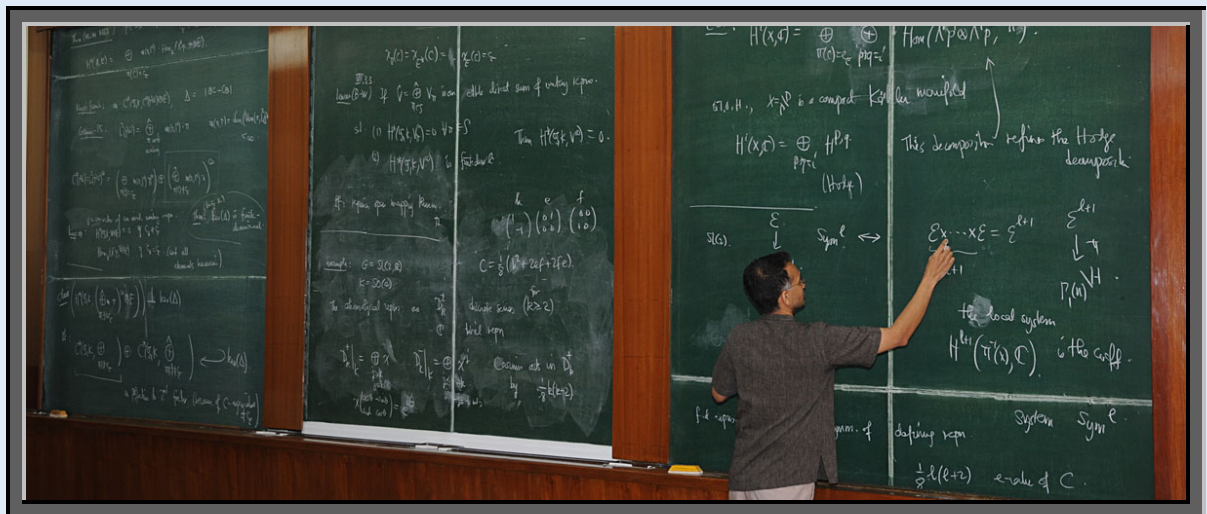


B3-I

School of Mathematics (Math)



School of Mathematics

1. Name of the Department :

School of Mathematics (Math)

2. Year of establishment :

1945

3. Is the Department part of a School/Faculty of the university?

It is an entire School.

4. Names of programmes offered (UG, PG, M.Phil., Ph.D., Integrated Masters; Integrated Ph.D., D. Sc, D. Litt, etc.)

1. Ph.D.

2. Integrated M.Sc.-Ph.D.

The minimum eligibility criterion for admission to the Ph.D. programme is a Master's degree in any of Mathematics/Statistics/Science/Technology (M.A. / M.Sc. / M. Math / M. Stat / M.E. / M. Tech.). The minimum eligibility criterion for admission to the Integrated Ph.D. programme is a Bachelor's degree in any of Mathematics/Statistics/Science/Technology (B.A. / B.Sc. / B. Math. / B. Stat. / B.E. / B. Tech.). Students without a Master's degree will generally be admitted to the Integrated Ph.D. program and will obtain an M.Sc. degree along the way subject to the completion of all requirements. Students with a four-year Bachelor's degree may be considered for admission to the Ph.D. Programme.

5. Interdisciplinary programmes and departments involved

None

6. Courses in collaboration with other universities, industries, foreign institutions, etc.

None

7. Details of programmes discontinued, if any, with reasons

There are no such programmes.

8. Examination System: Annual/Semester/Trimester/Choice Based Credit System

There is an evaluation at the end of each semester course, based on assignments and written examinations, and an annual evaluation of courses based on an interview.

9. Participation of the department in the courses offered by other departments

NA

10. Number of faculty positions:

	Faculty Designation with DAE Grade	Abbreviation (Item 11)	Number
1.	Distinguished Professor	Dist. Prof	--
2.	Senior Professor (I)	Sr. Professor (I)	4
3.	Professor (H)	--	11
4.	Associate Professor (G)	Assoc. Professor (G)	9
5.	Reader (F)	--	3
6.	Others	--	2
		Total	29

11. Faculty profile with name, qualification, designation, area of specialization, experience and research under guidance

	Name	Deg*	Designation	Specialization	Exp [†]	Stu [‡]
1.	A. J. Parameswaran	Ph. D.	Professor (H)	Singular theory, Topology of open surfaces	25	-
2.	A. Sankaranarayanan	Ph. D.	Professor (H)	Number theory	26	1
3.	Amalendu Krishna	Ph. D.	Associate Professor (G)	Algebraic cycles and K-theory	15	2
4.	Amitava Bhattacharya	Ph. D.	Reader (F)	Combinatorics	16	2

	Name	Deg*	Designation	Specialization	Exp [†]	Stu [‡]
5.	Anish Ghosh	Ph. D.	Associate Professor (G)	Ergodic Theory and Number Theory	10	2
6.	Arvind N. Nair	Ph. D.	Associate Professor (G)	Lie groups and representation theory	19	1
7.	C.S. Rajan	Ph. D.	Professor (H)	Number theory	23	1
8.	Dipendra Prasad	Ph. D.	Senior Professor (I)	Number theory	27	2
9.	Eknath Ghate	Ph. D.	Professor (H)	Number theory, automorphic forms and L-functions	19	2
10.	Indranil Biswas	Ph. D.	Senior Professor (I)	Vector Bundles	23	2
11.	J. Sengupta	Ph. D.	Professor (H)	Modular forms, harmonic analysis on symmetric spaces	30	-
12.	Mahan MJ	Ph. D.	Professor (H)	Topology/Geometry	19	3
13.	N. Fakhruddin	Ph. D.	Associate Professor (G)	Algebraic Geometry	21	-
14.	N. Saradha	Ph. D.	Professor (H)	Number theory, exponential Diophantine equations	32	1
15.	Nitin Nitsure	Ph. D.	Professor (H)	Algebraic Geometry, Vector bundles, D-modules	29	1
16.	Radhika Ganapathy	Ph. D.	Reader (E)	Representation Theory	4	-
17.	Raja Sridharan	Ph. D.	Associate Professor (G)	Projective modules and complete intersections	21	-
18.	Ravi. A. Rao	Ph. D.	Professor (H)	Classical algebraic K-theory	32	1
19.	Ritabrata Munshi	Ph. D.	Associate Professor (G)	Number Theory	10	-
20.	S. E. Rao	Ph. D.	Professor (H)	Representation of toroidal Lie algebras	28	-
21.	S. K. Roushon	Ph. D.	Associate Professor (G)	Topology	19	-
22.	S. Subramanian	Ph. D.	Professor (H)	Algebraic Geometry	27	-
23.	Sandeep Varma	Ph. D.	Reader (F)	Representation Theory	7	-
24.	Siddharth Bhattacharya	Ph. D.	Reader (F)	Ergodic theory	16	-
25.	T. N. Venkataramana	Ph. D.	Senior Professor (I)	Liegroups and arithmetics groups	26	2
26.	Tanmay Deshpande	Ph. D.	Reader (E)	Representation Theory	5	-
27.	V. Srinivas	Ph. D.	Senior	Algebraic cycles and K-	33	4

	Name	Deg*	Designation	Specialization	Exp [†]	Stu [‡]
			Professor (I)	theory		
28.	V. Trivedi	Ph. D.	Associate Professor (G)	Hilbert-Samuel functions, Frobenius splitting, Hilbert-Kunz function and multiplicity	20	1
29.	Yogish Holla	Ph. D.	Associate Professor (G)	Vector bundles	14	1

* Highest degree obtained

† Years of Experience as a regular Faculty Member (TIFR and elsewhere)

