

# ACM Survey on PhD Production in India for Computer Science and Information Technology

## 2015 – 2016

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The purpose of this study is to collect reasonably reliable data on PhD production in CS in India, and then use it to identify useful trends. This exercise was motivated by the Taulbee report in the US, and Dr Gautam Shroff, Vice President and Chief Scientist, Tata Consultancy Services has been leading this year's survey. Based on the inputs and experience from the survey conducted in last couple of years, the survey and report for academic year 2015-16 has been incorporated.

### **Institutes Included**

Last year, the study attempted to include all institutions which have a PhD program in CS/IT. A list of 2507 institutes from all over India was obtained from AICTE. According to the data available on the websites, of these institutes, 73 institutes stated that they have a PhD in CS or IT. We added to these, other institutions (IITs, NITs, etc.) which are known to be granting PhDs in computer science – inputs for this was taken from various researchers and faculty and from the previous study. Additional institutes were obtained from the partner institutes to TCS Research Scholar Program. This gave a total of 145 institutes which claims to have a PhD program and which could be included in this study. This list of institutions is given in Appendix H.

### **Data Collection**

An online form was created, and sent to the Head of Department (CSE/IT) and the Director of the institutes. The form asked for information on: the number of PhD faculty, number of non-PhD faculty, total number of PhD students enrolled and the total number of PhDs graduated last year who got their degree. The form also asked for the stipend that was paid to the PhD students and the major problems that the institutes face with regard to the PhD programme.

Reminders were sent, and the institutions were informed that if they failed to respond, the data of students pursuing PhD from those institutes cannot be captured.

We got responses from 16 institutes through online survey. We assume that the other institutions (i.e. which did not respond and for which we could not find relevant data) don't have an active PhD program, or if they do, it is too small to be of any significant impact.

For this year's report, we have grouped the institutions as follows:

- Group 1: Institutions which provided the data about number of faculty, PhDs enrolled, and PhDs awarded. (16)
- Group 2: Institutes which provided data last time but did not do so for this year's report. (19)
- Group 3: Institutions which did not submit the filled form, but the number of faculty, and the total number of PhDs enrolled was available on their website. (8)

- Group 4: Institutions which did not submit the form and we could not find information about the PhD students enrolled on their websites, but obtained information about the number of faculty. (24)

For group 2, we took the data from last year's study – assuming that it would not have changed significantly this year.

## Analysis

### *PhD Production*

The number of students who completed their PhD from August 2015 to July 2016

Group 1 institutes: 73

Group 2 institutes (estimated): 66

Group 3 institutes (estimated): 44

Group 4 institutes (estimated): 86

To better understand where these PhDs are being produced, we divide the institutions in two categories: those that have 80% or more faculty with PhDs, and others. Presumably the first category represents the more research-focused institutions, while the second category is likely to be the more teaching-focused institutions. There are 37 institutions in the first category (List of these institutions and their data ids given in Appendix E), and 30 institutions in the second category (Appendix F). With this classification, we have the following for PhD production:

- ***Research-focused institutes produced a total of 173 PhDs and other institutions produced 96. The total number of PhDs produced last year from all institutions is 269.***

Based on the detailed data provided by Group 1 institutions, we can say:

- ***Of the total PhDs produced, 68% were male and 32% were females.***

Looking at the statistics, the number of students who are enrolled:

Group 1: 881

Group 2: 691

Group 3: 430

Group 4 Estimated: 854

For all the institutes, the total adds up to 2856. And for group 1 and group 2 is 1572. Out of which, the total number of part time students doing PhDs in institutes belonging to Group 1 is 196 and that of Group 2 is 162.

Using this total, we can estimate the number of PhDs likely to be produced in the country in the coming years. We assume that 90% of these students will graduate over the next five years. If we expect that these graduations will be spread across 5 years with approximately uniform distribution, the number of PhDs graduating will come to around 515 per year for the coming five years. Since we know that the enrolment in PhD programs has been increasing over the past few years, we can expect the increase to be gradual. We assume that the increase in first year is x, in

