

Summary Report

About Department/Center/School: Since its inception in 1951, the Department has been contributing to teaching and research in Mathematics and Statistics. However, over the past few decades due to rapid growth of Computer Science as an area of Mathematical Sciences, the department has been focusing its attention to Computer Science as well. At present, the Department offers a five-year integrated M.Sc. course in Mathematics and Computing, a Joint M.Sc-PhD course in Mathematics, and a Joint MTech-PhD course in Computer Science and Data Processing. The Department also offers Mathematics, Statistics and Computer Science subjects to students of other departments. The department is well known nationally and internationally for its research in various areas of applied mathematics, functional analysis, algebra, statistics and operations research. The placement record of the students of our department has been very impressive. Almost all of our students are being placed in finance and banking sector, analytics and software industry. Many students take up higher studies in many universities in USA, Canada, UK, Germany, Australia etc. Many of our M.Tech. students take up teaching positions in various engineering institutions.

1. Academic Programs (Range of Degrees and Disciplines):

- Five Year Integrated M.Sc. (Mathematics and Computing) (MC)
- Joint M.Sc.-PhD. (Mathematics) (MA)
- M.Tech (Computer Science and Data Processing) (PG)
- Ph.D

2. Major 4-5 Thrust Areas of Research:

(i) Functional and Complex Analysis (ii) Fluid Mechanics and Differential Equations (iii) Probability and Statistics (iv) Graph Theory and Cryptography (v) Operations Research and Fuzzy Mathematics.

3. Curriculum and Courses & Teaching Environment

Items	Ratio/ Number	Items	Number/%
Teacher-student Ratio	1:191	Average No. of Course done per student for MC/MA/M. Tech/Ph.D	65/25/14/6
No. of Faculty members as on today	30	Average No. of students motivated (%) to opt of careers Eng/ Tech. Sectors UG/PG/PhD	170/100/10
Average No. of Tutorial Assistants	40	Average No. of students motivated (%) to opt of careers in Science sectors UG/PG/PhD	120/25/50
No. of UG students	5400	No. of Students' workshops/`Tinkering` Labs	4
No. of PG students/PhD students	200/130	Average Students placements (%) (MC/MA/PG)	1 to 4
Average no. of tutors with more than 100 students	42	No. of new courses introduced	10
No of courses with more than 100 students	12	Undergraduate Vs PhD strength expressed as Percentage	75/25

No of faculty in courses with more than 100 students	15	No of PG/research labs developed/new set up	3
No. of teaching labs	5	No. of lab classes per week	15
No of Lab courses	9	No. of core/lab/elective/common depth/breadth/seminar/project subjects (MC)	24/7/7/13/3/1/2
Average No. of students per lab/experiments in core courses	40	No. of core/lab/elective/common depth/breadth/seminar/project subjects (MA)	15/4/2/2
No of major curriculum review in both UG & PG level	1	No. of core/lab/elective/common depth/breadth/seminar/project subjects (MTech)	8/6/2/2

4. Research and Development & its Environment

Items	Number	Items	Number	Items	No.
Total No. of Publications in Journals (2008-13)	362	Average no. of citation per paper	3.05	No of large interdisciplinary research projects	2
Total No. of Publications in Conference & Symposium	90	Average Journal publication per year	72	Number of Int. conf./workshops attended by students	6
Total No of Books & e-books published	4	h-Index of the department since 2008/overall h-index in Scopus	20	No. of PDF hired in the dept	3
Total No of e-courses developed	10	Number of papers with citation more than the average no. of citation of the Journals	350	No. of international Students as PhDs/PDFs	0
Total No. of Technology Developed/transferred	0	No. of recognitions & Awards, fellows etc to faculty/students (provide break up if necessary)	2/2	No. of International visiting researchers/adjunct faculty stayed here for at least a week	5
Total No. of Patents Filed/Obtained	0	Average Retention(%) of Young faculty for at least 10 years	75	No. of short courses/workshops /conf. organized with international participations	0
Total No. of Copyright Filed/Obtained	10	No. of Sponsored research Project /fund(lakh) generated from non-internal source	26/248.90	Average No. of PhD granted per year	12
No. of Publications per Faculty/Masters/PhD	12/1/4	No. of Consultancy /fund (lakh) generated from non-	19/792.98	Average No. of PhD Granted per year per faculty	0.4