‡ Ph.D. students guided within the last 4 years (including those joined and those graduated)

12. List of senior Visiting Fellows, adjunct faculty, emeritus professors

(a) List of Visiting Fellows

1. Ambily A A
2. Chetan Balwe
3. Romie Banerjee
4. Saurav Bhaumik
5. Saikat Chatterjee
6. Seshadri Chintapalli
7. Anisha Chorwadwala
8. Emre Coskun
9. Soumya Das
10. Umesh Dubey
11. Shane D'Mello
12. Abhik Ganguli
13. Thomas G. Gotsbacher
14. Neena Gupta

15. Sagar Kolte
16. Mousumi Mandal
17. Ritwik Mukherjee
18. Amrita Muralidharan
19. Supriya Pisolkar
20. Vijay Ravikumar
21. Sarang S. Sane
22. Chaitanya Senapathi
23. Sachin Sharma
24. Jyoti Singh
25. S.T. Spallone
26. Ajay Thakur
27. Viji Z. Thomas
28. Girja S. Tripathi
29. R. Venkatesh
30. Sushmita Venugopalan
31. Michael Lennox Wang

(b) List of Adjunct Faculty

1. Aravind Asok, University of Southern California
2. Manjul Bhargava, Princeton University, USA
3. L. Clozel, Universite de Paris-Sud, France
4. Tomas Gomez, Universidad Complutense de Madrid, Spain
5. Chandrashekhar B. Khare, UCLA, Los Angeles, USA
6. Shrawan Kumar, University of North Carolina at Chapel Hill, USA
7. V.K. Murty, University of Toronto, Canada

8. M. Ram Murty, Queen's University, Canada
9. M.V. Nori, University of Chicago, USA
10. T.R. Ramadas, ICTP, Trieste, Italy
11. Abishek Saha, University of Bristol, UK
12. S.R.S. Vardhan, New York University, USA
13. Angelo Vistoli, Scuola Normale Superiore, Italy

(c) Emeritus Professor

None

13. Percentage of classes taken by temporary faculty – programme-wise information

NA

14. Programme-wise Student Teacher Ratio

	Programme	Students (S)	Faculty (F)	Ratio S/F
1.	Ph.D.	30	30	1:1
2.	Integrated M.Sc.-Ph.D.			

15. Number of academic support staff (technical) and administrative staff:

	Scientific Staff	Administrative and Auxiliary Staff
Positions	2	7

16. Research thrust areas as recognized by major funding agencies

- Algebra
- Algebraic Geometry
- Number Theory
- Lie Groups and Representation Theory
- Ergodic Theory

- Topology
- Algebraic cycles and K-theory
- Lie groups and arithmetics groups
- Vector bundles

17. Number of faculty with ongoing projects from a) national b) international funding agencies and c) Total grants received. Give the names of the funding agencies, project title and grants received project-wise.

(a) National

	Agency	Project Title	Total Grant (Rs. lakhs)	Duration	Faculty
1.	DST	JC Bose Fellowship	50	2010-2015	Dipendra Prasad
2.	DST	JC Bose Fellowship	25.5	2008-2013 and 2013-2018	V. Srinivas
3.	DST	JC Bose Fellowship	124.8	2008-2013 and 2013-2018	T. N. Venkaratamana
4.	DST	JC Bose Fellowship	62.20	2013-2018	Navin M. Singhi
5.	DST	Swarna Jayanti Fellowship	34.75	2011-2016	Ritabrata Munshi
6.	DST	Swarna Jayanti Fellowship	30	2012-2017	Amalendu Krishna
7.	DST	JC Bose Fellowship	50	2013-2018	Indranil Biswas
8.	Israel Science Foundation and the University Grants Commission	ISF-UGC grant	110	2014-2017	Anish Ghosh
9.	DST	JC Bose Fellowship	68	2016-2021	Mahan Mj

(b) International

	Agency	Project Title	Total Grant (Rs. lakhs)	Duration	Faculty
1.	Isaac Newton Institute and Clay Mathematics Institute	Newton Institute Programme	50	2014-2015	Anish Ghosh
2.	European Commission – Marie Curie Actions	IRSES-MODULI	724,500 Euros	2014-2017	V. Srinivas
3.	University of Paris	IFCPAR-CEFIPRA Grant	30	2007-2010	Eknath Ghate
4.	Indo-French project no: 4610-2	Analytic aspects of modular forms	No grant received	2012-2015	J. Sengupta, D. Prasad, C. S. Rajan, R.Munshi
5.	Department of Sciences and Technology	DST-RFBR P-138 project	5.44	2012-2015	Ravi A. Rao

18. Inter-institutional collaborative projects and associated grants received

(a) National Collaboration

The National Center for Mathematics (NCM)} is an inter-institutional collaborative project with the Department of Mathematics, IIT-Bombay.

There is a shortage of Ph.D. level courses in advanced mathematics in the country, as most Universities lack the required Faculty and numbers. The NCM has been running such courses every year, with student participation from all over the country. Besides these courses, the NCM conducts training programmes for teachers, and research workshops for the different research specialties in Mathematics in the Country.

These training programmes and workshops are held at venues all over the country. So far nearly 200 such programmes have been held (more precisely, the number is 197 programmes till December 2015).

The programmes are classified into the following categories.

(a) AFS: Annual Foundation Schools: These give first year Ph.D. courses in 3 one

month instalments, meant for Ph.D. students from all Indian universities where such courses are not given.

(b) AIS: Advanced Instructional Schools: These focus on advanced specialized areas of modern mathematics, meant for Ph.D. students who have the corresponding specialization for the research.

(c) ISL: Instructional Schools for Lecturers: These are meant for college and university teachers, and treat material from the B.Sc. or M.Sc. syllabus, but with greater depth.

(d) Workshops: These focus on research topics, and are attended by Faculty Members as well as advanced PhD students.

(e) TEW: Teacher's enrichment workshops: These are short programmes for undergraduate teachers, focusing on a particular subject in the undergraduate syllabus.

(f) Panorama series: This is a series by a top expert giving a high-level view of the subject.

(g) DM: Discussion Meeting: These are advanced workshops at international level, attended by active research mathematicians and Ph.D. students.

Achievements during 2010-2015:

The following number of programmes were successfully conducted in each category in the period 1 Jan 2010 to 31 Dec 2015 (see webpage www.ncmath.org for full details).

Year	Number of Schools							Total Schools
	AFS	AIS	ISL	Workshops	MPL	TEW	DM	
2015	6	5	7	7	-	1	-	26
2014	6	8	6	11	1	3	1	36
2013	3	7	6	12	-	3	-	31

2012	3	7	5	7	7	1	-	30
2011	2	5	4	5	-	-	-	16
2010	2	6	3	4	-	-	-	15

Grants received from TIFR: Rs. 404 lakhs in last 5 years

(b) International Collaboration : None

19. Departmental projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, AICTE, etc.; total grants received.

	Agency	Project Title	Total Grant (Rs. lakhs)	Duration	Faculty
1	DAE	XII Plan Project – Maths and computer science	390	2012-2017	All math faculty

