 09: Question of Global Employability, pp. 204 -249) [10].

#### 4.4. Use of Technology

##### *Best Practices: IIIT-D*

- The institute has started a new system for MTech and PhD TAs attendance wherein their system's MAC Address is recorded and their attendance is tracked.
- The institute has also started attendance for BTech students using handheld face recognition device.
- Faculty uses backpack software to manage and plan their lecture schedules.
- Piazza is commonly used for online discussions in courses.
- Remote Access to Subscribed E-Resources: The center provides remote access to subscribed e-resources through VPN (Virtual Private Network). Now all IIITD Library users may access subscribed e-resources from outside campus as well.
- The Library and Information Center provides online book reservation service to all registered users.
- Few Kindle E-Book Readers are available for loan in the Library.
- Interlibrary Loan (ILL) and Document Delivery (DDS): IIITD Library offers Interlibrary Loan and Document Delivery Service through Developing Library Network (DELNET-network of more than 2000 libraries worldwide). Users may use this facility in case the required books, journal/articles etc. are not available at the IIITD Library and Information Center but are available at DELNET member's libraries.
- For some courses, IIITD class lectures are recorded and uploaded on website for students to access it on their convenience anytime. Also IIIT proposes to extend this facility of video lectures for all courses.
- IIITD faculty uses a software named Euphorous for checking malpractices and plagiarism
- ERP: IIITD provides Academic ERP to students and faculty. For students, ERP provides the facility to register for courses, add-drop courses and view grades. For faculty, it provides the facility to view the courses they are offering, view list of students enrolled in the courses and enter grades. The ERP portal can be accessed at <https://erp.iiitd.edu.in> [7]

#### 4.4. Remarks

The Indian Universities are not using technology for enhancing education standards like foreign universities. We are far behind. The scenario must change. On this topic, I have given detailed information in my book "Technology-Storms Redefining World Class Universities". [10]

#### 4.5. Students Life

##### Factsheet

IIIT-H

- In a majority of comparable institutions of higher education, the students lead an extremely passive existence. The interaction between college and student is almost completely one-way the lecture way. The IIIT-H is a major exception to this rule. This is one of the few institutes in the country where the students play a pivotal role in the day to day running of the institute. At IIIT-H, it is the students who take the initiative. Through the medium of elected students parliament, the students run every facet of their lives - their food arrangements, interaction of the student community with the administration of the university, student grievance redress, and coordination of active sports and cultural activities in the university. [85]
- In addition to this, the students are the chief participants in organizing various festivals and celebrations in the institute. It is a fact that every major event in the university has been organized, handled and coordinated entirely by the student body. The truly unique features of the student responsibility in the IIIT-H are demonstrated by the important part that students play in the academic functioning of the institute. With the active cooperation and encouragement of the faculty and the administration of the institute, the students work as Teaching Assistants, guiding and aiding the students in the batches that are junior to them. In addition, the students are placed almost completely in charge of the facilities that are offered by the college by way of Lab and Academic committees, supervised by the faculty. [85]

#### 4.5. Remarks

The technique like “Learning Beyond Classroom (LBC)” can enhance the student life. We need to focus on this issue. More detailed information is included in my book (Free Download) “Washington Accord & Multi-Objective Integrated Model for Developing WCU”. [12]

#### 4.6. Performance Audit

##### Factsheet

##### IIIT-D

- The university conduct performance audit of the various departments through the internal audit system.

#### 4.6. Remarks

The Indian Universities are not using the concepts like performance audit, productivity measurements and benchmarking effectively. On this topic, more detailed information is included in my book (Free Download) “Washington Accord & Multi-Objective Integrated Model for Developing WCU” (Chapter 12: Enhance Faculty and University Productivity for Better Educational Outcomes, pp. 203-228). [12]

## 4.7. Building of Brand Name

Building the Brand Name is not an easy task. For Brand Name, one should have all the required world class infrastructure, facilities, support services as well as faculty and then there should be a well-defined system to promote the Brand Name at National and International level. The IIIT-D has advertised the Senior Manager (Communications) to handle this job. They have clearly mentioned that “Senior Manager (Communications) will act as the sole custodian of IIIT-D’s Brand and lead IIIT-D’s media, PR, and brand initiatives”.

### *Best Practices*

#### **Advertisement for the Post of Senior Manager/ Manager (Communications) at IIIT Delhi**

Applications are invited for the position of Senior Manager/ Manager (Communication) at the Indraprastha Institute of Information Technology (IIIT) Delhi, a state University recently created by an Act of Delhi Govt. IIIT Delhi is a research-led institute, fashioned after IITs.

**Post Code: 01**

**Post: Senior Manager/ Manager (Communications)**

**Nature of Post:** Regular (initially a limited term contract will be given, which will be extended based on performance). **Part Time option is also available.**

#### **Job Description/ Role:**

- Design and develop communications campaigns around events, initiatives, and achievements of IIIT-D
- Leverage all sorts of media including but not limited to social media, internal announcements, fliers, mailers, information booklets, posters, press releases, and posts on IIIT-D website
  - Help with developing annual University reports, University and department level brochures, admissions brochures, program brochures, placement brochure, and event brochures.
- Set up IIIT-D’s Communications Office whose initiatives should facilitate and increase quality of admissions and placements and create interest in industry and overseas Universities for research collaborations with IIIT-D and better visibility for IIIT-D’s brand among various stakeholders.
- Represent IIIT-D at various professional, academic, and industry events and conferences in order to increase brand visibility of IIIT-D among participating audiences.
- Be the single point of contact (SPOC) for local, national, and international news media, of all formats – print, broadcast, and online
  - Assist in developing and editing newsletters and creating editorial guidelines for students published on-campus magazines.
  - As owner of IIIT-D’s website, set up guidelines for posting and editing content on the website.
- Regularly review and refine content on IIIT-D’s website to ensure that content is current, relevant, accurate, and in tune with the brand objectives of IIIT-D.
- Act as the sole custodian of IIIT-D’s Brand and lead IIIT-D’s media, PR, and brand initiatives.

Senior Manager (Communications) will act as Custodian of IIIT-D’s Brand Name [178]

#### 4.8. Most Complex Issue: Nurturing Value Based Innovation & Research Culture

It's most important aspect of any academic institute. The Rules, Regulations and Policies can't create the Human Value Based Innovation & Research Culture. The Processes decides the culture. The development of this culture is the most challenging task for Board of Governance and Vice Chancellor. On this issue, six wonderful talks of Dr. Rajeev Sangal Director IIIT-H are available at YouTube namely "Dr. Rajeev Sangal's talk in IIIT-H before leaving to IIT-BHU, Part-1 to 6".

[114]

##### *Best Practices*

The result of running Human Values program is that the atmosphere at IIIT-H has undergone a slow but sweeping change. This is being increasingly noticed by people and visitors at the Institute. It has developed deeper relationships among students, students and faculty, and a change in view towards culture, ragging, wastage of water and electricity, etc.

The program was also recognized by the President of India, in his address to the nation on the eve of independence day 2006. Since then it has grown from strength to strength.

Most importantly an atmosphere of empowerment and mutual support has grown at IIIT-H. This is seen as freedom with responsibility. At the student level, there is a feeling that IIIT-H is an extended family. This is the result of running the Human Values program and developing an institutional culture according to it.

Views of Dr. Rajeev Sangal, Director, IIIT-H [176]

##### **4.8. Remarks**

In this book, I have included one chapter for this vital topic. More detailed information on Innovation Culture is available in my book (free download) "Innovation - Growth Engine for Nation - Nice Buzzword but Often Misunderstood" (Chapter 4 and 5, pp. 175-244) [11]



## **Chapter 5: Issues, Which Need to be Addressed, Once the IIIT is Established**

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## 5.1. Business and Technology Innovation (Incubation) Center

Now a days, all most every premier institute in India is developing Business and Technology Innovation (Incubation) Center for nurturing innovation culture in the institute. Following Table shows the details.

### Factsheet

SN	Incubation Center	Institute	Number of Incubated Companies up to 2014
<b>IIT</b>			
1.	IIT-H Centre for Innovation& Entrepreneurship (CIE)	IIT Hyderabad	<b>8</b>
2.	Technology Innovation and Incubation Centre (TIIC)	ABV-IITM, Gwalior	6
3.	IIT-B Innovation Center	IIT Bangalore	5
4.	IIT-A Info Communication Incubation Centre (IIC)	IIT Allahabad	1
<b>IIT / IISc / NIT</b>			
5.	Centre for Innovation Incubation and Entrepreneurship (CIIE)	IIM Ahmedabad	<b>19</b>
6.	Nadathur S Raghavan Centre for Entrepreneurial Learning (NSRCEL)	IIM Bangalore	4
7.	Society for Innovation & Development (SID)	IISc Bangalore	5
8.	Society for Innovation and Entrepreneurship (SINE),	IIT Bombay	6
9.	Foundation for Innovation and Technology Transfer (FITT)	IIT Delhi	7
10.	IITGN Incubation Centre (IIC)	IIT Gandhinagar	2
11.	IITG-Technology Incubation Centre (IITG-TIC),	IIT Guwahati	4
12.	SIDBI Innovation and Incubation Center (SIIC)	IIT Kanpur	5
13.	Science Technology Entrepreneurship Park (STEP)	IIT Kharagpur	7
14.	Rural Technology and Business Incubator (RTBI)	IIT Madras	4
15.	Centre for Innovation and Business Incubation, (CIBI)	IIT Ropar	1
16.	Technology Business Incubator- NITC (TBI-NITC)	NIT Calicut	6
17.	NITK- Science and Technology Entrepreneurs' Park (NITK-STEP)	NIT Suratkal	4
18.	Centre for Entrepreneurship Development and Incubation (CEDI)	NIT Tiruchirappalli	4
<b>Other Universities</b>			
19.	KIIT Technology Business Incubator (KIIT-TBI)	KIIT Bhubaneshwar	<b>11</b>
20.	Amrita TBI Technology Business Incubator	Amrita University	4
21.	Technology Business Incubator	BITS Pilani	3
22.	Society for Technology Incubation & Development of Entrepreneurs (STIDE),	Central University of Rajasthan	2
23.	Dhirubhai Ambani Institute of Information and Communication Technology Centre for Entrepreneurship and Incubation (DCEI)	DA-IICT, Gandhinagar	5
<b>Total</b>			<b>123</b>

