

**B3-XIII**

**Centre for**

**Applicable Mathematics**

**(CAM)**





---

### Centre for Applicable Mathematics

1. Name of the Department :

TIFR- Centre for Applicable Mathematics (CAM)

2. Year of establishment:

1972

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

Yes, it is a part of School of Mathematics, TIFR, Mumbai.

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

1. Ph.D. in Mathematics
2. Integrated M.Sc.-Ph.D. in Mathematics (I-Ph.D.)

Students who cannot complete their Ph.D. degrees, but have completed some basic requirements may be awarded **M.Phil.** degrees. However, no students are admitted purely for an M.Phil programme.

5. Interdisciplinary programmes and departments involved

Not Applicable.

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

Not Applicable.

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

Not Applicable.

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

Semester

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

Not Applicable.

10. Number of faculty positions:

	Faculty Designation with DAE Grade	Abbreviation (Item 11)	Number
1.	Distinguished Professor (J)	Ds. Professor (J)	0
2.	Senior Professor (I)	Sr. Professor (I)	2
3.	Professor (H)	—	4
4.	Associate Professor (G)	Assoc. Professor (G)	3
5.	Reader (F)	—	5
6.	Fellow (E)	—	-
		Total	14

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

	Name	Deg*	Designation	Specialization	Exp <sup>†</sup>	Stu <sup>‡</sup>
1.	Prof Adimurthi	Ph.D.	Senior Professor (I)	Partial Differential Equation Variational Methods	42	1
2.	Prof Jospeh KT	Ph.D.	Senior Professor (I)	Partial differential equations, especially of Hyperbolic and parabolic type Analysis of boundary layers, classical Shock waves and delta waves.	33	2
3.	Prof Vasudeva Murthy A S	Ph.D.	Professor (H)	Numerical Analysis of PDE of Evolutionary type Mathematical modelling of Atmospheric Phenomenon	34	3
4.	Prof Veerappa Gowda G D	Ph.D.	Professor (H)	Partial Differential Equation Numerical Analysis Conservation Laws	34	3
5.	Prof Mythily Ramaswamy	Ph.D.	Professor (H)	Partial Differential Equations Nonlinear Functional Analysis Optimal Control Problems	37	3

	Name	Deg*	Designation	Specialization	Exp <sup>†</sup>	Stu <sup>‡</sup>
6.	Prof Vanninathan M	Ph.D.	Professor (H)	Partial Differential Equation Numerical Analysis Homogenization Controllability	41	
7.	Dr Sandeep K	Ph.D.	Associate Professor (G)	Partial Differential Equation Variational Methods Non-Linear Functional Analysis	11	2
8.	Dr Prashanth K Srinivasan	Ph.D.	Associate Professor (G)	Variational Methods Partial Differential Equations of Elliptic type	13	2
9.	Dr Aravinda Cs	Ph.D.	Associate Professor (G)	Geometric Analysis Ergodic Theory Topology	8	1
10.	Dr Ujjwal Koley	Ph.D.	Reader	Partial Differential Equations Numerical Analysis for Hyperbolic PDEs	1	
11.	Dr Venkateswaran P Krishnan	Ph.D.	Reader	Inverse Problems Integral Geometry Image Reconstruction Microlocal Analysis	4	
12.	Dr Imran H Biswas	Ph.D.	Reader	Partial Differential Equation Stochastic Analysis	5	1
13.	Dr Sreekar Vadlamani	Ph.D.	Reader	stochastic analysis and random fields	5	
14.	Dr Praveen C	Ph.D.	Reader	Computational Fluid Dynamics Shape Optimazation for Fluid Flows Discontinuous Galerkin Methods Uncertainty Quantification Parallel Computing	7	

\* 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

	<b>Name</b>	<b>Period</b>
1.	V S Borkar	2011
2.	Govind Menon	2011
3.	Giavanni P Galdi	2011
4.	Siddhartha Mishra	2012-15
5.	Sagun Chanillo	2012-15
6.	Malabika Pramanik	2014-17
7.	Mokshay Madiman	2014-17

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

Not Applicable

## 14. Programme-wise Student Teacher Ratio

	<b>Programme</b>	<b>Students (S)</b>	<b>Faculty (F)</b>	<b>Ratio S/F</b>
1.	Ph.D.	1	14	0.07
2.	Integrated M.Sc.-Ph.D.	17	14	1.21
3.	M.Sc.	–	–	–