20. Research facility / centre with

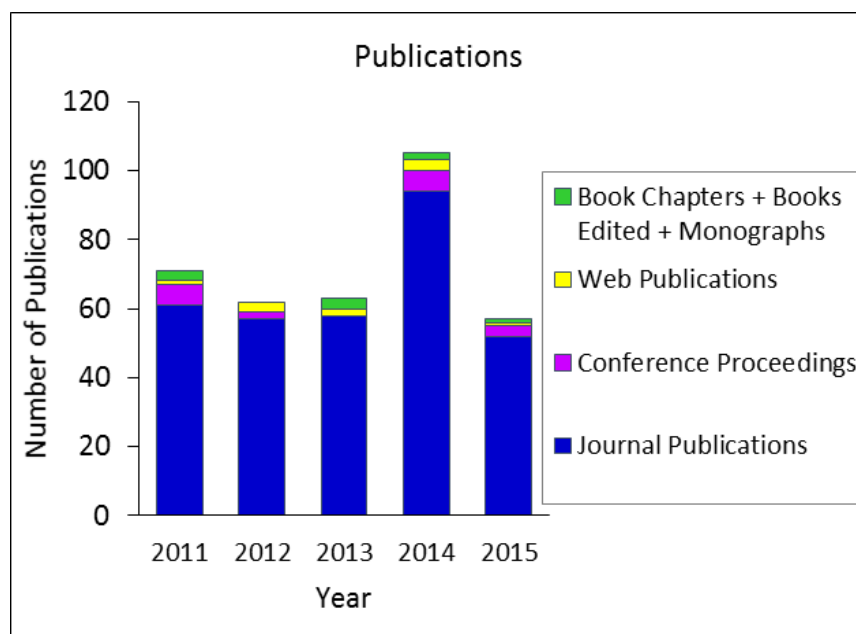
National recognition: NA

21. Special research laboratories sponsored by / created by industry or corporate bodies

None

22. Publications:

SCMA	Journal Publications	Conference Proceedings	Technical Reports	Web Publications	Book Chapters	Books Edited	Mono graphs
2010-11	61	6	-	1	3	-	-
2011-12	57	2	-	3	-	-	-
2012-13	58	-	-	2	3	-	-
2013-14	94	6	-	3	2	-	-
2014-15	52	3	-	1	1	-	-
Total	322	17	-	10	9	-	-



Citation Index – range / average:

- Total number of citations- 5644 (Source- MathSciNet – AMS)
- Number of citations per faculty- 195

23. Details of patents and income generated

None

24. Areas of consultancy and income generated

None

25. Faculty selected nationally / internationally to visit other laboratories / institutions / Industries in India and abroad

(a) National

	Name of Faculty member	Place visited	Date (MM/YYYY)
1	S.M. Bhatwadekar	Indian Institute of Science Education and	Sep - Nov 2010

	Name of Faculty member	Place visited	Date (MM/YYYY)
		Research, Pune	
2	Usha N. Bhosle	Kerala School of Mathematics, Kozhikode	Mar 2014
		Institute of Mathematical Sciences, Chennai	Jan 2012
		North Maharashtra University, Jalgaon, India	Jul 2011
		Kerala School of Mathematics, Kozhikode	Jan 2011
		Indian Institute of Science, Bangalore	Dec 2010
3	Indranil Biswas	Indian Institute of Technology, Guwahati	Feb 2015
4	S.G. Dani	Jawaharlal Nehru University, New Delhi	Dec 2011
5	Ritabrata Munshi	Indian Statistical Institute, Kolkata	Dec 2014 and Mar 2015
		Indian Statistical Institute, Kolkata	Nov – Dec 2013
		Indian Statistical Institute, Bangalore	Sep 2013
		TIFR-Centre for Applicable Mathematics, Bangalore	Jul - Aug 2013
		Indian Statistical Institute, Kolkata	May 2013
		Indian Institute of Science, Bangalore	Jan - Feb 2013
		TIFR-Centre for Applicable Mathematics, Bangalore	Nov - Dec 2012
		Indian Statistical Institute, Kolkata	Apr - May 2012
TIFR-Centre for Applicable Mathematics, Bangalore	Mar – Apr 2011		
6	Arvind Nair	Indian Statistical Institute, Bangalore	Feb 2015
7	Nitin Nitsure	Indian Institute of Science, Bangalore	Aug 2014
8	Dipendra Prasad	Institute of Mathematical Sciences, Chennai	Sep 2010
9	S. E. Rao	Harish Chandra Research Institute, Allahabad	May – Jun 2013
10	S. K. Roushon	North-Eastern Hill University (NEHU), Shillong	Jun 2013
11	A.	National Institute of Science Education and	Jan 2015

	Name of Faculty member	Place visited	Date (MM/YYYY)
	Sankaranarayanan	Research, Bhubaneswar	
		Harish-Chandra Research Institute, Allahabad	Dec 2011
		Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu	Oct 2011
		NIIT University (NU), Neemrana, Rajasthan	Dec 2010
		Institute of Mathematical Sciences, Chennai	Aug – Sep 2010
12	N. Saradha	Sastra University, Thanjavur, Tamil Nadu	Dec 2013
		Institute of Mathematical Sciences, Chennai	Aug 2011
		Harish Chandra Research Institute, Allahabad	Dec 2010
13	Navin M. Singhi	CR Rao Advanced Institute of Mathematics, Statistics and Computer Science, Hyderabad	Apr 2010
14	J. Sengupta	Indian Statistical Institute, Kolkata	Feb 2014
15	Raja Sridharan	Indian Institute of Science, Bangalore	Dec 2010 - Jan 2011
		Center of Policy Studies, Chennai	
		Kerala School of Mathematics, Kerala	
16	R Sujatha	Chennai Mathematical Institute, Chennai	Mar 2011
		TIFR-Centre for Applicable Mathematics, Bangalore	Jan - Feb 2011
17	T. N. Venkaratamana	TIFR Centre for Applicable Mathematics, Bangalore	Dec 2013 - Mar 2014
		TIFR Centre for Applicable Mathematics, Bangalore	Feb 2011
18	G. R. Vijayakumar	National Center for Advanced Research in Discrete Mathematics, Kalasalingam University, Tamil Nadu	Aug – Sep 2011
		National Center for Advanced Research in Discrete Mathematics, Kalasalingam University, Tamil Nadu	Sep – Dec 2010

(b) International

	Name of faculty member	Place visited	Date (MM/YYYY)
1	Usha N. Bhosle	Isaac Newton Institute of Mathematical Sciences, Cambridge, U.K	May - Jul 2011
2	Indranil Biswas	ICMAT, Madrid, Spain	Oct - Nov 2014
		National University of Singapore, Singapore	Aug 2014
		Marburg University, Germany	Jun - Jul 2014
		Aarhus University, Denmark	
University of Lille, France			
3	S.G. Dani	University of Michigan, Ann Arbor, Michigan, USA	Sep 2011
		Ohio State University, Columbus, Ohio, USA	Sep 2011
		Institut de Mathématiques de Luminy, Marseille	Sep – Nov 2010
		Institut de Recherche Mathématique de Rennes, University of Rennes-1, France	Apr 2010
4	Eknath Ghate	Mathematical Sciences Research Institute, Berkeley, USA	Oct 2014
		Universidade Federal do Rio de Janeiro, Brazil	May 2014
		UCLA, USA	Jun 2012
		University of Paris, Jussieu, France	Apr 2012
		McGill University, Canada	Oct 2011
		University of Montpellier, France	Apr - Jun 2011
		Université de Bordeaux I	Oct - Nov 2010
Université de Paris 7	Apr 2010		
5	R.V. Gurjar	Mathematische Forschungs Institut Oberwolfach, Germany	Aug 2014
		Centre de Recherches Mathématiques, Montreal, Canada	Sep 2014
		University of Kansas, USA	May - Jun 2014
		Jilin University, China	Aug 2014
		Kansas University	May 2014
		Steklov Institute, Moscow, Russia	Apr 2014
McGill University, Montreal, Canada	Aug 2011		