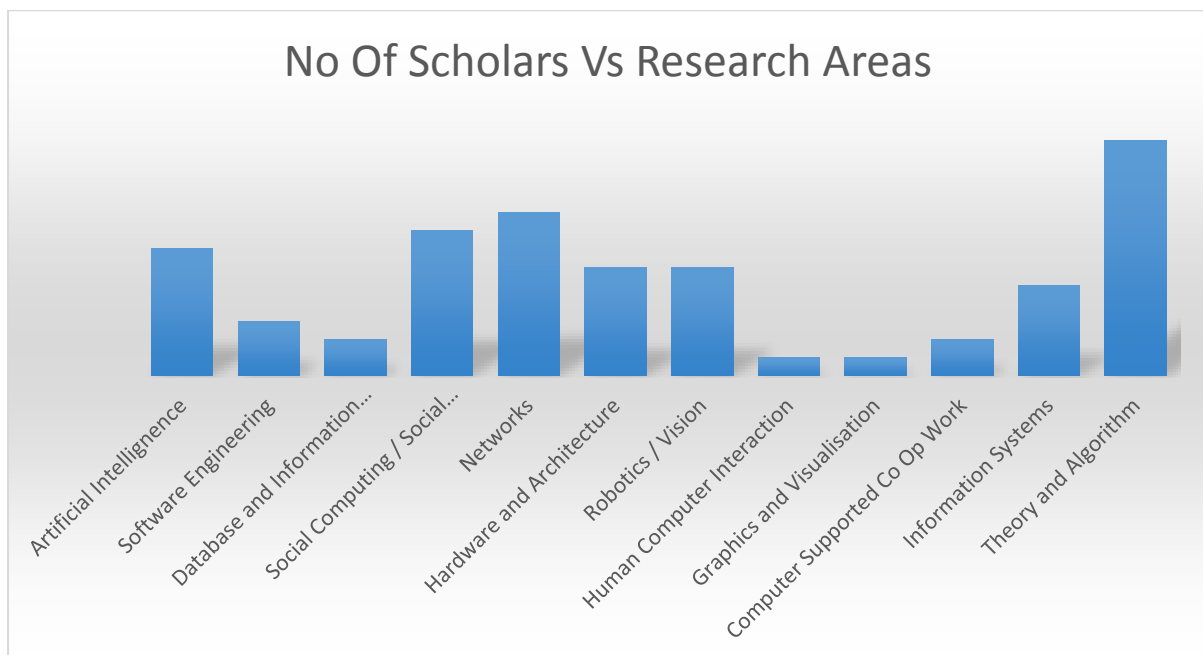
2nd year is 2x... and in 5th year it is 5x. With this, we can estimate that the number of PhDs graduating will gradually increase to about 540 per year in about 5 years among all institutions, and about 310 per year from institutions in group 1 and 2.

**Overall, keeping in mind the likelihood of overestimation for institutions in group 2 and 3, we can say that the PhD production in the Academic Year 2015-16 was around 269, and that PhD production is likely to grow gradually to about 470 per year in about 5 years.**

### *Areas of Research*

In this section we analyse the areas of research chosen by the students who completed their thesis in 2015-2016.

As can be seen from fig 1, the most popular area of research is Theory and Algorithm. Social Computing / Social Informatics, Networks, Hardware & Architecture, AI and Robotics / Vision are fields which are also popular as a research interest among PhD students. (This data is only from institutes in group 1 who filled the online form.)