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

<b>Scientific and Technical Staff</b>	<b>Administrative and Auxiliary Staff</b>
3	12

## 16. Research thrust areas as recognized by major funding agencies

1. Applications of Nonlinear Functional Analysis in the Study of Differential Equations.
2. Control Aspects of Partial Differential Equations.
3. Hyperbolic Equations and Conservation Laws.
4. Homogenization and Solid Fluid Interactions.
5. Numerical Analysis of PDE (Special Reference to Atmospheric Dynamics).
6. Microlocal Analysis.
7. Stochastic Analysis and Random fields.
8. Stochastic Partial Differential Equations.
9. Differential Geometry and Dynamics.

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.

**National**

	Agency	Project Title	Total Grant (Rs. lakhs)	Duration (years)	Faculty member
1.	Naval Physical & Oceanographic Laboratory, Kochi	Bistatic towed Synthetic Aperture Sonar image	3.3	1.25	Dr. Venkateswaran P Krishnan
2.	Indo-French Center for Applied Mathematics	PDE- Control	--	--	Prof. Mythily R
3.	AIR BUS	Mathematics of Complex Systems	100	4	Prof. Mythily R

18. Inter-institutional collaborative projects and associated grants received

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 (years)	Faculty member
1.	DAE	XII Plan Projects - CAM	325	5	All CAM faculty

20. Research facility / centre with

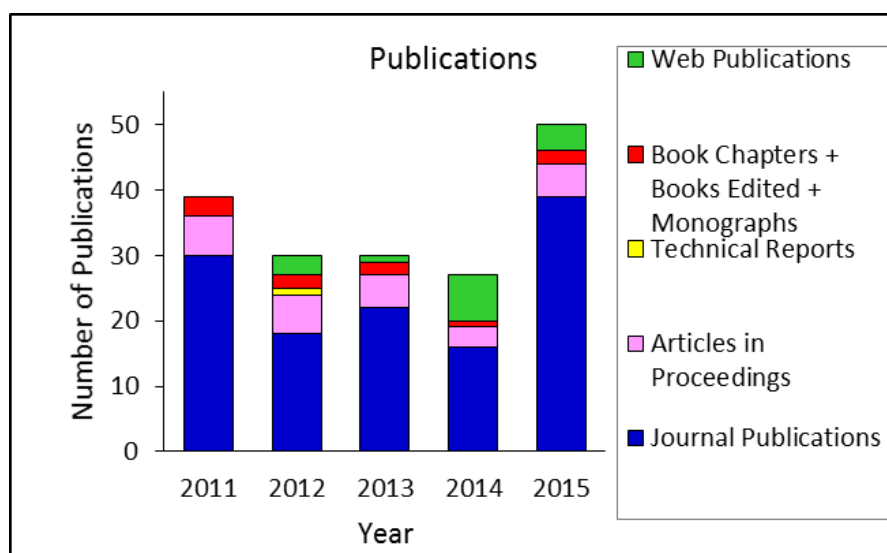
- state recognition :
- national recognition :
- international recognition : None

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

Not applicable

22. Publications:

CAM	Journal Publications	Articles in Proceedings	Technical Reports	Web Publications	Book Chapters	Books Edited	Mono graphs
2010-11	30	6	-	-	3	-	-
2011-12	18	6	1	3	2	-	-
2012-13	22	5	-	1	2	-	-
2013-14	16	3	-	7	1	-	-
2014-15	39	5	-	4	1	1	-
<b>Total</b>	<b>125</b>	<b>25</b>	<b>1</b>	<b>15</b>	<b>9</b>	<b>1</b>	<b>-</b>



\* Citation Index – range / average

- Total number of citations: 3054 (Source: MathScinet)
- Number of citations per faculty: 218
- h-index: Range: 4 - 23



## 23. Details of patents and income generated

Notice of Allowance for patent grant from the Chinese Patent Office has been received for the invention of "Optimal Wing Planforms for Reducing the Induced or Total Drag of the Wing of an Aircraft Driven by Wing-Mounted Tractor Propellers/Rotors".

Dr. Praveen Chandrashekarappa is one of the inventors.