	Name of faculty member	Place visited	Date (MM/YYYY)
		Kwansei Gakuin University, Japan	Mar 2011
		Korea Institute for Advanced studies, Seoul	Mar 2011
		National Singapore University, Singapore	Jan 2011
6	Amalendu Krishna	Korea Advanced Institute of Science and Technology (KAIST)	Jul – Sep 2014
		Daejeon, Korea	
		University of Duisburg-Essen, Germany	Apr - May 2014
7	Ritabrata Munshi	Mathematisches Forschungsinstitut Oberwolfach, Germany	Aug – Sep 2011
		Mathematical Sciences Research Institute (MSRI), Berkeley, USA	May 2011
8	Arvind Nair	National University of Singapore, Singapore	Jan 2015
9	Nitin Nitsure	University of Aarhus, Denmark	Jan 2014
		Isaac Newton Institute of Mathematical Sciences, Cambridge, U.K	Jan - Feb 2011
		Mathematical Sciences Research Institute, Berkeley	
10	Dipendra Prasad	CRM, Montreal	Mar 2015
		MSRI	Aug – Dec 2014
		Jussieu, Paris	Jun 2014
		Banff, Canada	Jun 2014
		1Tsinghua University, Beijing	Jun 2013
		Marseille, France	Jun 2013
		ICTP, Trieste, Italy	Jun 2013
		National University of Singapore, Singapore	Oct 2011 and Mar 2012
		Morning Side Center, Beijing	May - Jun 2011
		RIMS, Kyoto	Sep 2010
		Harvard University	Jun 2010
11	C.S. Rajan	Universite de Paris Nord	Jun 2013

	Name of faculty member	Place visited	Date (MM/YYYY)
		Max Planck Institut fur Mathematik at Bonn, Germany	May 2013
		International Centre for Theoretical Physics (ICTP), Trieste, Italy	Oct 2011
12	Ravi Rao	International Centre for Theoretical Physics (ICTP), Trieste, Italy	Dec 2012
		St. Petersburg University, Russia	Sep 2012
		Jilin University, China	Aug 2012
		Pennsylvania State University	Sep – Nov 2010
13	S. E. Rao	Shanghai Jiatong University, Shanghai	Jun 2014
		Chinese Academy of Sciences, Beijing, China	May 2014
		Aarhus University	Mar 2013
		University of Uppsala, Sweden	Sep 2012
		Chinese Academy of Sciences, Beijing, China	Aug 2012
		Institute of Physics and Mathematics, Tehran, Iran	May 2011
14	S. K. Roushon	Kunming University of Science and Technology, Kunming, China	Jul 2012
		University of Aegean in Karlovassi, Samos, Greece	Jun 2012
15	A. Sankaranarayanan	Shandong University, Shandong	Sep 2014
		Institute of Mathematics, Academia Sinica (Chinese Academy), Beijing	Aug 2014
		Peoples Republic of China	Sep 2013
		National Institute for Mathematical Sciences, Daejeon, Republic of Korea	Aug 2013
		Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea	Mar 2013
		National Institute for Mathematical Sciences (NIMS), Republic of Korea	Apr 2012 – Mar 2013
		Yonsei University	Jan 2013
		Pohang Mathematical Institute (PMI), POSTECH,	Dec 2012

	Name of faculty member	Place visited	Date (MM/YYYY)
		Pohang, Republic of Korea	
		Institute of Mathematics, Hong Kong University, Hong Kong	Jun 2012
		Keio University, Japan	May 2012
16	N. Saradha	Institut de Mathematiques de Jussieu, Paris	Sep 2014
		CIRM, Luminy	Sep 2014
		University of Debrecen, Hungary	Sep 2014
		University of Zagreb, Croatia	Sep 2014
		University of Leiden, Netherlands	Dec 2010
		Max Planck Institute for Mathematics, Bonn, Germany	Sep – Nov 2010
		Institute for Mathematical Research (FIM) ETH, Zurich	May – Jun 2010
		Institut de Mathematiques de Jussieu, Paris	Sep 2014
17	Navin M. Singhi	Department of Mathematics and Center for cryptology and Information Security, Florida Atlantic University, Boca Raton, Florida, USA	Mar – Aug 2011
		Pennsylvania State University	Sep - Nov 2010
18	J. Sengupta	Universite Paris 13	May – Jun 2014
		IAS Princeton	May – Jun 2013
		ICERM in Brown University	May 2013
		University de Nancy, Institut Eli Cartan	Nov 2012
19	V. Srinivas	Institute for Advanced Study, Princeton, USA	Jan – Apr 2015
		International Congress of Mathematicians, 2014: Gyeongju and Seoul, Korea	Aug 2014
		Freie Universitat, Berlin	Mar – Aug 2014
		University of Southern California, Los Angeles, USA	Apr – Jun 2013
20	R Sujatha	University of British Columbia	Sep – Dec 2010
		Postech University, Korea	Mar – Apr 2010
21	T.N. Venkataramana	Department of Math., Jussieu, Paris	May 2014
		Marburg University, Germany	Jun - July 2014
		Erwin Schrodinger Institute	Oct – Dec 2010

26. Faculty serving in

(a) National Committees

	Name of the Faculty Member	Name of the Committee	Role of the Committee	Term of Service
1	S. M. Bhatwadekar	Inter-Academy Exchange Programme of Indian National Science Academy.	Member	2010-2011
2	Usha N. Bhosle	Sectional Committee for Mathematical Sciences, Indian Academy of Sciences	Member	2012-2013
3	S. G. Dani	National Board for Higher Mathematics		2010-2011
		Executive Organizing Committee for organization of the International Congress of Mathematicians, ICM 2010, Hyderabad	Vice Chairman	Dec 2010
		Indian Society for History of Mathematics	President	2010-2011
		Governing Council, Institute of Mathematics and Applications, Bhubaneswar	Member	2010-2011
		Academic Advisory Committee, Bhaskaracharya Pratishthana, Pune	Member	2010-2011
		Academic Council, Chennai Mathematical Institute, Chennai	Member	2010-2011
		Governing Council, C.R. Rao Advanced Institute for Mathematics, Statistics and Computer Science, Hyderabad	Member	2010-2011
		Programme Advisory Committee, Department of Science and Technology	Member	2010-2011
		Board of Governors, Indian Institute of Science Education and Research	Member	2010-2011

	Name of the Faculty Member	Name of the Committee	Role of the Committee	Term of Service
		(IISER), Thiruvananthapuram		
		Academic Council, University of Hyderabad	Member	2010-2011
4	Eknath Ghate	Mathematical Sciences Research Committee, CSIR	Member	2015-2018
		Project Advisory Committee, SERB	Member	2015-2018
5	R. V. Gurjar	Bhaskaracharya Pratishthana, Pune	Trustee	2010-2014
6	Mahan Mj	National Board of Higher Mathematics	Member	2015-2019
		AFS Syllabus Committee	Member	2016
		SERB PAC Committee in Mathematical Sciences	Member	2015-2018
		IMU National Committee, INSA	Member	2016-2019
		Governing Council, Indian Association for Cultivation of Sciences	Member	2016-2019
7	Arvind Nair	Apex Committee, National Centre for Mathematics	Member	2014-2015
8	Nitin Nitsure	National Board for Higher Mathematics	Member	Till 2015
		Research Projects Committee, National Board for Higher Mathematics	Convenor	Till 2015
		Governing Board, Bhaskaracharya Pratishthana, Pune	Member	Till 2015
		Apex Committee, TIFR-IIT, National Centre for Mathematics	Member	2012-2015
		Governing Council, Chennai Mathematical Institute	Member	2012-2014
9	Dipendra Prasad	Governing Board, IISER, Pune	Member	2010-2015
		Academic Selection Committee, Central University of Bihar	Member	2008-2011
		Apex Committee, National Center of Mathematics	Member	2010-2014
		Jawaharlal Nehru University, New Delhi	Visitor Nominee	2012-Till date
		Centre for Advanced Study, Panjab University	UGC Nominee	2010-2015
		INSA Sectional Committee	Member	2011-2014
		Inspire Program, Department of Science and Technology, New Delhi	Member	2012-Till date