Table 5.1: As per Government records, in 2014, Number of Incubated Companies of different Incubation Centers of renowned institutes in India [62]

- IIT-H
  - IIT transfers its technology, skills, methods of manufacturing and knowledge to industries to ensure that scientific and technological developments are accessible to a

- wider range of users who can then further develop and exploit the technology into new products, processes, applications, materials or services. [29]
- Prashanth Meka, VP, Incubation Services & Industry Outreach at IIIT-H said that “One of our foremost criteria in incubating startups is to see how technology-driven they are. The ideal startups for our centre are those that are commercializing research. Having said that, we also look at other startups which deliver significant value.” [64]
  - Vasudeva Varma is Professor and Dean (Research & Development) at IIIT Hyderabad, India. He is also the CEO of IIIT Hyderabad Foundation, which manages IIIT-H’s IP and technology transfers. Our incubator CIE (**Centre of Innovation and Entrepreneurship**) is part of the IIIT-H Foundation which was created in **2008** to aid the International Institute of Information Technology, Hyderabad (IIIT-H), in managing its intellectual property portfolio, identify collaborative opportunities with industry, and above all to support entrepreneurial activity in Hyderabad by creating a startup hub to really push forward the city’s ambition to be a startup powerhouse. IIIT-H, our host institute, played a pivotal role in operationalizing this incubator. Department of Science and Technology recognized our vision and gave its support through the TBI scheme in 2012. [40]

*Best Practices: T-Hub at IIIT-H*

- The Telangana government began work on **T-Hub**, which promises to be **India's biggest incubation facility**. Telangana Information Technology Minister K Tarakarama Rao laid the foundation stone for the facility at the IIIT-H. Expected to be operational by June 2015, it would be the largest centre for start-up and entrepreneurship activities in the country. **The T-Hub is being set up in collaboration with IIIT Hyderabad, the Indian School of Business (ISB) and the NALSAR University of Law.** While NALSAR would help in intellectual property and related areas, ISB and IIIT would provide business mentoring and technology mentoring respectively. **Phase I coming up at IIIT at a cost of Rs.35 crore will be spread over 60,000 square feet and can accommodate 400 start-ups by 2017....** The hub will incubate **1,000 start-ups by 2020**. It is expected to generate annual employment for 3,000 people by 2017 and 10,000 by 2020. The minister said the fund corpus of T-Hub would be Rs.300 crore by 2017 and would be doubled to Rs.600 crore in three years. He was confident that the T-Hub would make Hyderabad the **start-up capital of India**. [42] [43]

*Best Practices*

**BusinessLine** THE HINDU  
Sat, January 31 2015 Pg No. 17

## T-Hub directors appointed

K V Kurmanath

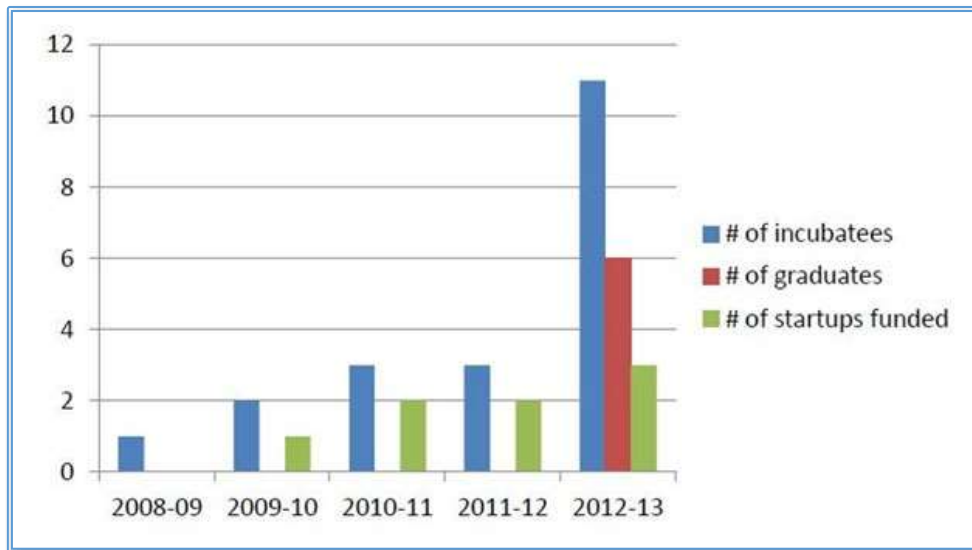
Heads of IIIT-Hyderabad, University of Law, Nalsar, ISB and IT Secretary on board

Hyderabad, Jan 30:

IIIT-Hyderabad Director P J Narayanan, NALSAR University of Law Vice-Chancellor Faizan Mustafa, Indian School of Business Director Ajit Ragnekar and Telangana IT Secretary Harpreet Singh have been appointed as Directors of the T-Hub.

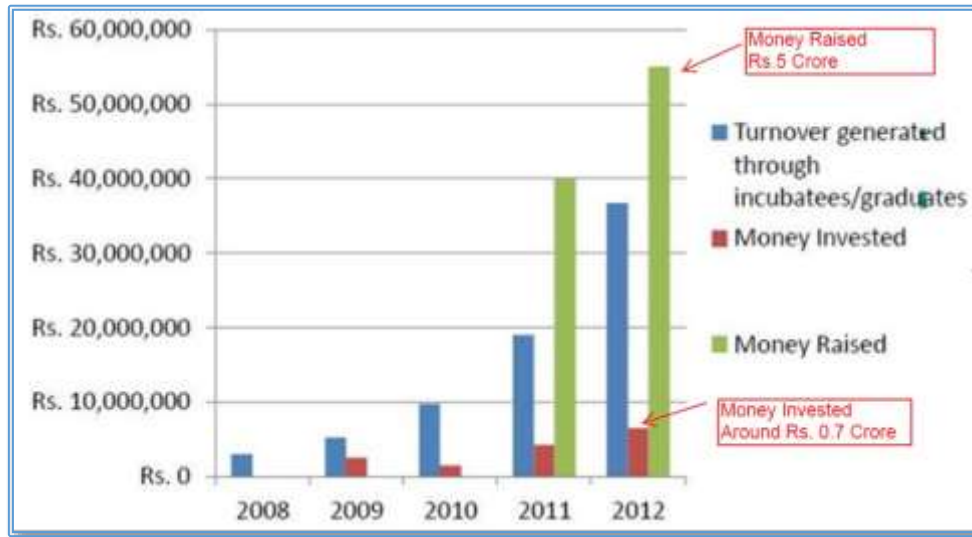
T-Hub Directors appointed [72]

*Best Practices*



IIIT-H: Year wise Companies Incubated, Student Graduated and Startup Funded [64]

*Best Practices*




IIIT-H: Turnover generated through incubatees, Money Invested and Money Raised [64]

- IIIT-D
  - It is established in 2008 and started Incubation Center in 2015 (after 8 years). In spite of this, IIIT-D could grab 7th position in Top T-School Ranking. [25]
  - The institute remains committed to developing technologies that can be transferred for commercial exploitation or use by other organizations. Last year alone over two dozen tools and technologies were developed which were transferred to 15 organizations /NGO's/ Community. Three start-ups based on technologies and tools developed at IIIT-Delhi have been started – one in the area of energy management, one in education, and one in social networking. [7]
- IIIT Gwalior
  - Technology Innovation and Incubation Centre (TIIC): This centre has incubated following companies under TIDE Scheme, namely: Decent Solutions, Spartan Elite Consulting, Pumpkin Pot.com, Mech-Mocha Game Studios, Head Gesture Controlled Wheel Chair for Disabled and Companion Device for Fostering Classroom Interactivity [62]
- IIIT-B
  - Hosted in Bangalore's Electronics City, the IIIT-B Innovation Centre is a hub for ICT4D entrepreneurship, innovation and research. Incorporated in the year 2009 as a Section 25 company with support from the Ministry of Information Technology (Government of India). [54]

*Best Practices*

**Social Impact**



- Incubated
  - **Tutor Vista** (2005) - 1,000+ jobs / Rs 150 Crores annual revenue [**Sold to Pearson for 1000 Crores**]
  - **Backend Bangalore** (2004) - 100 jobs / Rs 10 Crores annual revenue
  - **QSO Technologies** (2006) - 100 jobs / Rs 20 Crores annual revenue
  - **TLL** (2007) - 20 jobs / Rs 5 Crores revenue
- Incubating 6 companies currently.
- Closely working with NEN (National Entrepreneurship Network) and IIMA (Indian Institute of Management – Ahmedabad) in entrepreneurial education

42

IIIT-B: Incubation Center [63]

**5.1. Remarks**

The Incubation centers of IIIT-B, IIITM-Gwalior and IIIT-H had done a good job. The Table 4.1 shows that, the Incubation Centers of 23 top most premier institutes of India could produce only 123 incubated Startup Companies. That is just 5 startup companies per Incubation Center. It is not very impressive figure. This shows the state of affair of Innovation Activities in Indian Education Institutes.

The main job of Higher Education Institute is to develop **innovative brains** for the industry. It is expected that these innovative brains will innovate, when they join industry. It is better to focus on developing **Innovative Competencies** of the students. South Korea, Japan and Taiwan had followed this technique for becoming developed nation.