## 24. Areas of consultancy and income generated

Not applicable

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

**International Visits :**

	<b>Name of Faculty member</b>	<b>Institution and Location visited</b>	<b>Year</b>
1.	Dr Amit Apte	North Carolina	2011
		Providence USA	2011
		Oxford Man Institute and WarwickUniversit	2012
		University of Nice Sophia Antopolis, France, and the National University of Colombia, Bogota, Colom,	2013
2.	Dr Aravinda Cs	ICTP, Trieste, Italy	2013
		To visit Tom Farrell at SUNY Binghamton, SUNY Binghamton	2014
		University of Zurich, Zurich	2014
		Northwestern University, Evanston	2014
		Italy, Italy	2015
3.	Dr Debraj Chakrabarti	San Diego, California, USA, USA	2013
		University of Western Ontario, Canada, Canada	2013
4.	Dr Imran H Biswas	Rio De Janeiro, Brazil, Brazil	2014
		To visit University of Wurzburg, Germany	2015
		University of Pau, France	2015
		Beijing, China, China	2015
		IISER Kolkata, India	2015
5.	Dr Prashanth K Srinivasan	France, France	2013

	Name of Faculty member	Institution and Location visited	Year
		University of New York, New York, USA, USA	2013
		Madrid, Spain and CUNY, New York, USA	2014
		Department of Mathematics, University of Pau, France from 1 to 14 July 2015 and Department of Mathe, France, New York	2015
6.	Dr Praveen C	Toulouse	2011
		Univ. of Wuerzburg, Germany, Germany	2013
		Univ. of Wuerzburg, Germany	2014
		Univ. of Paul Sabatier and Univ. of Wurzburg,	2014
		Banff, Alberta, Canada	2015
		Univ. of Wurzburg, Germany	2015
7.	Dr Sandeep K	IMPA Rio-de Janeiro Brazil	2012
		Rome, Italy	2013
		University of Pau, France, France	2014
		University of Basel, Switzerland	2015
		University of Rome <sup>3</sup> , Roma	2015
		Politecnico di Torino, Italy	2015
8.	Dr Seema Nanda	Arizona, Arizona	2013
		Osaka, Japan, Japan	2014
		lahore, Pakistan	2014
		Arlington, Virginia. , USA, USA	2014
		Univ of Tennessee, Knoxville, USA, USA	2015
9.	Dr Sreekar Vadlamani	University of Rome-2, Italy	2013
		to visit the University of Rome at Tor Vergata, and ESSEC-Paris	2014
		Lorentz Center, Leiden, Netherlands	2014
		Prof. Marie Kratz, France	2015
		University of Michigan, Ann Arbor, US	2015
		Technion, Israel, ISRAEL	2015
		Technion, Israel	2015
		School of Mathematical Sciences, Monash University, Melbourne, Australia	2016
10.	Dr Ujjwal Koley	Department of mathematics, Würzburg, Germany, Germany	2015
11.	Dr Venkateswaran P Krishnan	Mittag-Leffler Institute, Sweden, Sweden	2013
		University of Wurzburg, Germany,	2013

	Name of Faculty member	Institution and Location visited	Year
		Germany	
		American Institute of Mathematics in Palo Alto, California, USA, USA	2013
		University of Texas at Arlington, USA	2013
		University of Texas, USA	2014
		Turkey, Turkey	2014
		Madrid, Spain, Spain	2014
		University of Stuttgart, Germany, Germany	2014
		Finland, Finland	2015
		University of Texas at Arlington, Texas, USA and Brown University, Rhode Island, USA, USA	2015
		Beijing, China	2015
12.	Prof Adimurthi	University of Paris 6, Paris	2012
		University of Uppsala Sweden	2012
		Basque Centre for Applied Mathematics, Spain	2013
		Laboratoire de Mathématiques de Besancon, France,	2013
		LMAP (UMR 5142), 64013	2013
		Uppsala University, Sweden, Sweden	2014
		Wuerzburg, Germany	2015
13.	Prof Mythily Ramaswamy	University of Toulouse, France, France	2013
		University of Bath, United Kingdom	2013
		Baltimore, Maryland and Virginia Tech, Blacksburg, USA, USA	2014
		CUNY, USA, USA	2014
		Lorentz Center, Netherlands	2014
		Toulouse University, France	2014
		CUNY Graduate Center, US, US	2015
		to visit Toulouse University, France	2015
		Beijing, China	2015
		Edinburgh, UK, UK	2015
14.	Prof Srikanth P N	Mexico city, North America	2015
15.	Prof Vanninathan	Kogakuin University Japan	2012
		University of Paris 6, France	2013
		L'Ecole Polytechnique, France	2013
		University of Rennes, France	2013
		University of Toulouse, France, France	2013
		Ecole Polytechnique, France, France	2014