	Name of the Faculty Member	Name of the Committee	Role of the Committee	Term of Service
10	C. S. Rajan	Curriculum Development Committee for Mathematics for Central University of Orissa, Koraput	Member	2010-2011
11	Ravi A. Rao	Bhaskaracharya Pratishthana, Pune	Adjunct Professor	2010-2015
12	A. Sankaranarayanan	Hardy-Ramanujan Society, Bangalore	Life-Member	
		Ramanujan Mathematical Society, Chennai	Life-Member	
		Indian Mathematical Society, Delhi	Life-Member	
13	N. Saradha	Indian Mathematical Society	Member	2010-2015
		Ramanujan Mathematical Society	Member	2010-2015
14	Navin M. Singhi	All India Council for Technical Education	Member	2011-2012
15	R. Sujatha	Scientific Advisory Council to Prime Minister of India	Member	2010-2011
		National Innovation Council, Govt. of India	Member	2010-2011
		Science and Engineering Research Board, India	Member	2010-2011
16	V. Srinivas	INSA-ICSU National Committee for IMU;	Ex-officio Member	2013-2015
		National Board for Higher Mathematics	Member and Chairman	2015
		DST FIST Committee for Math. Sci	Member	2013-2014
		DAE Specialist Group (SG) for Math. Sci	Member	2013-2014
		Academic Council Member, NISER	Member	2013
17	T. N. Venkataramana	Indian National Science Academy, New Delhi	Member	2011-2012
		Selection Committee for mathematical sciences at the Indian Academy of Sciences, Bangalore	Member	2010-2012
		Ramanujan Mathematical Society	Member	2010-2011
		Lie Theory Sectional Meeting, RMS	Organizer	2010-2011

(b) International Committees:

	Name of the Faculty Member	Name of the Committee	Role of the Committee	Term of Service
1	Usha N. Bhosle	Vector Bundles on Algebraic Curves (VBAC)	Member	2010-2014
2	S. G. Dani	Commission for Development and Exchange, of the International Mathematical Union	President	Dec 2010
		Developing Countries Strategy Group, of the International Mathematical Union	Member	Dec 2010
3	Eknath Ghate	Western India Secondary Schools of Committee, University of Pennsylvania.	Chair	2010-2012
4	Anish Ghosh	Isaac Newton Institute, Cambridge, UK	Member	2014-2015
		University of Bristol, UK	Member	2014-2015
		ETH Zurich, Switzerland	Member	2014-2015
		Aix-Marseilles University	Member	2014-2015
		Institut de Mathematiques de Luminy Technion, Haifa	Member	2014-2015
		Mathematical Sciences Research Institute, Berkeley, USA	Member	2014-2015
5	Navin M. Singhi	Center for Cryptology and Information Security, Boca Raton, Florida, USA	Member	2010-2012
6	R. Sujatha	Scientific Committee : Indo-French Centre for Promotion of Advanced Research (CEFIPRA)	Member	2010-2011
		Scientific Committee: Centre International Mathématiques Pures et Appliqués (CIMPA)	Member	2010-2011
7	V. Srinivas	Executive Committee of the International Mathematical Union	Member	2011-14 and 2015-18
		Inaugural Class of Fellows of American Mathematical Society	Member	2015

(c) Editorial Boards:

	Name of the Faculty Member	Name of the Journal	Impact Factor	Term of Service
1	Amitava Bhattacharya	Ramanujan Mathematical Society - Mathematics Newsletter.		2013-2014
2	Indranil Biswas	Bulletin des Sciences Mathematiques		2012-2013
		ISRN Geometry.		2012-2013
3	S. G. Dani	Journal of Theoretical Probability		2010-2011
		Monatshefte für Mathematik		2010-2011
		Proceedings of the Indian Academy of Sciences (Math. Sci.)		2010-2011
		Ramanujan Mathematical Society Lecture Notes Series		2010-2011
		Sankhya, Indian Journal of Statistics, Ser.A. (Co-editor)		2010-2011
		Ganita Bharati, Bulletin of the Indian Society for History of Mathematics		2010-2011
4	Mahan Mj	Proceedings of the IAS, Mathematical Sciences		2015-2018
		Ramanujan Mathematical Society – Lecture Note Series		2015-2018
5	Nitin Nitsure	Indian Journal of Pure and Applied Mathematics		2012-2014
		Proceedings of the Indian Academy of Sciences (Math. Sci.)		2015
6	Dipendra Prasad	Journal of Ramanujan Mathematical Society		1996-Till date
		Journal of Number Theory		2008-Till date
		Proceedings of Indian Academy of Sciences, Bangalore		2000-2015
		Journal of Pure and Applied Mathematics, New Delhi		2008-2013
		Mathematische Zeitschrift		2011-2012
7	C. S. Rajan	A sequel to the volume Connected at Infinity, presenting work of Indian mathematicians (Co-editor)		2011-2012
		Proceedings of the Indian Academy of Sciences (Mathematics)		2014-2015
8	Navin M. Singhi	European Journal of Combinatorics		2010-2011
		Journal Of Combinatorics, Information and System Sciences		2010-2011
9	V. Srinivas	Mathematische Annalen		2013-2014

		Algebra and Number Theory		2013-2014
		Asian Journal of Mathematics		2013-2014
		Journal of Algebra		2013-2014
		Journal of the Indian Mathematical Society		2013-2014
		Texts and Reading in Mathematics Series (TRIM)		2014-2015
10	R. Sujatha	International Journal of Number Theory		2010-2011
		Journal of Ramanujan Mathematical Society		2010-2011
		Asia Pacific Mathematics Newsletter		2010-2011
		Journal of Pure and Applied Algebra, New Delhi		2010-2011
11	T. N. Venkataramana	Indian Journal of Pure and Applied Mathematics, INSA, New Delhi (Chief Editor)		2011-2015

27. Faculty recharging strategies (UGC, ASC, Refresher / orientation programs, workshops, training programs and similar programs).

As all TIFR faculty members regularly participate in national and international research-oriented symposia, conferences, workshops and schools, often as the organizers or principal lecturers, they are always in touch with the state of the art in their areas of expertise. Therefore, no separate recharging/refresher programmes are needed, nor are any conducted. In fact, TIFR faculty are in great demand as lecturers in such programmes in other institutions, both inside and outside India.

28. Student projects

- percentage of students who have done in-house projects including inter-departmental projects

All 2nd year students in School of Mathematics undergo three courses of their choice, which are often conducted as reading and problem solving projects.

- percentage of students doing projects in collaboration with other universities

/ industry / institute

Almost all TIFR faculty and laboratories have collaborations with scientists in India and abroad. Students of these faculty members and laboratories participate in these projects. Thus the percentage of students involved in such projects may be 95% or more.