More detailed information is available in my book “Strategy to Develop World Class University” (Chapter 9 Section 11, pp. 245-249). [10]

In addition to this, more detailed information is available in my book (free download) “Innovation - Growth Engine for Nation - Nice Buzzword but Often Misunderstood” (Chapter 17, 18, 19, pp. 501-552) [11]

## 5.2. Alumni Involvement

### Factsheet

#### IIIT-A

- An alumni of IIIT-A has decided to return to the campus and share secret ‘mantras’ of success with the current crop of budding engineers. [91]
- Visit Alumni website of IIIT-A. [94]
- The alumni are deeply involved and concerned for their Alma matters. The Alumni Association of IIIT-A has filed a PIL (Public Interest Litigation) in the Allahabad High Court seeking information regarding necessary actions to be taken based on the Enquiry Committee's Report that was submitted to Board of Governors (BOG) in December 2011. [95] [96]

#### IIIT-H

- Visit the website of IIIT-H alumni. [92] [93]
- The **alumni fund** was set up in 2006 as a modality for alumni to have a direct hand in helping the Institute grow. In this round of fund raising, alumni can choose to contribute in the following categories:
  - Infrastructure - Strong infrastructure (classrooms, labs, hostels, sports facilities, etc) is the hallmark of any good institution which is why it forms an important parameter used in all popular rankings of educational institutions.
  - Tuition support – This is intended to provide access to meritorious students to an education in IIIT-H despite having inadequate financial resources. Donors will be given the right to choose a scholarship named as they please provided the donation is sufficient to support the complete studies of a student.
  - Institute corpus - This is a perpetual endowment to the institute. The donation to this category will be used to invest and only the interest earned will be used for top priorities of the institute. This ensures that the institute benefits from the donation on a recurring basis, rather than a one-time benefit. Endowments are an effective way to invest in better research, better education and better people without cascading the costs to students. [93]
- **Innovative Ideas:** Batch wise contributions can also be made to name different spaces in the Institute. [93]

#### IIIT-D

- Read the article of Dr. Pankaj Jalote, Director IIIT-D namely, “Role of Alumni in for an Institute”. [97]

### 5.2. Remarks

The detailed information about “Alumni Involvement” is available in my book “Strategy to Develop World Class University” (Especially Chapter 13: Alumni Decides Fate & Way to Billions of \$ Endowment, pp. 312-354). [10]

### 5.3. Accreditation and Government Recognitions

#### Factsheet

##### IIIT-B

- IIIT-Bangalore is highly rated. According to Tandon Committee constituted by MHRD Report of March 2009, IIIT-B has the highest ranking among all IIIT's and has the same score as IISc (the first Deemed University). [53]

##### IIIT-B, IIIT-D, IIIT-H, IIIT-Gwalior

- National Assessment and Accreditation Council (NAAC) has accredited the Institute with the Highest Grade of A. [53] [222] [165]

### 5.4. Attracting Global Talent (International Students)

#### Factsheet

##### IIIT-B

This institute admits foreign students. IIIT-B has had successful student exchange programs with:

- Malmo University in Sweden,
- University of Kaiserslautern Germany
- Hof University in Germany
- University of Nottingham in UK

#### *Best Practices*

Students Cell, IIITB has had international students visiting IIITB and vice versa. The record of visits made by students from IIITB to universities abroad as well as from foreign universities to IIITB is given below:

Year	Number of students visiting	
	From IIITB to universities abroad	From foreign universities to IIITB
2008	10	7
2009	2	4
2010	4	2
2011	10	4
2012	10	7

#### IIIT-B: Students classification

##### IIIT-D

Students	UG	PG	PhD
From the state where university is located	*M *F 322+131	*M*F 37+53	*M*F 38+28
From other states of India	57 +22	53+50	

Table 5.2: IIIT-D: Students classification

## IIIT-H

This institute is admitting international students the detailed fee structure is available at their website. [55]

### 5.4. Remarks

The Global Talent is must for developing World Class Research University and to attract research funds from the industry.

On this topic, the detailed information is available in my book “Strategy to Develop World Class University” (Chapter 7: International Students: \$100 Billion Market, pp. 138-185). [10]

## 5.5. Overall Internationalization

Like other World Class Universities, the concept of internationalization of higher education is not rooted in India. The internationalization includes

- International Students
- International Faculty
- Worldwide Curriculum
- Alumni Centers across the globe
- Worldwide Research Center
- Worldwide Extracurricular Activities
- Study Abroad Programs
- International Campuses etc.

We need to consider this issue.

### 5.5. Remarks

The details are available in my book “Strategy to Develop World Class University” (Especially Chapter 17: International Dimensions of WCU, pp. 390-398). [10]

## 5.6. Benchmarking

To remain in the competition, every IIIT must adopt the benchmarking strategies, academic auditing, international accreditations and productivity measurements. The IIIT Act 2014 stated that every year the institute must publish the annual reports on the website of the institute. Very few IIITs are following this practice.



<p><b>39. (1)</b> The annual report of each Institute shall be prepared under the direction of the Board, which shall include, among other matters, the steps taken by the Institute towards the fulfilment of its objects and an outcome based assessment of the research being undertaken in such Institute, and be submitted to the Board on or before such date as may be specified and the Board shall consider the report in its annual meeting.</p>	Annual report of each Institute.
<p><b>(2)</b> The annual report on its approval by the Board shall be published on the website of the Institute.</p>	
<p><b>(3)</b> The annual report of each Institute shall be submitted to the Central Government who shall, as soon as may be, cause the same to be laid before both Houses of Parliament.</p>	

Fig. 5.1: IIIT Act 2014: Annual Report helps a lot for Benchmarking of the institutes

Year before last year, one of the IIIT couldn't stand in the Times World University Ranking just because of insufficient data on website.

## **Chapter 6: Most Important Issues: Culture of Innovation**

## 6.1. Innovation: Role of University

The Main Job of University or Higher Education Institute is to Produce Highly Employable **Innovative Brains**. The other role of the University are Research, Innovation, Circulation of Knowledge and Technology Transfer. Mostly the innovation happens at the point of production or manufacturing, which is not the job of University. Thus it is expected that for Innovation the University should play a supportive role to the industry. The **Innovation Management** is the costly process and it is not expected that the University should participate in this process.

Building Culture of Innovation for **producing Innovation** (Product, Process, System, Business Model) and for **developing Innovative Brains** are altogether different processes. To understand these two “culture building processes” one should have clear idea of role of Industry and University in innovation process.

“...because the public sector **misunderstands the difference between Research and Innovation**, the **boundaries between the role of a University and the private sector get fuzzy.**” [129]

“In the 21st century world-class universities will need to be much more focused on innovation, rather than on stability and standardization... Those who want to **create and maintain a world class university will need to develop a culture of innovation in their organizations...** Universities that are **able to build a culture of innovation are more likely to develop and maintain world class status** than those institutions that use the past as a guide to the future...” William G. Tierney, Professor. Co-Director, University of Southern California, USA [130]

Innovation requires nothing short of a **paradigm shift in the established ways of thinking about university education**. It calls for Redefinition of knowledge and its purpose, Reorganization of branches of knowledge, Rethinking the existing practices of teaching-learning and research and Recognition of the limits of what we know [131-132]

Universities can not only be part of the new regional innovation ecosystems; they have the full capacity to evolve as a **kind of ‘cement’** to reinforce such ecosystems. [133]

### 6.1. Remarks

For details please refer “Chapter 6: Innovation: Role of University” of my book “Innovation - Growth Engine for Nation - Nice Buzzword but Often Misunderstood”. This book is available for FREE download at <http://www.dharaskar.com/innovation-book-6.html>

## 6.2. Remember That “They Are Different, Don’t be Confused”

- Innovative Teaching methods and Teach techniques to Innovate
- Innovative curriculum and Curriculum to develop innovative workforce
- Innovative Pedagogy and Pedagogy for developing innovative manpower

- Innovative Research Programs and Use of research to bring innovation
- Research collaboration and Collaboration for Innovation
- Entrepreneurship and Entrepreneurship to develop Innovation in company
- Teaching Creativity and Teaching Innovation
- Teaching Research Techniques and Teaching Innovation Techniques
- Building Research Culture and Building Innovation Culture
- National Innovation Ecosystem and University Innovation Ecosystem
- Investment for R&D and Investment for Accelerating Innovation
- Research and Patents vs. Innovation and Patents
- Discovery / Invention and Innovation
- Research Mindset and Innovative Mindset

### 5.2. Remarks

For details please refer “**Chapter 1: Introduction to Concept of Innovation**” of my book “**Innovation - Growth Engine for Nation - Nice Buzzword but Often Misunderstood**”. This book is available for FREE download at <http://www.dharaskar.com/innovation-book-6.html>

### 6.3. Research, Product Development and Innovation are Radically Different Disciplines

Bill George, Professor, Harvard Business School stated that “Research and Product Development Are Not Innovation. In this era, many companies are investing heavily in research and product development, yet they fail to create innovative products and ideas. U.S. pharmaceutical companies like Pfizer and software companies like Microsoft illustrate that **heavy spending on research and product development doesn't necessarily yield innovations**. In contrast, the breakthrough ideas that created Genentech, Google, and FaceBook illustrate what can be done with **limited budgets**. **It is important to recognize that research, product development, and innovation are radically different disciplines**. Research is based on well-established scientific principles. At its best, research produces scientific breakthroughs that extend knowledge like Schottky's invention of the transistor and Novartis's breakthrough drug Gleevec for treating chronic myelogenous leukemia. **Product development**, on the other hand, follows established engineering principles to improve existing products. **Innovations result from** unique ways of looking at problems that produce original solutions. Another approach to innovation takes existing ideas and combines them into unique solutions. In retrospect, the outcome may seem obvious, yet is highly original. Apple's iPad is an example, combining Apple's iPod, iPhone, and iMac to create a breakthrough product.” [120]

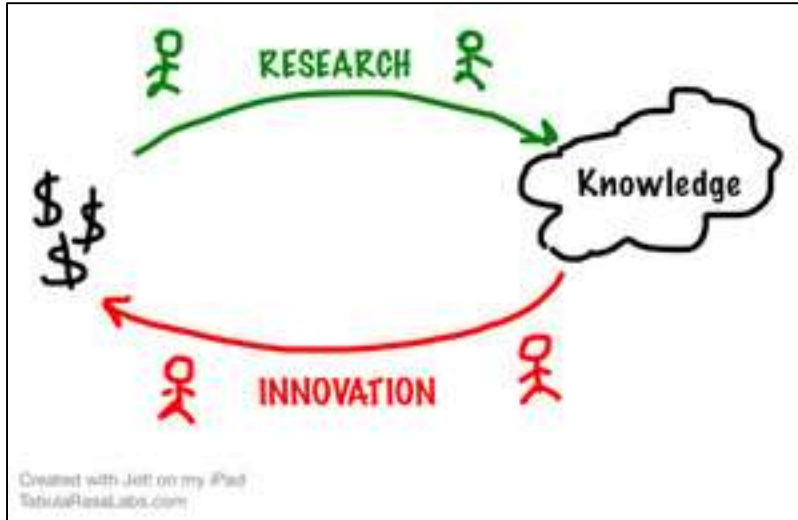


Fig. 6.1: Research & Innovation: Two different worlds [121]

