

# *Annual Report* 2016 - 2017



**INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH  
THIRUVANANTHAPURAM**

Vithura, Thiruvananthapuram - 695 551

#### **PUBLICATION COMMITTEE**

Prof. M. P. Rajan

Dr. Ramesh Chandra Nath

Dr. Ravi Maruthachalam

Dr. Gokulnath Sabapathy

Shri. Siva Dutt. V.K

Shri. B. V. Ramesh

Shri. Hariharakrishnan. S

Shri. Manoj Kumar. S

Ms. Divya V. J.

Ms. Nimi Joseph Chaly

**Contact :** 0471-2597459, **Fax :** 0471 2597427

**Email :** registrar@iisertvm.ac.in



# CONTENT

## PREFACE

<b>1. Preamble .....</b>	<b>9</b>
Introduction	
Board of Governors	
Finance Committee	
Building and Works Committee	
<b>2. Human Resources.....</b>	<b>12</b>
Faculty	
School of Biology	
School of Chemistry	
School of Mathematics	
School of Physics	
Emeritus/Honorary/Visiting/Adjunct Faculty	
Administrative and Support Personnel	
<b>3. Academic Programmes and Students.....</b>	<b>21</b>
<b>4. Research and Development Activities .....</b>	<b>23</b>
Collaboration with Foreign Institutions	
New Sponsored Projects	
Ongoing Sponsored Projects	
Completed Sponsored Projects	
<b>5. Research Publications .....</b>	<b>35</b>
Journal Articles	
Conference Articles	
Book Chapters	
Any Other Special Mention	
<b>6. Awards and Honours .....</b>	<b>44</b>
<b>7. Other Academic Activities .....</b>	<b>44</b>
Conference and Workshops Attended	
Invited Lectures and Seminars Delivered	
Conferences and Workshops Organised	
Foundation Day and Science Day Lecture	
Colloquia	
Seminars	
Short Term Courses Organised	
Patents Filed	
Summer Programme	
Counseling Center	
Outreach Activities	
<b>8. Facilities .....</b>	<b>61</b>
Laboratory	
Library	
Computing and Networking Facility	
Hostels	
<b>9. Sports and Cultural Activities .....</b>	<b>65</b>
<b>10. Permanent Campus .....</b>	<b>67</b>
<b>11. Statement of Accounts .....</b>	<b>70</b>



# PREFACE

**Prof. V. Ramakrishnan**  
Director

Date : 24<sup>th</sup> October 2017

I am pleased to report that much has been done, during the last one year, at Indian Institute of Science Education and Research Thiruvananthapuram (IISER TVM). With renewed vigour to continue our mission of providing high quality education and outstanding research at the undergraduate level and with appreciation of what remains to be done, I submit this annual report for the financial year 2016-17.

For the last eight years, since its establishment in 2008, IISER TVM was mostly operating from its transit campus from College of Engineering Thiruvananthapuram. This severely limited the infrastructural development and expansion in terms of students uptake and faculty recruitment at the institute for many years. I am proud to report that this year IISER TVM has successfully begin to operate from its permanent campus in Vithura. The first set of buildings including the Chemical Science Block, two hostels and a dining hall in the permanent campus were made ready for use. Thanks to the efforts of all individuals involved in developing these infrastructure facilities, starting from August 2016, IISER TVM could board and impart education to around 300 students from batches 2015 and 2016 in the permanent campus. Many PhD students have started conducting their research from the campus. Maintaining the momentum, in the past one year, more structures were completed and more facilities were added towards making this a complete and self-contained campus.

Common Instrumentation Facility (CIF) is ready to house several high-end research equipment like 300 kV Transmission Electron Microscope, 0 MHz and 700 MHz NMR, MALDI TOF, HRMS, XPS, PXRD, and SEM1, some of which are already operating from the CIF. Two hostel buildings (DB1 and SB3) and a primary school building were completed. A new bridge was commissioned. To keep with our promise to maintain the natural environment while clearing the space for various buildings, plantation of trees on the campus was initiated. In the large hostel block area near the main entrance, two blocks with around 340 beds are also ready for occupation. Two more hostels, SB4 and SB5 are getting ready within few months to be handed over. Every effort has been made to complete the construction of the remaining two academic blocks along at maximum speed. On the way to shifting the research laboratories from the transit campus to the permanent campus, the Physical Science block is getting ready for occupation. The work on the main entrance gate as well as the indoor stadium will be completed by the start of the next academic year adding much anticipated recreational spaces in