29. Awards / recognitions received at the national and international level

- **Faculty Members: (at national level)**

	Name of the Awardee	Name of the Award	Year/ Duration
1.	Usha N. Bhosle	Stree Shakti Science Samman Award	2012
		Fellow of the Indian National Science Academy (INSA)	2010
2	Indranil Biswas	Fellow of the Indian National Science Academy (INSA)	2013
		Shanti Swarup Bhatnagar Award	2006
		B. M. Birla Science Prize in Mathematics	1999
3	S. G. Dani	Srinivasa Ramanujan Medal of the Indian National Science Academy	2010
		Shanti Swarup Bhatnagar Award	1990
4	Eknath Ghate	Fellow of Indian Academy of Sciences	2014
		Shanti Swarup Bhatnagar Award	
5	Yogish Holla	B. M. Birla Science Prize in Mathematics	2006
		INSA Young Scientist Medal	2003
6	Amalendu Krishna	Shanti Swarup Bhatnagar Award	2014
		Swarna Jayanti Fellowship, DST	2010
		B. M. Birla Science Prize in Mathematics	2009
7	Mahan Mj	Infosys Award for Mathematical Sciences	2015
8	Ritabrata Munshi	B. M. Birla Science Prize in Mathematics	2013
		Swarna Jayanti Fellowship, DST	2012
9	Nitin Nitsure	Fellow of Indian Academy of Sciences	2000

	Name of the Awardee	Name of the Award	Year/ Duration
		INSA Young Scientist Medal	1989
10	Dipendra Prasad	J. C. Bose Fellowship, DST	2010
		Shanti Swarup Bhatnagar Award	2002
		B. M. Birla Science Prize in Mathematics	1994
11	C. S. Rajan	Fellow of Indian Academy of Sciences	2014
		Ramanujan Prize, University of Madras	2010
		B.M. Science Prize in Mathematics	2000
12	Ravi Rao	Fellow of the Indian Academy of Science	2014
13	Navin M. Singhi	J. C. Bose Fellowship, DST	2010
14	T. N. Venkataramana	JC Bose Fellowship	2008-18
		Member of American Mathematical Society	2012
		Fellow of Indian National Science Academy	2003
		Fellow of the Indian Academy of Sciences	2001
		Shanti Swarup Bhatnagar Award	2001
		ICTP Prize	2000
		Birla Award for Mathematics	1997
		Young Scientist Award	1990

- Faculty Members: (at international level):**

	Name of the Awardee	Name of the Award	Year/ Duration
1.	Amalendu Krishna	Ramanujan Prize	2015
2.	Nitin Nitsure	ICTP Mathematics Prize	1997
3	V. Srinivas	Humboldt Research Award	2013
4	T. N. Venkataramana	Fellow of the World Academy of Sciences	2014
		ICTP Mathematics Prize	1998

- Students, Postdocs, Scientific Staff and Others:**

	Name of the Awardee	Name of the Award	Year/ Duration
1.	Prashant Arote	National Board of Higher Mathematics (NBHM) Ph.D Fellowship Award	2015
2.	Omprokash Das	INSPIRE Faculty Award, Session II, DST, Government of India	2015
3.	Shreyasi Datta	National Board of Higher Mathematics (NBHM) Ph.D Fellowship Award	2015

		Inspire Scholarship	2010-2015
4.	Anupam Mondal	UGC Fellowship	2012
5.	Mandira Mondal	National Board of Higher Mathematics (NBHM) Ph.D Fellowship Award	2011
6.	Anuradha Nebhani	Dhirubhai Ambani Foundation Scholarship	2003
		Young Science Fellowship, IISc	2003
7.	Rakesh Pawar	Shyama Prasad Mukherjee Fellowship Award, CSIR	2011
8.	Vivek Rai	NBHM Undergraduate Scholarship	2008
		KVPY Scholarship	2009
		NBHM M. Sc Scholarship	2012
9.	B. Ravinder	Shyama Prasad Mukherjee Fellowship Award, CSIR	2009
		National Board of Higher Mathematics (NBHM) Ph.D Fellowship Award	2009
		Gold Medal in M.Sc, University of Hyderabad	2009
10.	Husney Parvez Sarwar	IMS scholarship for topped in MSC. IIT Guwahati	2009
		Silver Medal (Dept. of Math., IIT Guwahati)	2010
11.	K. V. Shuddhodan	Shyama Prasad Mukherjee Fellowship Award, CSIR	2011

30. Seminars/ Conferences/Workshops organized and the source of funding (national/ international) with details of outstanding participants, if any.

	Year	Name of the event	Funding Agency	Faculty Members
1	2016	Groups, Orbits and Diophantine Approximation	ISF-UGC	Anish Ghosh
		International Colloquium on K-theory	DAE	Ravi Rao, V. Srinivas, Amalendu Krishna, S.K. Roushon, and A. J. Parameswaran
2	2015	40 years of the Eta Invariant	DAE	Ravi Rao
		Discussion Meeting on Geometric and Ergodic Aspects of Group Actions	DAE	Siddhartha Bhattacharya and Anish Ghosh
		Discussion Meeting on Algebraic and Analytic Geometry related to Bundles	DAE	Indranil Biswas and A.J. Parameswaran
		Discussion Meeting on Analytic Number Theory 2015	DAE	R. Munshi and A. Sankaranarayanan

	Year	Name of the event	Funding Agency	Faculty Members
3	2014	Conference on Algebraic Cycles and Related Topics	DAE	Amalendu Krishna
		ICTS Advanced School and Discussion Meeting on Symplectic Geometry and Contact Topology	DAE	Indranil Biswas and Mahan Mj
		ICTS Srinivasa Ramanujan Lecture Series on Automorphic forms and Galois representations	DAE	Chandrasekhar Khare
		Discussion Meeting on Analytic and Algebraic Geometry	DAE	Indranil Biswas and A.J. Parameswaran
		Workshop and Conference on Local Langlands Conjecture and Galois Representations	DAE	Eknath Ghate, Chandrashekhar Khare, Dipendra Prasad, CS Rajan
4	2013	ATM Workshop on Classical and Non-stable Algebraic K-theory	DAE	C. S. Rajan, Ravi A. Rao
		International Conference on Analytic and Algebraic Geometry related to Bundles	DAE	Indranil Biswas and A.J. Parameswaran
		Workshop on Representation Theory of Real Lie Groups	DAE	T. N. Venkataramana
5	2012	International Conference on Recent Trends in Discrete Mathematics	DAE	Amitava Bhattacharya, Indranil Biswas, Najmuddin Fakhruddin, Dipendra Prasad
		International Conference on Complex Analytic Geometry	DAE	Indranil Biswas and A.J. Parameswaran
		International Colloquium on Automorphic Representations and L-functions	DAE	Dipendra Prasad, J. Sengupta, C. S. Rajan and A. Sankaranarayanan
6	2011	International Conference on Cohomology of Arithmetic Groups	DAE	S.G. Dani, D. Prasad, C.S. Rajan, T.N. Venkataramana
7	2010	Analytic Question in Arithmetic	DAE	J. Sengupta

31. Code of ethics for research followed by the departments

The School of Mathematics follows the TIFR Guidelines on Academic Ethics (See Annexure B2-B).

32. Student profile programme-wise:

Program	Applications received	Selected		Joined		Pass %	
		Male	Female	Male	Female	Male	Female
Ph.D.	13277	38	9	27	5	85	80

33. Diversity of students

a) Geographical:

Students	Ph.D.		Integrated-Ph.D.		Total
	Male	Female	Male	Female	
From the state where the university is located	1	0	0	0	1
From other states of India	17	4	6	0	27
NRI Students	0	0	0	0	0
TOTAL	18	4	6	0	28

b) Undergraduate Institution :

	Ph.D.		Integrated M.Sc.-Ph.D.		Total
	Male	Female	Male	Female	
From Universities	5	1	2	0	8
From premier science institutions †	7	1	3	0	11

From premier professional institutions #	6	2	1	0	9
From others*	0	0	0	0	0
Foreign Universities	0	0	0	0	0
Total	18	4	6	0	28

† Science institutions, e.g. CBS, NISER, etc.