### 6.3. Remarks

For details please refer “**Chapter 1: Introduction to Concept of Innovation**”, “**Chapter 2: Innovation Ecosystem, Culture, Clusters and Networks**” and “**Chapter 5: Innovation Culture Eats R&D for Breakfast**” of my book “**Innovation - Growth Engine for Nation - Nice Buzzword but Often Misunderstood**”. This book is available for FREE download at <http://www.dharaskar.com/innovation-book-6.html>

### 6.4. Innovation Pedagogy: Training to Enhance Innovation Competencies

As such, what training in innovation provides is not so much a guarantee of becoming the next great innovator, but a guarantee of **increasing the odds of innovation**. [122]

“One cannot depend or accept only the idea that **innovative concepts come exclusively from ‘gifted’ people**, or that **innovation is an intellectual ‘accident’ of inspiration** and not the result of hard and focused work. ... **Competencies that increase the chances of innovation can now be learned.**” [123]

For organizations, **innovation is the key for competitiveness**, being people in the core of the innovation process. Therefore **training people to develop innovation** competencies is a need for all companies that want to be competitive. All these considerations **became a great challenge** for the global educational system and of course for the University, that must to promote creativity and innovation through programs, courses and training. [124]

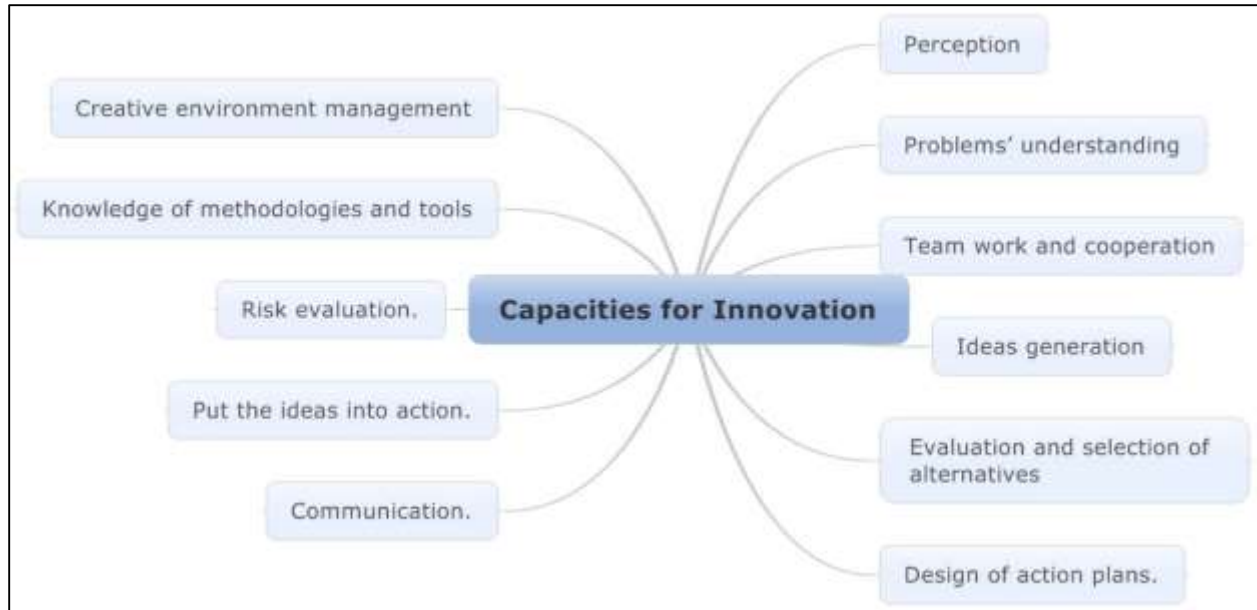


Fig. 6.2: Innovation Competencies [124]

Few Creativity & Innovation Competencies are:

- Accessing and analyzing information
- Active Learning
- Agility and Adaptability
- Collaboration across networks and leading by influence
- Community Building
- Creative thinking
- Curiosity and imagination
- Design and conduct high-performance idea-generation/problem-solving sessions
- Develop critical thinking
- Discovering your Creativity and Innovation styles
- Effective participation
- Effective written and oral communication
- Encourage Problem Solving
- How to enroll others in your ideas
- How to generate, analyze, evaluate and implement ideas
- Independent enquiry
- Initiative and Entrepreneurialism
- Lead creatively
- Manage Creativity and Innovation processes
- Reflective learning
- Risk-Taking
- Self-management
- Strategic decision making skills
- Team work

- The ability to ask the right questions Become an opportunity-finder [125-127]

## 6.5. Innovation Competencies: Examples of World Renowned Universities

The details of establishing of innovation culture through training for developing innovation competencies can be found at following university websites.

- Central Michigan University USA: Innovation Competency Model
- Universities of Finland, Spain, Germany and Belgium: Innovation Competency Development Project & Innovation Pedagogy
- University of Southampton, UK: Graduate Attributes & Passport
- Middle East Technical University, Turkey
- Griffith University Australia: Graduate Attributes Creativity and Innovation Toolkit
- Brigham Young University USA: Teaching Creativity and Innovation

### 6.4. & 6.5. Remarks

For details please refer “**Chapter 7: Innovation Pedagogy: Training to Enhance Innovation Competencies**” of my book “**Innovation - Growth Engine for Nation - Nice Buzzword but Often Misunderstood**”. This book is available for FREE download at <http://www.dharaskar.com/innovation-book-6.html>

## 6.6. Various Aspects of Culture of Innovation

While developing the culture of innovation numerous factors need to be considered. The following diagram shows the seven dimensions of culture of innovation.



Fig. 6.3: Seven dimensions of culture for innovation [128]

The various factors, which need to consider, for developing culture of innovation are as follows.

1. Must Have Patience
2. Change Management: A Challenging Task
3. Need Lots of Extra Efforts
4. Bureaucracy Kills Innovation
5. Innovative Companies Provide Forums for Employees to Pursue Opportunities
6. 'Resource' of Authority and Autonomy
7. Broad-based Knowledge
8. Goals: What but Not How
9. Appropriate Tools for Innovation
10. Relationship Dimension
11. Fuel Passion, Articulate Vision, Cultivate Engagement & Enthusiasm, Inspire & Enable Motivation
12. Promote Reverse Mentoring
13. Optimize Decision-Making
14. Invest in People and Processes
15. Employ Technology as an Enabler
16. Use New Technology
17. Reward Risk, Celebrate & Incentivize Ideas
18. Reward Contribution



19. Teach Creative Thinking & Doing, Mockup Crazy Ideas
20. Create the Conditions for Teamwork & Involved Everyone
21. Maximize Diversity
22. Be Open, Have Wide Exposure, Foster Collaboration & Networking
23. Promoting Regional Collaboration
24. Fostering Cross-Sectoral Partnerships & Academic Partnerships
25. Communicate
26. Experiment and Learn
27. Fail Forward, Embrace failure & Failure as a Learning Opportunity
28. Manage Accountability
29. The Change Heard Round the World
30. Hunt for Talents, Bring the Right People, Creative Mind, Find the People with Ideas & Develop Community of Innovators
31. Form an Innovation Management Team
32. Tap the Creativity of “Lead Users” & Find Leaders and Influencers
33. Tap the Potential of Own Nation
34. Challenge People to Take Risks, Make them Comfortable for Taking Risks, Encourage Courage & Develop Fearlessness
35. Teach Your Employee “Innovation is not Optional”
36. Promote Creative Time
37. Ensure that the Fiscal and Temporal Resources Necessary to Accomplish Tasks are Available
38. Time Deadlines and Creativity
39. Measure and be Accountable
40. Think Small
41. Analyze the Innovative Ideas
42. Democratize innovation
43. Change Agents are Needed
44. Encourage Volume, Speed, and Iteration
45. Open up the Innovation Process & Provide a Full Range of Support for Innovators
46. Sometimes Tighten the Purse Strings
47. Delegate the Firefighting
48. Establish Credibility
49. Accept and Seek Criticism
50. Look Around
51. Customer as Innovation Partner
52. Telling Stories of Famous Failures that Subsequently Created Breakthrough Products
53. Pursuit of Improvement
54. Necessity Is Not the Only Mother of Invention
55. Innovation Can Be Incremental
56. Multiple Career Path
57. Look Forward
58. Define the Kind of Innovation that Drives Growth and Helps Meet Strategic Objectives
59. Add Innovation to the Formal Agenda at Regular Leadership Meetings
60. Set Performance Metrics and Targets for Innovation
61. Designing Innovation Networks

62. Imagination and Communication
63. Have a Vision for Change
64. Think like a Venture Capitalist
65. Guiding strategic Collaborations
66. Crossing Boundaries and Integrating Diverse People and Activities in a Team
67. Change Your Perspective
68. Challenge Your Assumptions
69. Stop Jumping To Solutions
70. Important Power Thinking Skills for Innovative Leadership
71. Multi-Screen Thinking vs. Spot Thinking
72. Passion for Innovation
73. A Long-Term Perspective
74. Deep Engagement with the Innovators
75. Willingness to Tolerate Mavericks and Defend Them from Middle Management
76. Management is the Problem
77. Have a Mission That Matters
78. Required Different Leadership Skills in Open Innovation
79. Think Big but Start Small
80. Look for Ideas Everywhere
81. Share Everything
82. Be a Platform and Have Openness
83. Create a Learning Culture
84. Be Sensitive to External Changes
85. Train Employees on Creating and Selling Innovation
86. Develop Healthy Competition
87. Build A Team That Can Both Identify Gaps In The Market And Markets In The Gap!
88. Find Team Members Who Tell Great Stories!
89. Hire People with Different Perspectives
90. Encourages Independent Thinking
91. Create a Safe Space for Innovation
92. Toxic Questions: Guaranteed To Kill Innovation
93. Open Innovation and Partnership Programs
94. Talent Management Process
95. Globalization and Innovation Demands New Type of Leaders
96. Few More Ways
97. Running Innovative Company and Innovation Ecosystem
98. Innovation Leaders

## 6.6. Remarks

For details please refer “**Chapter 4: Building Culture of Innovation in any Organization to Produce Innovation**” of my book “**Innovation - Growth Engine for Nation - Nice Buzzword but Often Misunderstood**”. This book is available for FREE download at <http://www.dharaskar.com/innovation-book-6.html>

### 6.7. Ways to Introduce Innovation in University System

The following diagram shows the ways to introduce innovation in University system.