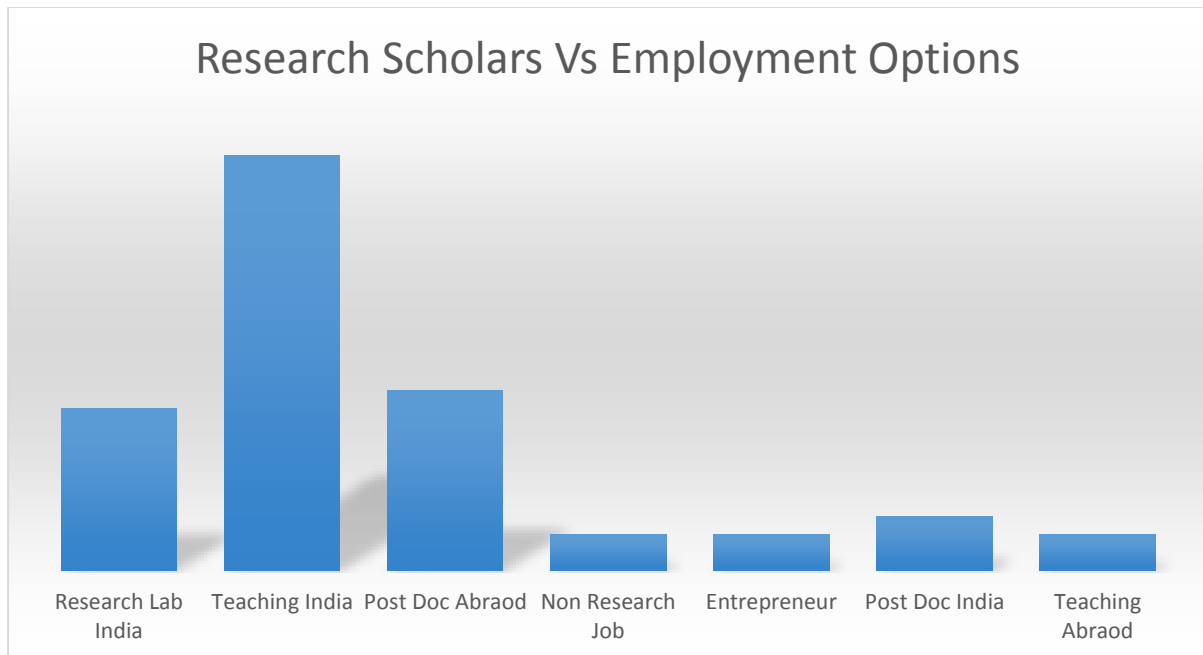


**Fig 1:** Area of research chosen by students who completed their PhD in 2015 – 2016

Comparing this with last year's response, we observe an increase in interest for Social Computing / Social Informatics and Robotics / Vision.

### Employment Statistics

Based on the data provided by institutes of group 1, the most popular choice of employment after completing PhD is teaching in India.



**Fig 2:** The employment options chosen by students who completed their PhD in 2015-2016.

### Stipend/Compensation given to PhD students

Based on the data provided by 17 institutes about the stipend paid to a PhD student, we can say:

The highest salary given: Rs. 34,500

The lowest salary given: Rs. 12,000

Average salary a student can expect is: Rs. 23,250

### Issues/Challenges faced by the PhD program

The online form had an open question for institutes to list down the issues they face with the PhD program. The response that we got can be broadly categorized into the following:

- Attracting good students to pursue PhD
- Infrastructural Support
- Lack of tie ups in the industry and other institutions

### Faculty

For the 66 institutes covered in the study, the total number of faculty with PhD is 1146 and the average faculty with PhD in the CSE/IT department of an institute is 17.

## References

1. CRA Taulbee Survey. <http://cra.org/resources/taulbee/>

## Acknowledgements

*I would like to thank Sachin Parkhi for his help in conducting the study and preparing the report. I would also like to thank all the institutions who provided data by either filling the form or by sending data over email.*

## Appendix

## A. Group 1 institutes: Provided Data

Institute	PhD Faculty	Non PhD Faculty	PhD Graduates Males	PhD Graduates Female	PhD Graduates Total	Faculty from PhD Students	PhD Students Enrolled	Part Time PhD Students Enrolled
Calcutta University	12	0	8	3	8	1	107	0
Indian Institute of Technology Kanpur	33	0	6	0	6	0	51	0
Delhi University (Main Campus)	5	1	1	5	6	3	45	0
Indian Institute of Technology Ropar	12	0	1	0	1	0	15	0
IIIT Bangalore	19	0	2	2	4	0	67	34
Indian Institute of Technology Bombay	43	0	12	0	12	0	112	28
National Institute of Technology Trichy	12	3	1	2	3	1	8	1
Chennai Mathematical Institute	12	0	2	0	2	0	19	4
IIIT Noida	33	57	0	2	2	2	61	53
Sir M.visvesvaraya Institute of Technology	3	20	0	1	1	1	11	10
IIIT Hyderabad	48	4	2	1	3	0	126	38
Indian Institute of Science Bangalore	32	0	9	0	9	0	90	13
IIIT Delhi	27	0	2	3	5	0	74	0
Ahmedabad University, Institute of Engineering and Technology (IET)	10	3	0	0	0	0	11	2
University of Hyderabad	23	3	5	5	10	0	62	0
Institute of Mathematical Sciences Chennai	9	0	1	0	1	0	22	0
<b>Total</b>	<b>333</b>	<b>91</b>	<b>52</b>	<b>24</b>	<b>73</b>	<b>8</b>	<b>881</b>	<b>183</b>