IITs, NITs, etc.

34. How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise.

	Examination	No of students who cleared
1.	Civil Services and Defense Services	0
2.	CSIR-NET	19
3.	SET	1
4.	GATE	11
5.	IIT-JAM	2
6.	IIT-JEST	1
7.	NBHM	4

35. Student progression

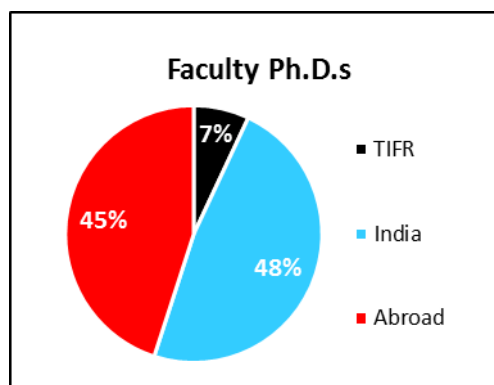
- Ph.D. programme: Most of the students admitted to the School of Mathematics go on to complete the course work and get their Ph.D.'s. Once in a while (less than one per year), a student may opt out of the programme, for various reasons. Normally, after completing their Ph.D., students have to leave TIFR. The vast majority go elsewhere for postdoctoral research. A small number (less than 10%) go for other employment, such as teaching positions or industry.
- Integrated M.Sc.-Ph.D. programme: Most of the students admitted to the School of Mathematics go on to complete the course work and get their M.Sc.'s and Ph.D.'s. Once in a while (less than one per year), a student may opt out of the

programme, for various reasons. Normally, after completing their Ph.D., students have to leave TIFR. The vast majority go elsewhere for postdoctoral research. A small number (< 10%) go for other employment, such as teaching positions or industry

36. Diversity of staff

Number of faculty who are Ph.D.'s

from TIFR :	2
from other institutions in India :	14
from institutions Abroad:	13
Total No	29



37. Number of faculty who were awarded M.Phil., Ph.D., D.Sc. and D.Litt. during the assessment period

The minimum eligibility criteria for selection as a member of the TIFR faculty is a Ph.D. degree. Thus, this number is not relevant.

38. Present details of departmental infrastructural facilities with regard to

a. Library

School of Maths, like other departments of TIFR in the Colaba campus, makes use of the TIFR library and Scientific Information Resource Centre (SIRC).

b. Internet facilities for staff and students

School of Maths, like other departments of TIFR, uses the Computer Centre and Communication Facility (CCCF).

c. Total number of class rooms

School of Maths, like other departments of TIFR in the Colaba campus, makes use of the common class rooms and lecture theatres of TIFR.

d. Class rooms with ICT facility

All the classrooms have ICT facilities like overhead projectors, Wi-Fi, etc. Video conferencing is also conducted in most of the lecture rooms.

e. Students' laboratories : None

f. Research laboratories : None

39. List of doctoral, post-doctoral students and Research Associates

Post-Doctoral Fellows	Research Scholars	
1. Ananyo Dan	1. Kuntal Chakraborty	15. Rakesh Pawar
2. Omprokash Das	2. Sujoy Chakraborty	16. Ankit Rai
3. Souvik Goswami	3. Shreyasi Datta	17. Vivek Kumar Rai
4. Ritwik Mukherjee	4. Arijit Ganguly	18. Charanya Ravi
5. Santosh Nadimpalli	5. C. Gangopadhyay	19. Arideep Saha
6. Anuradha Nebhani	6. Mainak Ghosh	20. Rijul Saini
7. Tali Pinsky	7. Abhishek Gupta	21. Gobinda Sau
8. B. Ravinder	8. Rahul Gupta	22. Divyum Sharma
9. Vivek Sadhu	9. Pritam Majumder	23. Sampat K. Sharma
10. Husney P. Sarwar	10. Amiya Mondal	24. Amit Shastri
11. R. Sivaguru	11. Anupam Mondal	25. K. V. Shuddhodan
12. Rohith Varma	12. Mandira Mondal	26. Lovy Singhal
-	13. Pratyush Nath	27. Bhamidi S. Sreedhar
-	14. Arjun Paul	28. Ravitheja Vangala

40. Number of post graduate students getting financial assistance from the university.

Since all the students of School of Maths are enrolled in doctoral programmes, they are provided with TIFR fellowships.

41. Was any need assessment exercise undertaken before the development of new programme(s)? If so, highlight the methodology.

School of Maths and TIFR as a whole, has been training students for Ph.D. since its inception in 1945. Right from the beginning, the School of Mathematics has admitted exceptionally well prepared students who only have B. Sc for their Ph. D program along with M. Sc students. The Integrated Ph. D program was formalized only by recently in the year 2012.

42. Does the department obtain feedback from

- a. faculty on curriculum as well as teaching-learning-evaluation? If yes, how does the department utilize the feedback?

The Subject Board of Mathematics is constantly in touch with the Instructors of different courses, and collects their feedback at regular intervals. This is used to (a) advise the Instructors, (b) update the Syllabus, and (c) fine-tune the curriculum.

- b. students on staff, curriculum and teaching-learning-evaluation and how does the department utilize the feedback?

The Subject Board of Mathematics needs individual graduate students to get their feedback on courses and research projects. The relevant points in this are communicated to the Instructors and research supervisors for necessary modification and rectification in their pedagogic styles. These feedback forms also form an important input in selecting a faculty for the Excellence in Teaching Award of the TIFR Alumni Association.

- c. alumni and employers on the programmes offered and how does

the department utilize the feedback?

Currently no such feedback is collected on a formal basis.

43. List the distinguished alumni of the department (maximum 10)

	Name of the Alumnus	Reason for Distinction
1.	K. Chandrasekharan	Professor Emeritus at ETH Zurich, and a founding faculty member of School of Mathematics, TIFR
2.	K. G. Ramanathan	Known for his work in number theory. His contributions are also towards the general development of mathematical research and teaching in India
3.	M. S. Narasimhan	Well known along with C S Seshadri for their proof of the Narasimhan-Seshadri theorem. Fellow of the Royal Society and Honorary Fellow of TIFR
4.	C. S. Seshadri	Founder-Director of the Chennai Mathematical Institute. Fellow of the Royal Society and Honorary Fellow of TIFR
5.	M. S. Raghunathan	Head of the National Centre for Mathematics, Indian Institute of Technology, Mumbai. Fellow of the Royal Society and Honorary Fellow of TIFR
6.	V. K. Patodi	Famous for applying the heat equation methods to the proof of the Atiyah-Singer Index Theorem for elliptic operators
7.	S. G. Dani	Professor of mathematics at the Indian Institute of Technology, Bombay. Important contributions to the area of ergodic theory
8.	R. Parthasarathy	Important contributions to Representation Theory of real Lie groups
9.	M. V. Nori	Important contributions to algebraic geometry. Currently a professor at the University of Chicago
10.	Chandrasekhar Khare	Important contributions to Number Theory. Currently a professor at the University of California, Los Angeles. Fellow of the Royal Society

44. Give details of student enrichment programmes (special lectures / workshops / seminar) involving external experts.

As Item No 30 shows, the School of Maths regularly conducts conferences etc.

which are attended by all the doctoral students, and these provide the required introduction to the state of the art in the subjects of their research. In addition, TIFR has a vibrant programme of seminars, colloquia and public lectures which the students are encouraged to attend and absorb as much information as they can.

45. List the teaching methods adopted by the faculty for different programmes.

The School of Mathematics generally adopts the conventional blackboard teaching methods. Reading courses are also nominally given which included the student reporting on what he/she has learnt.