students		internal source			
No. of Publications per Faculty/Masters/PhD students in Top Ten Journals as Identified by the department	9/0/2	No of Internal and external Collaborations research papers/research projects/PhD students	30/80/3/1/6/1	Patent granted per faculty	0
Average No. of Citation per faculty per year	7	No of M. Tech students motivated into pursuing PhD/PhD graduates motivated to pursue career in Academics(abroad or IIT etc)	15/35	Number of articles in collaborations with Ten countries*	30
Ranking of the department in terms of average citations per paper within the Institute	17	Ranking of the department in terms of total number of Journal publications within the Institute/publications per faculty	15	No of articles of the dept. contributing towards h-index of the Institute since 2008	5

5. External Stakeholder Engagement and others

Items	Number	Amount Lakh
No. of PhD/Master students' thesis funded by Industries	0	NA
Total number of Industry sponsored projects and its income (Lakh)	0	NA
No. of Curriculum Development Initiative for Industries	0	NA
No of Technology transfer/adopted by Industry/Labs	0	NA
No. of Nationally relevant research projects	33	269.00
No of Policy inputs/consultancies provided	19	792.98
No. of Research grant and seed money from internal savings of the Institute per young faculty of the department and its total fund	7	19.1
No. of Community Relevant projects	0	NA

6. Vision for the Future (in brief):

(a) Departments/centers/schools should spell out its Mission and Vision Statements, (b) Plans for future to achieve the projected goals and (c) measures adopted towards above.

Vision:

Since the inception of the institute, the department is known for its strength in applied mathematics and statistics. However, considering the increased role of mathematical sciences in various interdisciplinary areas, there is a need to strengthen new emerging fields and specializations such as mathematical finance, bioinformatics, computational fluid dynamics, micro and nano fluids, cryptography and network security, computational functional analysis and big data analytics. Further, there is a need to strengthen the core

areas of mathematics, statistics, operations research and theoretical computer science. Department is also planning to further strengthen the areas such as functional analysis, complex analysis, number theory, algebra, and topology. The department aims to take necessary steps in this direction so that the curriculum will be enriched with subjects in the above related areas, and plan to initiate new programs so that students get better exposure.

We plan to create a vibrant academic environment by holding conferences, workshops and seminars on a regular basis and increasing interaction and collaborating research with other institutions of the world. We have excellent state of art computer laboratory and we further wish to strengthen it by acquiring more high end computers.

7. External peer review of the Dept./centre/schools (in brief):

(a) Date of the peer review: Feb, 2013

(b) Name of the Experts involved and their affiliations in short:

1. Professor D. V. Pai, Visiting Professor, Department of Mathematics, IIT Gandhinagar (Formerly Professor of Mathematics, IIT Bombay)
2. Professor Ashis SenGupta, Applied Statistics Unit, Indian Statistical Institute, Kolkata
3. Professor T. Amarnath, School of Mathematics and Statistics, University of Hyderabad, Hyderabad

(c) Overall recommendations of the peer review committee: Strengths, weaknesses, suggestions and comments (Based on reports received from Reviewers)

➤ Comments on Programmes

(i) Five Year Integrated M.Sc. (Mathematics and Computing) Program

The reviewers are satisfied with the overall structure of the program, its demand and the performance of output in terms of trained manpower. However, they have given suggestions for adding a few topics in some courses, addition of some new courses and reorganization of contents of some existing courses.

- These suggestions are very pertinent and the department will take care of these suggestions at the time of curriculum revision.

(ii) Joint M.Sc.-Ph.D. (Mathematics) Program

According to the reviewers, the program is very good keeping in view that the talented students are very much required to be attracted to the Ph.D. for mathematical sciences. They have also given suggestions for positioning of courses and inclusion of some topics and courses in the curriculum to make it more appealing and effective.

- The department agrees with these suggestions.

(iii) Two Year M.Tech. (Computer Science and Data Processing) Program

On the whole the program looks quite good and relevant to the needs of the manpower training in this domain. Suggestions regarding inclusion of some courses are given.