	Name of Faculty member	Institution and Location visited	Year
		University Paul Sabatier, Toulouse,France, France	2014
16.	Prof Vasudeva Murthy A S	Lorentz Centerc, Holland	2014
		Kogakuin University and Waseda University, Japan	2012
17.	Prof Veerappa Gowda G D	INRIA, France	2014
		University of Pau, France	2015
		University of Wuerzburg, Germany	2015

All the faculty are invited to visit other laboratories /institutions in India and abroad

26. Faculty serving in

<b>(a) National Committees :</b>				
	Name of the Faculty Member	Name of the Committee	Role in the Committee	Term of Service
1	Prof. Joseph KT	Mathematical Sciences	To select fellows of INSA and select Young scientist and recommend their names to the Council, INSA.	2015-2017.
2	Prof. Mythily R	Science Education Panel in the Indian Academy of Sciences, Bangalore.  Project Monitoring Committee of SERB for Mathematical Sciences  Board of Governors IIT Gandhinagar.  Standing Committee on IISER's	selection of summer research fellowships of the Science Academies  Project Monitoring	2006 for 6 years  since September 2015.  since March, 2016  Since March 2016

**(b) International Committees :**

Name of the Faculty Member	Name of the Committee	Role of the Committee	Term of Service
Prof. Mythily R	Member of the Subcommittee for the International Council for Industrial and Applied Mathematics	Su Buchin Prize	2015
	Olga Taussky-Todd Lecture selection committee at the International Council for Industrial and Applied Mathematics		2015

**(c) Editorial Boards :**

	Name of the Faculty Member	Name of the Journal	Impact Factor	Term of Service
1.	Prof. Mythily Ramaswamy	JI Ramanujam Mathematical Society,	Not assigned	Jan 2015 onwards
		Boundary Value Problems	1.014	June 2015 onwards
		Proceedings of Mathematical Sciences	0.24	November 2014 onwards
2.	Prof. Vasudevamurthy A. S.	Mathematics Student	0.05	1 year
3.	Prof. Aravinda CS	Geometry, Topology, and Dynamics in Negative Curvature Part of London Mathematical Society Lecture Note Series. Geometry Groups & Dynamics. (1) Hardy Ramanujan Journal, (2) RMS Newsletter, (3) Mathematics Student.	0.05	4 Years 8 Years 1 Year
4.	Prof. Veerappa Gowda GD	Indian Journal of Pure and Applied Mathematics	0.224	2014 onwards
5.	Prof. Adimurthi	Differential Equations and Dynamical Systems	0.822	
6.	Prof. Sandeep K	Indian Journal of Pure and Applied Mathematics	0.224	2016 onwards

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

Not Applicable

28. Student projects

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

60 % - In house projects

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

#### National Awards

	Awardee	Name of the Award/Honour	Year
1.	Prof. K Sandeep	B. M. Birla Science prize	2013
2.	Dr. Imran H Biswas	Young Scientist Award	2013
3.	Prof. Adimurthi	JC Bose Fellowship	2013
4.	Prof. K Sandeep	Shanti Swarup Bhatnagar award	2015

#### Recognitions

Recognition	Name of Faculty
Fellow, National Academy of Sciences, Allahabad	Prof. P N Sirkanth
	Prof. Adimurthi
	Prof. Mythily Ramaswamy
	Prof. Veerappa Gowda G D
Fellow, Indian National Science Academy, New Delhi	Prof. Adimurthi
	Prof. K. T. Joseph
	Prof. Veerappa Gowda GD
Fellow, Indian Academy of Sciences, Bangalore	Prof. Adimurthi
	Prof. Mythily Ramaswamy
	Prof. Vanninathan M
	Prof. K.T. Joseph

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

On an average the Center conducts Conferences / Workshops / Seminars / Compact courses once in three months in a year at both national and international level. Important events are indicated below.