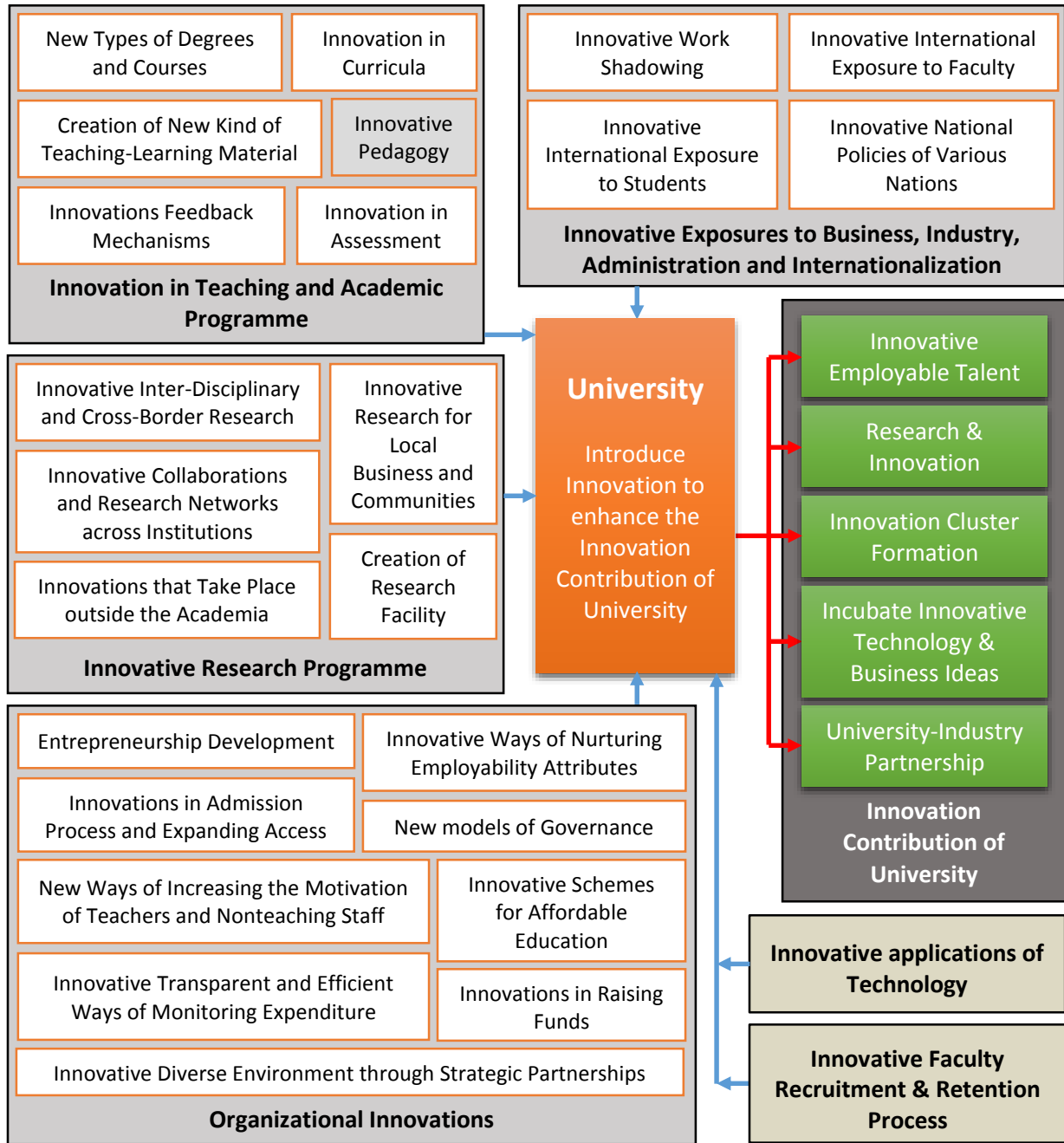


Fig. 6.4: Ways to Introduce Innovation in University System to enhance Innovation-Contribution of University

### **6.7. Remarks**

For details please refer “Chapter 8: Ways to Introduce Innovation in University System” of my book “Innovation - Growth Engine for Nation - Nice Buzzword but Often Misunderstood”. This book is available for FREE download at <http://www.dharaskar.com/innovation-book-6.html>



## **Chapter 7: Case Study: IIT-D**

### 7.1. Initial Two Years (2008-9, 2009-10)

The important steps in building the IIIT Research University are:

- **Build Strong Research Groups:** Being research-led, R&D is the main focus area for the Institute. To enhance R&D, the Institute has been following the approach of building strong Research groups in different areas. That is, when the Institute enters an area, it plans to recruit multiple faculty members in that area to build a strong group. The goal is that any research group started in the Institute should aim to become within the top three groups in the country within three years. As research groups gain strength, they are expected to start specialized MTech programs, while continuing the PhD program. [116]
- **Attract Good Faculty:** The Institute has shown that it can attract good faculty, which in turn attract good PhD scholars – this also the Institute has demonstrated. [116]
- **Collaborative Programs:** Rapidly expand the PhD (Computer Science) program, and enhance our collaborative PhD program further. [116]

The IIIT-D has been started in 2008. The facts mentioned in Annual Report 2009-10 are as follows. It shows the gradual development of IIIT-D without compromising quality aspects.

B Tech (IT)					
Year	Avg XII %	Admitted	Graduated	Left	Total
2008-09	82.5	60	0	5	55
2009-10	82.7	65	0	4	61
2010-11	85.1	97	0	9	88

Table 7.1: B.Tech. Intake Capacity [116]

Year	Admitted	PhD (CS)			M Tech			
		Graduated	Left	Total	Admitted	Graduated	Left	Total
2009-10	8	0	1	7	0	0		0
2010-11	9	0	0	16	23	3		20

Table 7.2: Number of PhD students registered [116]

Student Achievements		
-	Number of papers authored by Phd students:	3
-	Number of papers authored by B Tech students:	2
-	Number of programs organized by ACM Students Chapter:	3

Fig. 7.1: Student’s Achievements [116]

INTERNSHIPS				
Year	In IIIT-Delhi	In India	Abroad	Total Internship
2010-2011	48	8	Nil	56

Table 7.3: Internship Program details [116]

FACULTY AND STAFF ADDING / LEAVING			
MANPOWER			
FACULTY			
Year	Added	Left	Total
08-09	Prof. Pankaj Jalote Dr. Veena Bansal Dr. Astrid Kiehn Dr. Mayank Vatsa Dr. Richa Singh	Nil	05
09-10	Dr. Vikram Goyal Dr. Ponnurangam K. Dr. Ashish Sureka Dr. Anirban Mondal Dr. Pushpendra Dr. Vinayak S. Naik Dr. Amarjeet Singh Dr. Debajyoti Bera Dr. Gaurav Gupta Dr. Somitra	Nil	10
10-11	Dr. Saket Dr. Shishir Dr. Subhasis	Nil	03
<b>Total</b>			<b>18</b>

Table 7.4: Year wise Faculty appointments [116]

Research and Development						
Year	No of Papers	No of conferences attended	No of books	Total no of citations	No of seminars given outside	Awards
2008-09	--	--	--	--	--	--
2009-10	11	5	--	--	--	6
2010-11	18	5	--	--	--	1

Research and Development					
Year	No of Technologies	No of R&D projects	Value of R&D projects (Rs. in lacs)	No of Consultancy Projects	Value of Consultancy Projects (Rs. in lacs)
2008-09	--	--	29.89	1	3.60
2009-10	2	14	519.43	2	6.33



PROGRAMS ORGANIZED THROUGH ACM			
Sl. No.	Type of activity	Brief Description	Date of activity
1	Outreach	Workshop on Cloud Computing by Dr. Chandu Thekkath from Microsoft Research	Jan 01, 2010
2	Workshop	An introductory Mobile Computing Workshop was conducted by the PhD students to give a brief knowledge of mobile application development on various platforms such as Symbian and Android	Mar 27, 2010
3	Workshop	Workshop gave an overview of open source telemedicine platform called Sana, workshop provided a deep technical detail of technologies involved in Sana, and will also give users hand-on experience on developing modules in Sana. This was conducted by RJ Ryan from MIT.	July 05, 2010

Table 7.5: R&D activities [116]

BOOKS		
Year	2008-09	2009-10
Added	0	142
Gone	0	0
Total	0	142

Table 7.6: Books [116]