**B. Group 2 institutes: Provided data for last year's report**

Institute	PhD Faculty	Non PhD Faculty	Total PhD Graduates	Total Number of PhD Scholars Enrolled
Amrita University	7	27	0	59
BITS Pilani	23	8	4	13
BMS Bangalore	7	23	0	49
DAIICT	37	0	4	26
IIIT Allahabad	24	0	8	58
IIT Bhubaneswar	3	0	0	4
IIT Delhi	31	0	3	55
IIT Gandhinagar	8	0	0	9
IIT Hyderabad	14	0	2	47
IIT Indore	9	0	3	30
IIT Madras	27	0	9	104
IIT Mandi	8	0	0	16
IIT Patna	13	0	3	49
ISI Kolkata	50	0	8	48
Jadavpur University	32	4	8	149
MNNIT Allahabad	13	8	5	81
NIT Meghalaya	5	7	0	11
NIT Surathkal	5	11	3	21
NIT Warangal	14	1	6	24
<b>Total</b>	<b>330</b>	<b>89</b>	<b>66</b>	<b>853</b>

**C. Group 3 institutes: PhD faculty and students enrolled data found on website**

Name of Institute	PhD Faculty	Non PhD Faculty	PhD Graduates (14-15) (Estimated)	Total Enrolled
IIT Rajasthan	5	0	2	12
Anna University	25	22	6	140
TIFR	15	0	4	20
IIT Roorkee	21	0	8	40
Manasa Gangothri, University Of Mysore	8	1	2	28
IIT Kharagpur	37	0	10	70
Thapar University	32	33	9	90
VNIT	10	6	3	30
<b>TOTAL</b>	<b>153</b>	<b>62</b>	<b>44</b>	<b>430</b>

**D. Group 4 institutes: Only PhD faculty data available on website**

Name of the Institute	Ph D Faculty	Non PhD Faculty	PhD Graduates (15-16)(Estimated)	Total Enrolled(Estimated)
Indian School of Mines, Dhanbad	14	2	4	40
JNU	21	0	4	40
University of Pune	4	3	1	4
BIT Mesra	24	9	5	50
Gitam	68	63	17	170
College of Technology and Engineering Udaipur	1	14	1	10
College of Engineering Pune	13	27	3	30
Jamia Milia Islamia	14	1	4	40
NIT Agartala	4	21	1	10
NIT Durgapur	10	4	3	30
NIT Silchar	8	12	2	20
PSG College of Technology	9	25	3	30
Thiagrajar College of Engineering	12	16	3	30
NIT Bhopal	17	2	4	40
Institute Of Engineering Jiwaji University, Gwalior	2	0	1	10
Government College of Technology, Coimabto	3	8	1	10
Andhra University College of Engineering	23	1	6	60
Department of Computer Science and Applications, Kurukshetra University	9	3	2	20
Punjab Engineering College	8	10	2	20
SJB Institute of Technology	23	18	6	60
SNS College of Technology	20	20	5	50
Sona College of Technology	17	10	4	40
Veer Surendra Sai University of Technology, Burla	12	15	3	30
SJCE	4	10	1	10
<b>Total</b>	<b>340</b>	<b>294</b>	<b>86</b>	<b>854</b>