	Year	Name	Funding agency	Faculty member
1.	2012	Advances in partial differential equations	TIFR CAM	Prof.Verrappa Gowda, Dr. Sandeep K
2.	2013	International Conference on Conservation laws and applications	TIFR CAM	Prof. Verrappa Gowda GD, Prof. Adimurthi Prof. Joseph KT Dr. Praveen C
3.	2015	Workshop on Control and Numerics for Fluid-Structure Interaction Problems	TIFR CAM, AIRBUS, IFCAM	Sreekar Vadlamani, M. Vanninathan, Mythily Ramaswamy, Venky Krishnan, Praveen Chandrashekar
4.	2015	Advanced Summer School on Control and Numerics for Fluid-Structure Interaction Problems	TIFR CAM IFCAM, AIRBUS	Sreekar Vadlamani, M. Vanninathan, Mythily Ramaswamy, Venky Krishnan, Praveen Chandrashekar

## 31. Code of ethics for research followed by the departments

CAM follows the TIFR Code of Ethics. (Please refer Annexure B2-B)

## 32. Student profile programme-wise:

Numbers are summed over 2011 – 2015 batches.

Name of the Programme	Applications received	Selected		Joined		Pass percentage*	
		Male	Female	Male	Female	Male	Female
Ph.D.	795	2	-	1	0	100	§
I-Ph.D.	1968	61	10	35	5	77	§

§ No female students in these batches

## 33. Diversity of students

## a) Geographical:

Students CAM	Ph.D.		Integrated-Ph.D.		M.Phil.		Total
	*M	*F	*M	*F	*M	*F	
From the state where the university is located	0	0	1	0	0	0	1
From other states of India	1	0	16	0	0	0	17
NRI students	0	0	0	0	0	0	0
Foreign students	0	0	0	0	0	0	0
<b>Total</b>	<b>1</b>	<b>0</b>	<b>17</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>18</b>



## b) Undergraduate Institute:

Students from	Ph.D.		Int.-Ph.D.		Total
	Male	Female	Male	Female	
Indian Universities	0	0	17	0	17
Premier science institutions †	1	0	0	0	1
Premier professional institutions #	0	0	0	0	0
Others*	0	0	0	0	0
Foreign Universities	0	0	0	0	0
<b>Total</b>	<b>1</b>	<b>0</b>	<b>17</b>	<b>0</b>	<b>18</b>

† 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.

We do not have any students who appeared for these exams.

35. Student progression

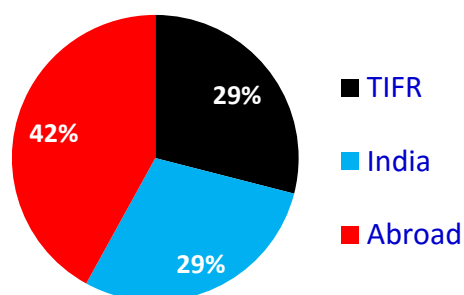
In the past five years 20 students were awarded PhD degree among them, 6 are already faculty members in leading institutions in India like IISER, IIM etc., two of them are inspire faculties at ISI and IISER and remaining are doing their post-doc in leading institutions in India and abroad.

36. Diversity of staff

**Number of faculty who are Ph.D.'s**

from TIFR :	4
from other institutions in India :	4
from institutions Abroad:	6
<b>Total No</b>	<b>14</b>

**Faculty Ph.D.s**



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

Not Applicable, since all the faculty members are PhDs while joining.

38. Present details of departmental infrastructural facilities with regard to

a) Library

CAM has a library spread over 265.72 Sq Meter. It has about 10500 books, 6000 back volumes and 100 theses. It has 8 study tables with chairs, 6 sofa chairs, and 2 study desks. The library staff works from 9.30am to 6.00pm on working days. The academic community at CAM has 24/7 access to the library.

b) Internet facilities for staff and students

CAM has connectivity from Tata Telecommunications and Railtel through NKN.

c) Total number of class rooms

Three

d) Class rooms with ICT facility

All Class rooms have ICT facility.

e) Students' laboratories

Computer Lab is available for Students. Being a centre for mathematics, there are no other laboratories.

f) Research laboratories

Not Applicable.