- The department agrees with these suggestions.

(iv) Five Year Integrated M.Sc. and Two Year M.Sc. (Statistics and Informatics) Programs

These programs are currently under abeyance. However, the reviewers have strongly recommended the revival of both the programs with addition of some faculty in the area of statistics. They have appreciated the course structure and further given suggestions for addition of some more topics and courses.

- The department strongly feels that this course may be revived and effort will be made to recruit faculty in this area.

➤ Comments on the Contributions of the Department

The reviewers have identified **the main thrust** areas of department as:

- (i) Numerical and Applied Functional Analysis
- (ii) Nonlinear Programming, Operations Research, Optimization, Combinatorics
- (iii) Statistical Decision Theory, Inference, Stochastic Processes
- (iv) Mathematical and Computational Fluid Dynamics

The reviewers have identified other research areas of the department as

- (i) Functional Analysis, Complex Analysis
- (ii) Theoretical Computer Science, Cryptography
- (ii) Queuing Theory, Digital Image Processing

The reviewers feel that the research contribution in terms of publications is adequate which is expected to increase further. Contributions towards sponsored research and consultancy, development of video courses etc. is satisfactory.

➤ Overall Observations and Suggestions for Improvement

(A) Strengths: The courses are quite good and seem to be doing well with respect to increasing demand of trained manpower in mathematical sciences.

(B) Weaknesses: The department needs more faculty. The current faculty strength of 30 is very low. The reviewers feel it should be about 40. Special recruitment must be made in area of statistics and the suspended programs in Statistics and Informatics be revived immediately. The idea of visiting faculty, adjunct faculty may also be considered.

The reviewers have suggested awards for teaching and research to motivate faculty.

Important Highlights

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ACADEMIC PROGRAMS (RANGE OF DEGREES AND DISCIPLINES)

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INFRASTRUCTURE

Class rooms: 5
Seminar room: 1
Faculty room : 1
Laboratories: 5

SOFTWARES

S Plus
Mathematica
Matlab
Lingo
Maple



PLACEMENT (2012-2013)

- Five Year Integrated M.Sc. (Mathematics and Computing) 24/25 (96%)
- Joint M.Sc.-PhD. (Mathematics) 14/19
- M.Tech (Computer Science and Data Processing) 7/19

The placement record of the students of our department has been very impressive. Almost all of our students are being placed in finance and banking sector, analytics and software industry. Many students take up higher studies in many universities in USA, Canada, UK, Germany, Australia etc. Many of our M.Tech. students take up teaching positions in various engineering institutions.

SPONSORED AND CONSULTANCY PROJECTS

Research Project

- Total no. of Projects (2008-13): 34 Total Value: Rs 268.00 Lakhs
- Sponsoring Agency: Government: CSIR, DST, ISRO, European Aeronautics Defence Space Company, MHRD

SHORT-TERM COURSES, TRAINING PROGRAMMES AND WORKSHOPS ORGANIZED (2008-13)

1. National Meet of Research Scholars in Mathematical Sciences, IIT Kharagpur, October 2011
2. Session on Statistical Decision Theory in 99th Indian Science Congress, KIET University, Bhubaneswar (Organized an invited session), Jan 2012
3. Recent Advances in Computational Science with Application (one week)
4. Regional Symposium on Mathematics 2010, Jan 2010
5. National Workshop on Some Recent Research Directions in Graph Theory.
6. The Indian Society of Theoretical and Applied Mechanics (ISTAM) An International Meet



RECOGNITIONS & AWARDS (NATIONAL AND INTERNATIONAL)

1. Srivastava, Parmeshwary Dayal, Elected Member - National Academy of Science ,India
2. Gupta, Dharmendra Kumar, Elected Member - Natioanl Academy of Sciences
3. Kumar, Somesh, Elected Member - National Academy of Sciences
4. Kumar, Jitendra, Alexander von Humboldt Fellowship
5. Raja Sekhar, G P, Alexander von Humboldt Fellowship for Experienced Researchers
6. Bhattacharyya, Somnath, Max Planck, Germany Fellowship