46. How does the department ensure that programme objectives are constantly met and learning outcomes are monitored?

The Subject board for Mathematics constantly monitors the progress of the students and obtains feedback from faculty and students alike.

47. Highlight the participation of students and faculty in extension activities.

The School of Mathematics faculty, postdocs and students regularly participate in the Outreach Activities of TIFR.

48. Give details of “beyond syllabus scholarly activities” of the department.

The School of Mathematics conducts and participates in the following activities on a regular basis.

- Maths Colloquium
- VSRP Programme

49. State whether the programme/ department is accredited/ graded by other agencies? If yes, give details.

The doctoral programmes in the School of Maths are conducted under the TIFR University, which was recognized as a Deemed University by UGC in 2002.

50. Briefly highlight the contributions of the department in generating new knowledge, basic or applied.

Ever since its inception, the School of Mathematics at TIFR has been holding a prominent place in global mathematics. Over the past several decades the mathematicians at TIFR have contributed to the development of many important ideas, topics and fundamental theorems in mathematics. We list below some of the significant contributions to mathematics done by the members of the school during the past few years.

The study of distribution of prime numbers occupies a central place in number theory. A fundamental insight of Riemann and Dirichlet is that the study of the primes is dual to analytic properties of Riemann zeta functions and its generalizations, especially the zeros of such functions. The Riemann hypothesis is possibly the most important conjecture to be proved in mathematics today. Weaker conjectures called as sub convexity estimates for the behavior of the L-functions have been made, but which still have interesting arithmetic consequences. So far the sub convexity estimates have been known up to degree 2 automorphic L-functions thanks to the work of many eminent mathematicians done over the last 50 years.

One of the important breakthroughs that has come from the Tata Institute in recent years, has been to establish various aspects of the sub convexity estimates for degree 3 automorphic L-functions.

The Langlands program presents a vast generalization of the classical quadratic reciprocity law of Euler, Legendre and Gauss. This has been a cornerstone of number theory for the past 400 years. An important recent development is the confirmation the local Langlands conjectures for classical groups over local fields of positive characteristic.

An exciting development during the past couple of decades has been the emergence of the p-adic Langlands program, motivated in part by the fundamental results of Wiles towards proving Fermat's conjecture. Various aspects of this theory were studied and interesting results were obtained to the question of characterizing CM forms by properties of the Galois representations associated to it.

A question that had its origins in physics is to know the extent to which the spectrum (of Laplace type operators) determines the geometry of spaces. In the context of Riemannian locally symmetric spaces, assuming strong conjectures (Schanuel's conjecture) in transcendental number theory, various commensurability results were established for isospectral spaces by Gopal Prasad and Rapinchuk. Under stronger but natural hypothesis on the equivalence of the spectrum, these results were established without invoking Schanuel's conjecture.

A new way of looking at Diophantine approximations on homogeneous varieties by connecting it with spectral properties of automorphic representations was developed.

In various questions arising in physics, geometry and arithmetic, the study of the actions of the fundamental group (monodromy) has been of fundamental importance. In natural contexts such as the action of braid groups on certain cohomology groups, or arising from the monodromy of hypergeometric differential equations, new and significant results have been obtained towards basic questions such as whether the image of the monodromy is a lattice, and if so, whether it is arithmetic, etc.

The mathematical study of symmetry is the subject of representation theory in mathematics. One of the most natural problems regarding representations, present from the early days of representation theory, concern with restriction problems in representation theory, also known as branching laws. The connection of these branching laws in various arithmetical contexts, that of reductive groups over local fields were extensively studied, a general conjectural framework was established and significant progress towards settling these conjectures have been carried out during the past several years. A new cohomology theory for varieties defined over either the complex numbers or finite fields was developed having a number of interesting properties.

The theory of vector bundles on curves was developed by mathematicians at the Tata Institute from the early 60's. This tradition has been strengthened and various aspects of the moduli of vector bundles on varieties has been intensely studied at the Tata Institute for the past 50 years.

The idea of uniting all the known physical forces, especially gravity and

electromagnetism is a long cherished dream of Einstein. String theory is a modern approach to this topic of grand unification. The moduli theory of curves and that of vector bundles over curves, is fundamental to the development of string theory. The computation of the Chern classes of conformal blocks on the moduli spaces of rational curves with n -punctures, was carried out. These conformal blocks appear naturally in the study of these moduli spaces.

One of the central areas in algebraic and arithmetic geometry is the study of algebraic cycles. The Hodge conjecture and the Standard conjectures of Grothendieck are the basic open problems in this subject. The study of these topics require a mastery of large tracts of modern mathematics, its concepts and techniques. Many basic questions remain unanswered. A basic question is Bloch's conjecture concerning the non-triviality of the group of 0-cycles on smooth, projective surfaces. In an important development, the Chow groups of 0-cycles on normal varieties were related to the Albanese groups of these varieties, and various vanishing theorems and also non-triviality theorems for these groups were established.

A well-known popular theorem in mathematics is the 'Hairy Ball theorem' asserting that the hair cannot be combed flat on any head. The context of this theorem has been vastly generalized. The question of triviality of vector bundles or projective modules based on the geometry of these spaces is of fundamental interest in algebra and geometry. One of the finest results that came in the last few years resolves a long standing conjecture of over 40 years. It was shown that stably free modules of rank $d-1$ on a d -dimensional normal affine algebra over an algebraically closed field of sufficiently large characteristic is free.

51. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of the department.

Strengths

- Research:

The School of Mathematics is recognized in the world as one of the leading centers of mathematical research. Very important new mathematical developments have

emerged from here.

- **Graduate Program:**

The graduate school of the School of Mathematics is one of the strongest Ph.D. programmes in India. This was formally established in 1951, It has produced a very large number of distinguished mathematicians of high international repute. The Ph.D's of TIFR have gone on to lead all the major mathematics departments in the country. The graduate students of TIFR are recognized for their depth and breadth of mathematical scholarship, and their knowledge of the latest developments combined with a high level of creativity.

Weaknesses

- The various research areas within mathematics that are currently represented in the School of Mathematics, TIFR, are a small fraction of the total spectrum of mathematics. We need to cultivate new areas in addition to areas of our traditional strength.
- Despite having the strongest pure mathematics department in the country, our presence in the national university system and in various decision making bodies, etc. is rather limited. We need to get more involved, and provide academic leadership to the Indian mathematical community.

Opportunities

- The rise of internet has provided us with the opportunity to make more web-based programmes including videos of lectures, so as to reach out to mathematics students in the Country on a large scale.
- As the society becomes more knowledge based, and as high technology becomes more and more important, there is an opportunity to make significant use of modern mathematics in emerging new areas of applications, which may be entirely unexpected so far.

Challenges

- The brain drain of top students to the West means that we lose many potential good students and faculty members. This is a huge challenge.

- Even though our budget requirements are small, given the abstract nature of our subject it is not very easy to convince all policymakers that it is worthwhile to support higher mathematics.

52. Future plans of the department

- To recruit the best possible people at all levels – Faculty, postdoctoral fellows and students – irrespective of the area, and provide the best possible working atmosphere for them.
- To run the best mathematics graduate school in the country and turn out high quality Ph. Ds.
- We will ensure that the best possible mathematicians from across the world visit us and our people get opportunities to interact with the best people in the world.
- To continue with our work of nurturing Students and young Faculty in the country by training activities and collaborations (including those via the National Board for Higher Mathematics, National Center for Mathematics etc.).
- To have a vigorous programmes of lectures, seminars, conferences and colloquia which will keep us abreast with the latest important research developments in world mathematics, and allow us to contribute to the progress.