**E. Research-focused institutes: 80% or more PhD faculty**

<b>Institute</b>	<b>PhD Faculty</b>	<b>Non PhD Faculty</b>	<b>PhD Graduates Total</b>	<b>Total Enrolled</b>
Calcutta University	12	0	8	107
Indian Institute of Technology Kanpur	33	0	6	51
Indian Institute of Technology Ropar	12	0	1	15
IIIT Bangalore	19	0	4	101
Indian Institute of Technology Bombay	43	0	12	140
Chennai Mathematical Institute	12	0	2	23
Indian Institute of Science Bangalore	32	0	9	103
IIIT Delhi	27	0	5	74
Institute of Mathematical Sciences Chennai	9	0	1	22
DAIICT	37	0	4	22
IIIT Allahabad	24	0	8	58
IIT Bhubaneshwar	3	0	0	4
IIT Delhi	31	0	3	47
IIT Gandhinagar	8	0	0	9
IIT Hyderabad	14	0	2	44
IIT Indore	9	0	3	30
IIT Madras	27	0	9	92
IIT Mandi	8	0	0	15
IIT Patna	13	0	3	45
ISI Kolkata	50	0	8	48
IIT Rajasthan	5	0	2	12
TIFR	15	0	4	20
IIT Roorkee	21	0	8	40
IIT Kharagpur	37	0	10	70
JNU	21	0	4	40
Institute Of Engineering Jiwaji University, Gwalior	2	0	1	10
Andhra University College of Engineering	23	1	6	60
NIT Warangal	14	1	6	21
Jamia Milia Islamia	14	1	4	40
IIIT Hyderabad	48	4	3	164
NIT Bhopal	17	2	4	40
Jadavpur University	32	4	8	92
Manasa Gangothri, University Of Mysore	8	1	2	28
University of Hyderabad	23	3	10	62

Indian School of Mines, Dhanbad	14	2	4	40
Delhi University (Main Campus)	5	1	6	45
National Institute of Technology Trichy	12	3	3	9
<b>Total</b>	<b>734</b>	<b>23</b>	<b>173</b>	<b>1843</b>

**F. Institutions with less than 80% PhD Faculty**

<b>Institute</b>	<b>PhD Faculty</b>	<b>Non PhD Faculty</b>	<b>PhD Graduates Total</b>	<b>Total Enrolled</b>
Ahmedabad University, Institute of Engineering and Technology (IET)	10	3	0	13
Department of Computer Science and Applications, Kurukshetra University	9	3	2	20
BITS Pilani	23	8	4	13
BIT Mesra	24	9	5	50
NIT Durgapur	10	4	3	30
Sona College of Technology	17	10	4	40
VNIT	10	6	3	30
MNNIT Allahabad	13	8	5	61
University of Pune	4	3	1	4
SJB Institute of Technology	23	18	6	60
Anna University	25	22	6	140
Gitam	68	63	17	170
SNS College of Technology	20	20	5	50
Thapar University	32	33	9	90
Punjab Engineering College	8	10	2	20
Veer Surendra Sai University of Technology, Burla	12	15	3	30
Thiagrajar College of Engineering	12	16	3	30
NIT Meghalaya	5	7	0	10
NIT Silchar	8	12	2	20
JIIT Noida	33	57	2	114
College of Engineering Pune	13	27	3	30
NIT Surathkal	5	11	3	17
SJCE	4	10	1	10

Government College of Technology, Coimabto	3	8	1	10
PSG College of Technology	9	25	3	30
BMS Bangalore	7	23	0	26
Amrita University	7	27	0	37
NIT Agartala	4	21	1	10
Sir M.visvesvaraya Institute of Technology	3	20	1	21
College of Technology and Engineering Udaipur	1	14	1	10
<b>Total</b>	<b>422</b>	<b>513</b>	<b>96</b>	<b>1196</b>

#### H. All institutes included in the study

Name of Institute
AIT Technical Campus
Akshaya College of Engineering and Technology
Aligarh Muslim University
Amity School of Engineering and Technology
Amrita University
Andhra University College of Engineering
Anna University
Asian School of Technology
Aurangabad College of Engineering
Avinashilingam Deemed University for Women
BHU IT
Bengal Science and Engineering University
BITS Pilani
BITS Mesra
Bapuji Institute of Engineering and Technology
Bengal Engineering and Science University, Shibpur
Chennai Mathematical Institute
College of Engineering
College of Technology and Engineering, Udaipur
D.E.I. Technical College
Delhi Technological University
Delhi University (Main Campus)
Department of Computer Science and Applications, Kurukshetra University
Department of Studies in Computer Science, Manasa Gangothri, University Of Mysore
Desh Bhagat Foundation Group of Institutions, Ferozpur Road Moga
Dhirubhai Ambani Institute of Information and Communication Technology
Don Bosco College of Engineering and Technology
Dr. Babasaheb Ambedkar Technological University Institute of Petrochemical Engineering
Dr. B.R Ambedkar National Institute of Technology, Jalandar
Dr C.V Raman Institute of Science and Technology
East West Institute of Technology
GITM Institute of Technology
Goduati Engineering College For Women
Government College of Technology, Coimabto
Guru Gobind Singh Indraprastha University
Guru Nanak Dev Engineering College
Guru Teg Bahadur Khalsa Institute of Engineering and Technology
IIIT Allahabad
IIIT Bangalore
IIIT Delhi