LIST OF PROJECTS				
Sl. No.	Project Title	Granting Agency	Funding Amount	Principal Investigator
1	Research and Design of face Recognition Algorithms for face Images with Variations in pose, Illumination and Expression	Dept of Information Technology	INR 87,50,000	Mayank Vatsa Richa Singh
2	Analyzing quality of fingerprint images for Indian population	UIDAI	INR 12,50,000	Mayank Vatsa Richa Singh
3	Analyzing online content using data mining techniques to counter Cyber Crime	Dept of Information Technology	INR 81,50,000	PK / Ashish Sureka
4	Research in location-based services in India	Nokia Research Centre, Palo Alto USA	INR 545,975	Vinayak
5	Set up a Nokia Lab at IISc and IIIT-D	Nokia Research Centre	Euro 40,000 (INR 27,54,988)	Vinayak
6	Work on the problems localization using mobile phones	Nokia Research Centre, Palo Alto USA	USD 50,000 (INR 23,11,249)	Vinayak
7	Wireless Structural Health Monitoring of Impact Damage and Vibration in Spacecraft Structures	ISRO-IISc Space Technology Cell	INR 10,00,000	Vinayak
8	Process Review and Re-engineering	IFFCO Kisan Sanchar Limited	INR 450,000	Vinayak / Amarjeet/ Pushpendra
9	Privacy in India	Int'l Dev Research Centre, Canada & Privacy Int'l, UK	INR 17,94,246	Ponnurangam Kumaraguru
10	Video analysis for law enforcement and intelligence agencies	Palladian, Intelligence & Security Informatics	INR 13,00,000	Ponnurangam Kumaraguru
11	Obtained travel and participation grant to attend Terrorism & New Media: Building a Research Network in Dublin City University		INR 60,510	Ponnurangam Kumaraguru
12	Review of their existing system, recommendations for technology advancements for scaling up the operations, developing the software requirements for efficiently managing their operations and prototyping and piloting a new technology for exploring new services in this domain.	IFFCO Kisan Sanchar Limited	INR 490,000	Pushpendra Singh
13	Reengineering existing applications for the Multicore servers	Dept of Science and Technology	INR 31,76,000	Pankaj Jalote
14	Statistical Evaluation and Recognition of Simultaneous Latent Fingerprint Impressions	Dept of Science & Technology	INR 558,000	Mayank Vatsa Richa Singh
15	Building a CMM like model for assessing the maturity of E-Governance	NISG	INR 720,000	Pankaj Jalote
16	Rapidly developing software using globally distributed teams	SAP Labs	INR 1,100,000	Pankaj Jalote
17	Grant for research in computer sciences	Microsoft	INR 420,000	Pankaj Jalote
18	Microsoft/CSE/20040029 Microsoft/CSE/20040052	Microsoft	INR 1,849,507	Pankaj Jalote
	Botnet defenses for enterprises networks	DRDO	INR 1,000,000	Shishir Nagaraj

Table 7.7: R&D Projects [116]

**CONSULTANCY PROJECTS**

Sl. No.	Project Title	Granting Agency	Funding Amount	Principal Investigator
1	Consulting IFFCO Kisan Sanchar Limited for voice based value added services for farmer	IKSL	INR 153,033	Amarjeet Singh
2	Advisory services for educational initiatives	NASSCOM	INR 360,000	Pankaj Jalote
3	For consultancy and training	System Consultant	INR 480,000	Pankaj Jalote

Table 7.8: Consultancy Projects [116]

**LIST OF AWARDS**

Journal Paper listed 15th among Top 25 articles in Image and Vision Computing Journal between January – March 2009 (this list was available during July 2009 – September 2009)

*R. Singh, M. Vatsa, and A. Noore, Face recognition with disguise and single gallery images, Image and Vision Computing Journal, vol. 27, no. 3, pp. 245-257, 2009.*

Journal Paper listed 18th among Top 25 articles in Image and Vision Computing Journal between January – March 2009 (this list was available during July 2009 – September 2009)

*M. Vatsa, R. Singh, and A. Noore, Feature based RDWT watermarking for multimodal biometric system, Image and Vision Computing Journal, vol. 27, no. 3, pp. 293-304, 2009.*

**Received Best Poster Award**

*R. Singh, M. Vatsa, A. Ross, and A. Noore, Online learning in biometrics: A case study in face classifier update, Proc. IEEE International Conference on Biometrics: Theory, Applications, and Systems (BTAS'09), pp. 1-6, 2009.*

**Received Best Paper Award**

*M. Vatsa, R. Singh, A. Noore, and K. Morris, Simultaneous latent fingerprint recognition: A preliminary study, Proc. IEEE International Conference on Biometrics: Theory, Applications, and Systems (BTAS'09), pp. 1-6, 2009.*

**IEEE Spectrum (September 2009)**

*An article in the September issue of the IEEE Spectrum featured our research on face recognition. The research results reports the effectiveness of existing face recognition algorithms especially when a person has undergone cosmetic facial plastic surgery.*

**97th Indian Science congress, Young Scientist Award held in Thiruvananthapuram from 3-7 January 2010**

*G. Gupta: "Development of methodology for Detection and Fixing of Physical Devices for Security and Forensic Applications"*

**Pankaj Jalote selected for SEIF Award 2010 (April 22, 2010)**

*Prof. Pankaj Jalote: Microsoft Research Software Engineering Innovation Foundation (SEIF) Awards 2010.*

Fig. 7.2: Awards and Recognitions [116]

**Continuing Education and Outreach**

OUTREACH		
Year	Total programs	Total attendance
2008-09	--	--
2009-10	11	11

Table 7.9: Faculty Development activities [116]

LIST OF DONATIONS			
Sl No	Particulars	2008-09	2009-10
1	Dr. A. R. Krishnamurthy Faculty Research Fellowship	--	1,000,000
2	Dr. T. V. Raman Pai Faculty Research Fellowship	--	1,000,000
3	Dr. S. D. Shibulal Research Travel Fund	--	1,000,000
	<b>TOTAL</b>	--	<b>3,000,000</b>

Table 7.10: Donations or Endowment [116]

INCOME		
Year	2008 – 2009	2009 – 2010
Government Grant	150,000,000	150,000,000
Fees	5,024,600	10,194,400
R & D Grants	3,349,507	15,452,901
Donations	0	4,893,889
Interest	4,066,399	16,581,608
Miscellaneous	37,500	1,897,214
Total	162,478,006	199,020,012

Table 7.11: Income of IIIT-D [116]

EXPENSES		
Year	2008 – 2009	2009 – 2010
Salaries	960,248	14,566,554
Scholarships	225,000	225,000
Capital	4,788,500	24,967,741
Services	2,545,133	6,793,905
Consumables	231,550	789,084
Miscellaneous	3,140,977	5,357,349
Total	11,891,408	52,699,633

Table 7.12: Expenditure of IIIT-D [116]

## 7.2. Third to Fifth Year (2010-13)

- We continue to recruit in a highly selective manner, keeping the quality very high – **all of our faculty members have PhDs from fine Institutions across the world, most of them having obtained their PhD in the US.**
- Our faculty has received one best poster award; **one PhD Student was selected for the IBM PhD Fellowship**, which globally awarded around 70 such fellowships with about 7 in India. **One PhD student got the coveted Microsoft PhD Fellowship** – only six are given across India. **Three PhD students were selected for TCS PhD Fellowship**, out of a total of about 20 Fellowships given. [117-119]

The following factsheet highlights their spectacular growth rate.

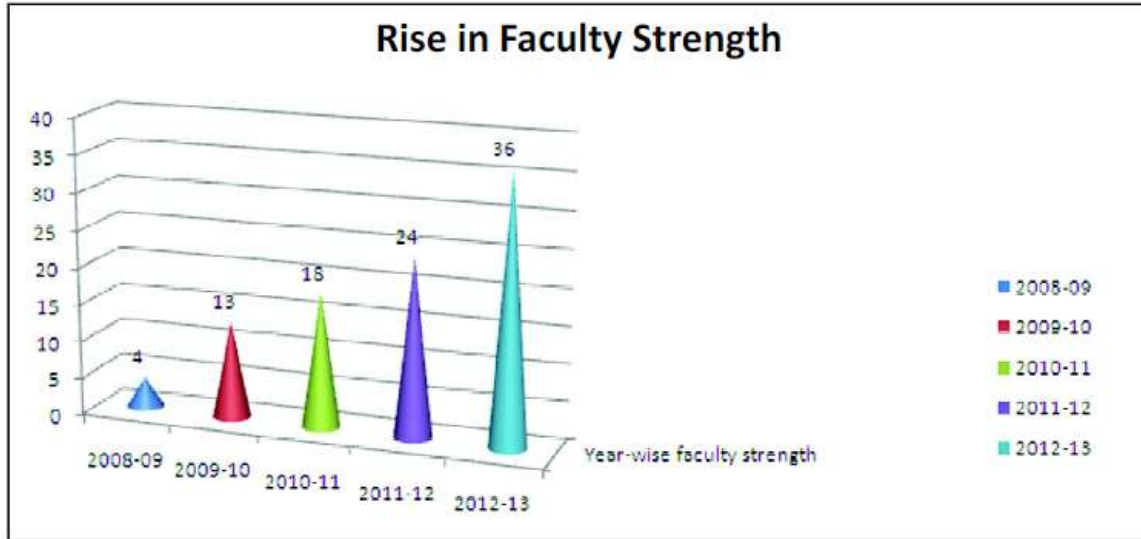


Fig. 7.3: Faculty Strength from 2008 to 2013 [119]

Conferences		Other Visits by Faculty	
Abroad	India	Abroad	India
08	6	08	6

Table 7.13: Participation of Faculty in National & International Conferences and other visits as a speaker, session chair etc. (2010-11). [117]

SN	Parameters	Details 2008-9	Details 2009-10	Details 2010-11	Details 2011-12	Details 2012-13
1.	Number of Faculty	5	10	19 (14 with PhD from foreign University)	28	35 (26 with PhD from foreign University)
2.	BTech Students	55	61	308	CSE (121), ECE (51), Total 430	539
3.	MTech Students • Computer Science (from 2010-11) • Mobile Computing • Information Security • Data Engineering (from 2010-11) • VLSI & Embedded Systems	Nil	23	53	115	187
4.	PhD Students	Nil	8	21	39	68
5.	Faculty Selection Meetings			at USA	Twice at USA	at USA

6.	Research Papers (2011-12)	Nil	11	34 (Journal 3, Conference 31)	40 (Journal 4, Conference 36)	102 (Journal 24, Conference 78)
7.	Funding Proposals	Nil	19	15	23	29
8.	Funding from Government Agencies		10		10	18
9.	Funding from Industry or Non-Government Agencies		9		9	5
10.	Consultancy Assignments	1	3	1	2	3
11.	Other Support / Grant			5	2	4
12.	Total Funding grants	29	Rs. 5.19 Crore	Rs. 1.37 Crore	Rs. 2.77 Crore	Rs. 7.42 Crore
13.	Patents			1	Applied 01	2
14.	Placement	N/A	N/A	N/A	Average Salary Rs. 7 Lakh About 10 students got Highest Salary above Rs. 10 Lakh	Highest Salary BTech Rs. 16 Lakh and MTech Rs. 7 Lakh
15.	Technologies Developed / Deployed	Nil	2	9	21	18
16.	Conference / Short Courses / Workshops Organized	Nil	3	6	6	4
17.	Faculty Research invitations and Visits				30	Many
18.	Distinguished Visitors and Invited Seminars			19	11	20
19.	Faculty served in various research and conference committees			25	Many	Many
20.	Internships to other students in IIIT-Delhi				12	20
21.	Awards and Recognition	Nil	7	Faculty: 5	Faculty: 5 Students: 7	Faculty: 7 Students: 15
22.	Internship Abroad	Nil	Nil	12	Not Available	Not Available