---

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

**a) List of Ph.D. Students**

1. Deep Ray
2. Indranil Chowdhury
3. Debabrata Karmakar
4. Rohit Kumar Mishra
5. Sombuddha Bhattacharya
6. Madhuresh
7. Manish Kumar Singh
8. Manmohan A
9. Arnab Roy
10. Arka Mallick
11. Neelabja Chatterjee
12. Abhishek Das
13. Neeraj Singh Bhauryal
14. Nilasis Chaudhuri
15. Saibal Khan
16. Saikatul Haque
17. Suman Kumar Sahoo
18. Ganesh Kiran Vaidya

**b) Doctoral students from the host institution/university**

1. Dr.Kaushik Bal
2. Dr. Shirshendu Chowdhury
3. Dr. Manas Ranjan Sahoo
4. Dr. Rishu Saxena
5. Dr. Binoy Ravindran
6. Dr. Eunkyung Ko
7. Dr. Gyula Csato
8. Dr. Anupam Pal Choudhury
9. Dr. Ananta Kumar Majee
10. Dr. Abhishek Sarkar
11. Dr. Denbanja Mitta
12. Dr. Debayan Maity

**c) Doctoral students from other institutions/universities**

1. Dr. Satyanarayana Engu (NBHM)

2. Dr. Ravi Shankar (NBHM)
3. Dr. Rasmita Kar (NBHM)
4. Dr Ravi Prakash (NBHM)
5. Dr. Parantap Shukla – (Funded by his guide in France)
6. Dr. Saumya Bajpai (NBHM)
7. Dr. Prosenjit Roy (NBHM)
8. Dr. Sweta Tiwari (NBHM)
9. Dr. Shirshendu Chowdhury (NBHM)
10. Dr. Surabhi Pandey (NBHM)

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

ALL the students are in doctoral programmes, and hence they are all given TIFR fellowships.

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

Not Applicable

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?

Faculty discusses during Faculty meeting and evaluate the curriculum and make appropriate changes depending on research needs.

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

Students are asked to give the feedback in the Feedback form at the end of each semester. Feedback of students are used for assessing the performance of teachers and improving the quality of teaching.

- c. alumni and employers on the programmes offered and how does the department utilize the feedback?

Not Applicable

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

	Name of the Alumnus	Reason for Distinction
	Professor Siddarth Mishra	Professor at ETH, Zurich. One of the Leading experts in Hyperbolic Conservation laws

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

CAM organizes conferences, workshops, compact courses on various topics and students benefit from these programs.

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

- Class Room Lectures
- Assignments
- Personal Discussions

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

Faculty meetings are conducted at periodical intervals, during the meeting program objectives and learning outcomes are monitored.

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

Mathematics of Planet 2013 was organized by TIFR CAM and ICTS.  
Centre is organizing Visiting Students Research Program every year.  
Instructional Schools for students and teachers are conducted.  
Faculty visit Universities and Institutions to deliver lecture across the country.

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

In house symposia, Students seminars, colloquia, Special lectures from other disciplines

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

The mathematics programme at CAM has been earlier reviewed by the UGC in 2002 and 2010, along with other TIFR Centres.

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

Many important contributions were made in theory and numerics of partial differential equations (pde). In the theory of elliptic pde many path breaking results were obtained, to name a few the discovery of a counter example for a conjecture of Lin and Ni, discovery of sharp hardy inequalities, symmetry and bifurcation results and the discovery of hyperbolic symmetry for Hardy-Sobolev-Mazya equations.

For conservation laws with discontinuous flux a criteria was discovered to check the finiteness of the total variation of a solution. Complete solutions for exact and optimal control problems for convex conservation laws were obtained. An explicit formula for spherically symmetric solutions to the system of multidimensional zero-pressure gas dynamics was derived. An entropy condition was discovered for conservation laws with noise term in source and uniqueness result was established.

Significant controllability results for fluid solid coupling and null controllability results for compressible Navier-Stokes system were established.

Entropy stable and kinetic energy preserving finite volume schemes are developed for compressible Euler equations. An efficient and novel numerical algorithm is developed for inversion of an integral transform arising in ultrasound imaging.

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

Strengths	Weaknesses	Opportunities and Challenges
CAM has an exclusive group of mathematicians in the country, dealing with analysis, computation and applications of partial differential equations for more than three decades.	CAM is working in a campus which is not sufficient for the group to carry out its high quality research.  CAM does not have space or other infrastructure facilities to encourage the students in other extracurricular activities.	Endeavour to train the next generation of teachers for IITs and IISERs, and research personnel for Research laboratories and IT Companies requiring Mathematics for S & T.

52. Future plans of the department

Apart from continuing research and training in our thrust areas of PDE with analysis and its numerics and applications, the centre is planning to explore its applications in emerging areas relevant to the country.