IIIT Hyderabad
IITB-Monash Research Academy
ISI Kolkata
Indian Institute of Science Bangalore
Indian Institute of Technology Bhubaneswar
Indian Institute of Technology Bombay
Indian Institute of Technology Delhi
Indian Institute of Technology Gandhinagar
Indian Institute of Technology Guwahati
Indian Institute of Technology Hyderabad
Indian Institute of Technology Indore
Indian Institute of Technology Kanpur
Indian Institute of Technology Kharagpur/ Scholl of IT
Indian Institute of Technology Kharagpur/CSE
Indian Institute of Technology Madras
Indian Institute of Technology Mandi
Indian Institute of Technology Patna
Indian Institute of Technology Rajasthan
Indian Institute of Technology Roorkee
Indian Institute of Technology Ropar
Indian School of Mines, Dhanbad
Institute Of Engineering Jiwaji University, Gwalior
Institute Of Technology, Guru Ghasidas Vishwavidyalaya, Bilaspur
Institute of Mathematical Sciences Chennai
Invertis Institute of Engineering & Technology
ITM University, Gwalior
JNU
Jadhavpur University Kolkata
Jaipur National University
Jamia Hamdard
Jamia Millia Islamia
JIIT Noida
JNTUH College of Engineering Hyderabad
K S R Institute For Engineering And Technology
K S Rangasamy Institute of Technology
K. L. E. Society's College of Engineering And Technology, Belgaum
K.V.G. College of Engineering
LMNIIT
MNNIT Allahabad
Madan Mohan Malvia Engineering College
Madhav Institute of Technology & Science
Maharashtra Institute of Technology, Pune
Manonmaniam Sundaranar Uviversity
Mumbai University
National Institute of Technology Agartala

National Institute of Technology Bhopal
National Institute of Technology Calicut
National Institute of Technology Durgapur
National Institute of Technology Goa
National Institute of Technology Jamshedpur
National Institute of Technology Kurukshetra
National Institute of Technology Meghalaya
National Institute of Technology Raipur
National Institute of Technology Rourkela
National Institute of Technology Silchar
National Institute of Technology Surathkal
National Institute of Technology Trichy
National Institute of Technology Warangal
National Institution of Technical Teachers' Training and Research
Netaji Subhas Institute of Technology
Padmashree Dr. D. Y. Patil Institute of Engineering and Technology
PSG College of Technology
Rajeev Gandhi Proudhyogiki Mahavidyalaya
Ramrao Adik Institute of Technology
Sant Longowal Institute of Engineering and Technology
Sardar Patel College of Technology
School of Computer Science and IT
School of Computer Sciences, Mahatma Gandhi University
Shobhit Institute of Engineering and Technology
Shri G.S Institute of Tech. and Science
Shri Guru Gobind Singhji Institute of Engineering and Technology
Shridevi Institute of Engineering And Technology
Sir M.visvesvaraya Institute of Technology
SJB Institute of Technology
SNDT Womens University
SNS College of Technology
Sona College of Technology
Sri Jayachamarajendra College of Engineering
Ssbt's College of Engineering and Technology
Swami Vivekanand Institute of Technology, Sagar
Symbiosis Institute of Technology
Symbiosis Institute of Technology & Science
Thapar University
Thiagrajan College of Engineering
TIFR
University Institute of Engineering and Technology
University of Hyderabad
University of Pune
Veer Surendra Sai University of Technology, Burla
Vishwakarma Institute of Information Technology

Vishwakarma Institute of Technology
Visvesvaraya National Institute of Technology Nagpur
BMS, Bangalore
College of Engineering, Calcutta University, Kolkata
CUSAT, Kochi-kerala
Govt. College of Engg. (GCOEP), Pune
Heritage Institute of Technology
Institute of Technology, Nirma University - Ahbad
MIT, Manipal
National Inst of Technology (NIT), Jalandhar
Osmania University
Punjab Engg College, Chandigarh
SASTRA, Thanjavur
Veer mata Jeejabhai Technological Instt (VJTI), Mumbai
Walchand College of Engg. - Sangli