Table 7.14: At a Glance picture of IIIT-D after 5 years [116-119]

<b>INCOME</b>		
<b>Year</b>	<b>2009 – 2010</b>	<b>2010-2011</b>
Government Grant	150,000,000	50,00,00,000
Fees	10,194,400	2,47,91,042
R & D Grants	15,452,901	1,37,28,424
Donations	4,893,889	30,00,000
Interest	16,581,608	2,22,23,013
Miscellaneous	1,897,214	13,48,145
<b>Total</b>	<b>199,020,012</b>	<b>56,50,90,624</b>

<b>EXPENSES</b>		
<b>Year</b>	<b>2009 – 2010</b>	<b>2010-2011</b>
Salaries	14,566,554	2,91,25,831
Scholarships	225,000	7,00,000
Capital	24,967,741	14,19,29,161
Services	6,793,905	1,12,80,418
Consumables	789,084	16,14,210
Miscellaneous	5,357,349	27,90,750
<b>Total</b>	<b>52,699,633</b>	<b>18,74,40,370</b>

Table 7.15: Income and Expenses [117]

<b>INCOME</b>	<b>2011-12</b>	<b>2010-11</b>
Income from conduct of Programs	384.09	240.91
Interest Income	24.24	37.99
Other Income	29.48	13.49
<b>EXPENDITURE</b>		
Establishment Expenses	396.47	304.91
Administrative Expenses	174.97	100.28
Program Expenses	83.24	47.65
Depreciation	50.87	50.73
Other Expenses	24.28	25.87

Table 7.16: Income and Expenditure 2011-12 [118]

<b>Income</b>	<b>(Rs in Lakh)</b>
Income from Conduct of Programs	833.26
Interest Income	66.92
Other Income	63.63
<b>Expenditure</b>	
Establishment	678.32
Administrative	538.59
Program Expenses	114.97
Depreciation	830.18
Others	33.58

Table 7.17: Income and Expenditure 2012-13 [117-119]

It currently has strong research groups in the following areas

- Image Analysis & Biometrics
- Emerging Architecture and System Design
- Information Management & Data Analytics
- Security & Privacy
- Mobile Computing & Sensor Networks
- Software Engineering [119]



Fig. 7.4: Recruitment of International Faculty by conducting interviews at USA [181]

## 7.2. Remarks

IIIT-Delhi has organized full **selection committee meetings in the US** from 2011. This is perhaps the first time in recent past that an academic Institution from India is holding selection committee meeting in US, where the largest number of Indians graduates with PhDs in Computer Science every year. It is perhaps the only leading Institute in India to take this route. [117-119]





## **Chapter 8: Final Words: IIT Model Can Rejuvenate & Ignite Engineering Education in India**

### 8.1. New Hybrid Model for Rejuvenating Existing Engineering Education in India

Developing World Class Education Facilities, Culture and Environment without any opposition from existing stakeholders of Teaching University system is the major problem faced by many Universities. People always oppose to major changes. I would like to propose new technique with the help of Research Groups or Center of Excellence, which can introduce the World Class Research University Component without any opposition and without modifying existing structure. That is, Equity and Excellence can grow in parallel.

I have suggested similar but Hybrid Model in Chapter 4 (pp. 69-82) of my book (Free Download) “Washington Accord & Multi-Objective Integrated Model for Developing WCU (World Class University)”. This model is more relevant for developing engineering institutes in India (see following diagram). [12]

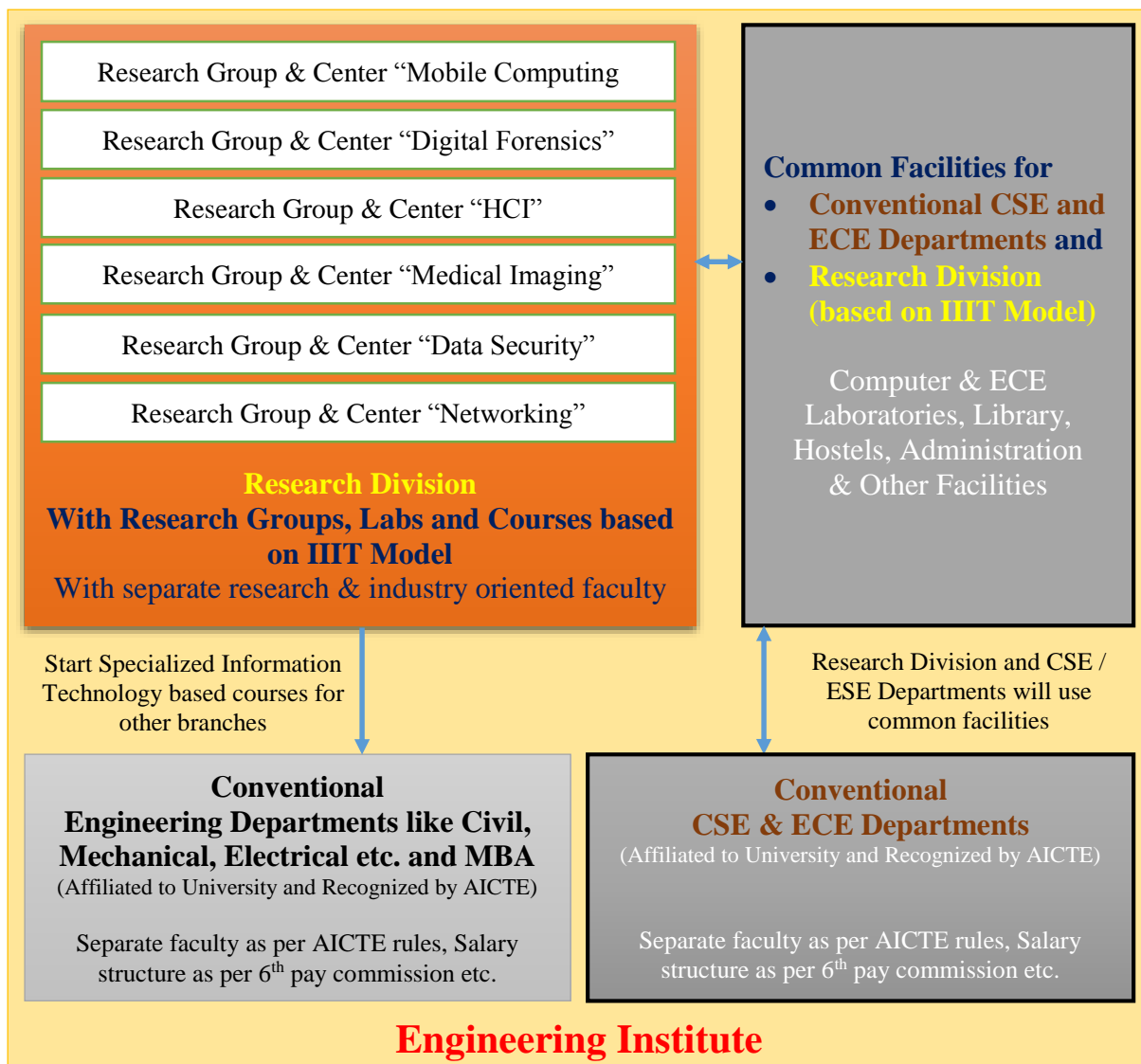


Fig. 8.1: The New Mechanism based on IIIT Model

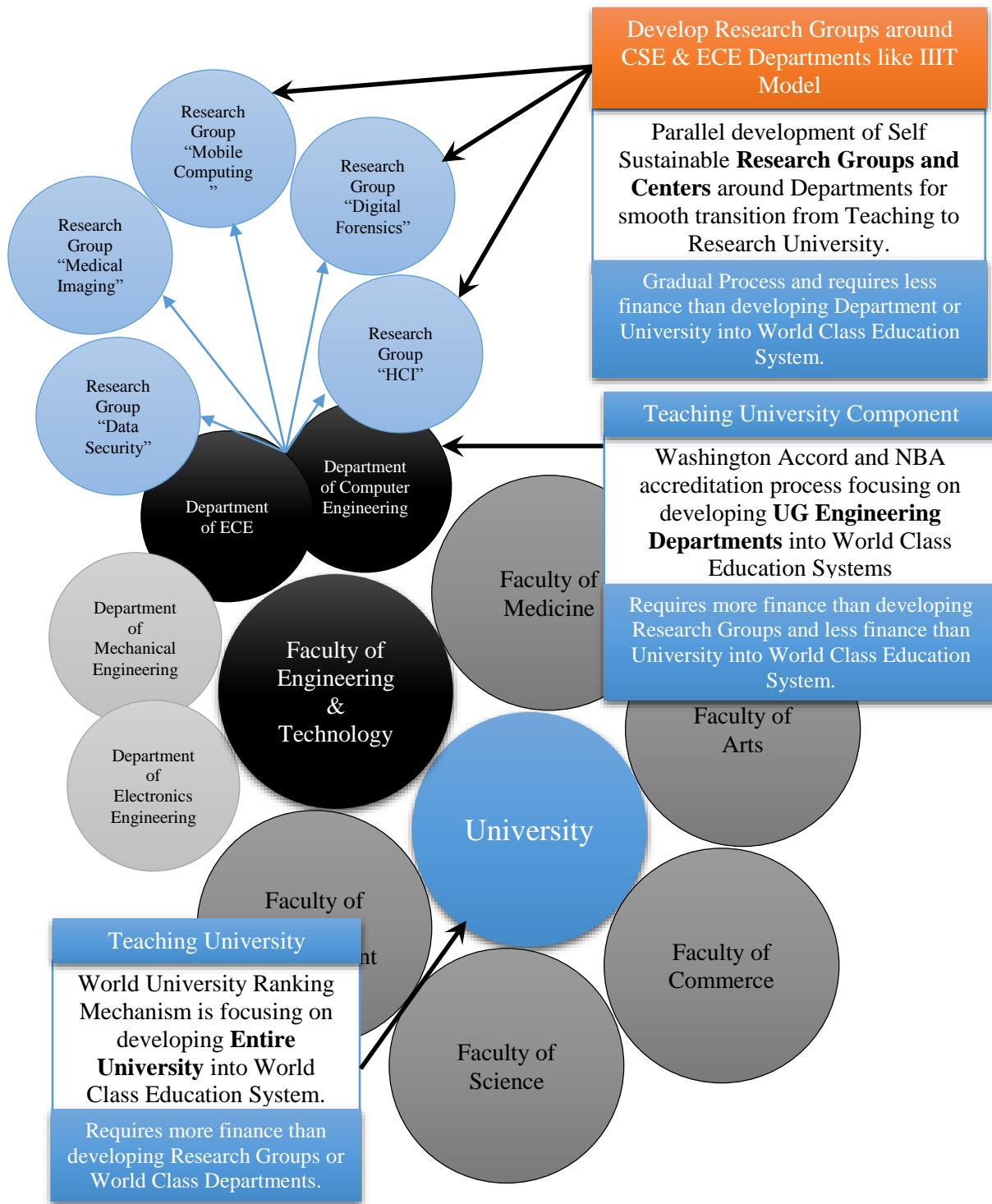


Fig. 8.2: Hybrid model suggested by me for developing engineering institutes in India [12]

In existing Engineering Institutes, develop the IIIT Model around existing Conventional Computer and ECE Departments with common laboratories, without changing conventional structures of other departments. Every IIIT is organized around Research Groups. This concept can be applied to engineering institutes. Like IIIT, the research groups can be built around each core department, which will be self-sustainable. **The government should allow them to grow like Research Groups of IIIT, by providing special autonomous status.** Whereas the Core Departments (for example, Computer Engineering & IT) will run in a conventional style.

With the help of this new mechanism, slowly the existing engineering colleges can follow the route of Research University, without any additional financial burden.

To reduce the financial burden of Research Division, the ECE and CSE Department can share the facilities with Research Division. In addition to this, the Research Division can introduce the specialized IT based courses for other engineering and management branches. I am sure this Hybrid Model can help to implant Industry supported Research University component at engineering institutes and help to develop top ranking institute like IIIT.

## 8.2. Why IIIT Model Can Change Engineering Education Scenario of India?

Many features of IIIT Model are common with IITs. Then why IIIT Model can change the Engineering Education Scenario of India?

To answer this question, I would like to classify the features of IIIT Model into two categories. The first category contains common features of IIIT and IIT and second category contains features of IIIT Model, which are not common with IIT (or NIT) Model.

SN	Common Features of IIIT and IIT (or NIT) Model
1.	Intensive Search for internationally renowned faculty by conducting interviews at USA
2.	40% to 75% faculty with PhD from World Renowned Universities & remaining from IIT / IISc
3.	Industry supported Research Centers, Labs, Chair Professors, Scholarships and Research Grants
4.	During Internship, opportunity to do research and project work at many foreign universities
5.	Controlled by BOG, which consists of renowned persons from academics and IT industry
6.	Building strong international linkage through internationally qualified faculty
7.	International Curriculum with high degree of flexibility
8.	Nurturing Innovative Minds through Innovation Culture
9.	Business Innovations through Incubation Center
10.	Strictly merit based admission process
11.	Fruitful international collaborations
12.	Active Alumni involvement
13.	Visionary Vice Chancellor

Table 8.1: Common Features of IIIT and IIT Model

SN	Unique Features of IIIT Model, which are not Common with IIT (or NIT) Model
14.	Self-Sustainable Industry Supported IIIT Research University
15.	Must be located in Metros or in the middle of IT Industry Hub
16.	40% Income Generation through industry oriented Research & Technology Transfer
17.	Government provides only Land and Buildings either directly or through PPP model
18.	Not having departments, organizing structure around Research Groups / Centers / Labs

19.	Involving industry as partner, involving them in curriculum design and teaching too
20.	More weightage to coding and problem solving. Establish “Coding Culture”
21.	US University style salary structure and service conditions

Table 8.2: Unique Features of IIIT Model, which are not common with IIT (or NIT) Model

Let’s analyze the 8 features of IIIT Model given in Table 8.2. These features are related to Self-Sustainable Institute, Location, 40% Revenue Generation through Industry support, Coding Culture, US style salary structure, Partnership with Industry etc. The leading IIITs have adopted these features whereas IITs are not emphasizing on it. These features act as a strong pillars of Unique IIIT Model.

### 8.2.1. Self-Sustainable Industry Supported IIIT Research University

The IITs are fully funded government institutes. They never opted the route of “Self-Sustainable institute with strong support from Industry”. It’s a government policy for “nation building exercise” and it is very successful in last 60 years.

In India 80% engineering institutes are in private sector. They can’t even dream about government funding like IIT or NIT. The tuition fees is the major source of revenue for them (90% revenue). The research university needs huge funding, which can be generated through the industry supported self-sustainable route. It’s the only feasible option left for them. They must try.

### 8.2.2. Must be Located in Metros or in the Middle of IT Industry Hub

The established engineering institutes located in Metros or in the middle of IT Industry Hub are good candidates for IIIT Model. Even the established engineering institutes, which are near to Innovation Clusters, can get locational advantage.

### 8.2.3. Income Generation (40%) through Industry Oriented Research & Technology Transfer

To add self-sustainable research University component, the Established engineering institutes can focus on industry oriented research activities and can slowly enhance the industry funding. The government is encouraging Business Incubation activities and providing funds for it. Thus, they can even establish Incubation Centers and go for Technology Transfer activities for generation revenue.

### 8.2.4. Government Provides Only Land and Buildings either Directly or through PPP Model

This is the unique feature of IIIT Model. In case of IIT, government is providing everything, whereas IIIT needs to develop everything on it’s own, except building and land. It develops huge financial pressure on them. Under this pressure the IIITs are finding it’s own revenue generation sources and finally could develop the strong bond with industry.

The scenario of private engineering institutes and IIIT is almost similar. The IIITs are atleast getting partial support from government. In case of private engineering institutes, even that kind of support

is missing. Under this situation, the private engineering institutes can go for IIIT Model to become top ranking institute.

#### 8.2.5. Not having Departments, Organizing Structure around Research Groups / Centers / Labs

In previous section, to build up strong research culture, I have suggested the Hybrid Model for existing established engineering institutes. On this pattern, like IIITs, these institute can be reorganized and build the organization around research laboratories without disturbing AICTE / UGC framework.

#### 8.2.6. Involving Industry as Partner

It's an era of Public Private Partnership (PPP). Many IIITs have been started on the basis of PPP model. It can be extended to "Private-Private Partnership". It is possible, if private institutes could maintained the academic standards like BITS Pilani or DA-IICT. It is happening all over the world. If the established engineering institutes could attract global talent then they can develop better industry interface. The best example is BITS Pilani. They could develop very strong industry interface through activities like WILP program. They are generating more than 60% revenue through this scheme. The details are available in Chapter 8: Revenue Generation (section 8.3) of my book namely "Funding Techniques of World Renowned Universities". [10]

#### 8.2.7. Establish "Coding Culture": More Weightage to Coding and Problem Solving

It is major point where IIIT and IIT differs. There is difference between "Education" and "Training". The IITs focus more on "Education" and IIITs aims at perfect combination of education and training. Both the approaches have its own advantages. I personally feel that, established engineering institutes can easily adopt the coding culture, which ultimately can attract more campus placement, brand name and in turn, will help to generate more revenue.

#### 8.2.8. US University Style Salary Structure and Service Conditions

In India, the salary structure and service conditions of engineering institutes are governed by UGC and AICTE. They specify minimum standards. The institutes are free to give conditional higher salaries and better facilities. Thus, US University Style Salary Structure and Service Conditions can be adopted to attract global talent; provided the institute could generate more revenue through variety of ways like research and technology transfer etc.

#### 8.2.9. IIIT Model can change the Engineering Education Scenario of India

The 13 features given in Table 8.1, which are common in IIIT and IIT, can be adopted by any established engineering institute. In fact, many Autonomous engineering institutes or Technical Universities are already on the way.

The engineering institute should come forward to adopt remaining 8 features listed in Table 8.2. These 8 feasible features can change the entire dimensions of engineering institutes. These are

essential conditions to build institute as per IIIT Model, which is altogether different from IIT Model. Thus, I have stated that, IIIT Model can change the Engineering Education Scenario of India.

### 7.3. Final Words

In India, in the last 3 years, the engineering admission scenario is not good. All most all engineering institutes are struggling for survival. The current model failed to satisfy the quality manpower requirements of the industry. There is an urgent need for new model for survival.

If you observe the Medical Education System, especially MBBS degree courses, you will find that the medical faculty are managing hospitals of the medical colleges and then sparing time for teaching. They are fully responsible for

- Management of the entire hospital
- Checking OPD patients
- Operative work in the hospital
- 24 hours on Call duties

There is no gap between “Hospital Industry” and institute. You wouldn’t find any “Industry Institute Interaction Cell” in medical colleges. In medical colleges, the hospital and institute are not disjoint systems. They are tightly coupled.

In engineering institutes, there is a wide gap between industry and institutes. The faculty don’t have the industry exposure. Thus there is a requirement of Industry-Institute-Interaction-Cell to reduce this wide gap. Unfortunately, in India, these cells couldn’t reduce the gap upto desired level. Thus the engineering institutes are unable to produce globally employable engineers.

It is difficult to reduce the of industry-institute gap for all engineering disciplines except Computer Engineering. The most of the IT industry oriented R&D can be done at computer labs of the institutes or even at personal computers. On the top of that, the faculty members of IIIT are fully involved in all 4 fronts simultaneously viz. Industrial project, consultancy, research and teaching. Thus many IIITs could reduce this gap substantially.

The Hybrid Model concept or similar pattern can be applied to engineering institutes to produce better quality engineers, which are acceptable to industry. I am sure, this IIIT Model can Rejuvenate & Ignite Engineering Education in India.





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