addition to the volleyball court and the courts between the hostel blocks. Construction work on many more buildings has been initiated in the past year months including a shopping center, a health center, a community welfare center and a guest house. As a part of supporting sports and recreational activities, a new outdoor playground is also being built and plans are on to transform it into a full-fledged stadium. Efforts are underway to run the permanent campus in full capacity by the end of 2017 so that the institute can operate entirely from the eco-friendly permanent campus in 2018. The last major part of the campus master plan is also initiated to build the administrative block, lecture hall complex and some more academic area completing the campus as originally envisaged.

In the presence of academic luminaries, IISER TVM community held the 4th convocation this year on May 27th, 2016 in the permanent campus. The function was presided by Shri. Kris Gopalakrishnan, Co- founder Infosys and Chairman, Axilor Ventures. The fourth batch of Five Year BS-MS Dual Degree Programme consisting of 78 students, 1 MS and 10 Ph.D. students were graduated. Many of these students are continuing higher education in reputed institutions worldwide. The institute celebrated its eighth foundation day on October 14th 2016. The chief guest Dr. R. Chidambaram, Principal Scientific Advisor to the Government of India, delivered the foundation day lecture.

This year also, we have been able to attract talented young faculty members to join the institute and increased the number of students to our academic programs. At the end of financial year 2016-17 the institute has faculty strength of 57 and 53 administrative staff. In addition to regular faculty, we have several guest faculty helping with teaching. The total strength of students presently is 907 with 650 in BS-MS Programme, 65 in Integrated Ph.D. Programme, and 192 in Ph.D Programme. In August 2016, 192 students joined the ninth batch of Five Year BS-MS dual degree program. These students qualified to the admission through channels, namely KVPY, IIT-JEE merit list and the Aptitude test conducted jointly for all the IISERs. This year 24 students were admitted to Int Ph.D. programme and 45 students joined Ph.D. programme, with 6 students from IPHD being promoted to PhD programme.

Many distinguished academicians serve as members of the Senate them being associated with the Institute as Honorary Professors, or Visiting Professors. The faculty members of our institute are continuing to do cutting edge research in the frontier areas of science. The faculty members are also optimally using the research opportunities provided by the Memorandum of Understanding (MoUs) that were signed between IISER TVM and other international institutions. The academic environment is

being continuously enriched with exchange of faculty and students, academic visits, organization of conferences and workshops and signing Memorandum of Understanding (MoU) with other institutions.

In addition to ongoing sponsored projects, the faculty members have acquired many new projects. In total research projects worth tens of crores are funded by several funding agencies. IISER TVM has published 111 papers during this period in highly reputed journals. During the last year many recognitions conferred on our faculty members including the Ramanujan Fellowship, Ramalingaswami Fellowship, Kerala State Young Scientist Award, Fellow of the Royal Society of Chemistry, G. D. Naidu Award, INSA Young Scientist Award, Chemical Research Society of India Bronze Medal etc. Thanks to the hard work of teachers and students, students graduated from IISER TVM exhibited competitiveness globally, and considerable percentage of graduating students will be following their research careers in reputed academic/ research institutions in India and abroad, including countries of North America, Europe and Asia. This year also, IISER TVM students were selected for the German Academic Student Exchange Programme (DAAD-WISE) and HarGobind Khorana Programs.

This campus in Vithura, along with adjoining forests are part of the Western Ghats mountain system, is recognized as a UNESCO World Heritage Site and one of the eight Hottest Hotspots of Biodiversity. To facilitate world-class research and education in ecology, evolution and allied disciplines, IISER TVM established IISER-TVM Centre for Research and Education in Ecology and Evolution (ICREEE) under School of Biology. The richly forested tracts and the location make the campus an ideal location for the centre. In the long run, ICREEE has outstanding potential to develop into a world-renowned research hub in ecology and related disciplines.

This year also IISER TVM organized several international conferences and workshops, including Basic Aspects of Nonlinear Dynamics and its Application, Chromosome Stability 2016, The 1st Cryo Electron Microscopy and 3D Image Processing of Macromolecular Assemblies and Cellular Tomography (CEM3DIP), and Workshop on High Performance Scientific Computing. To further our commitment to quality education and research, IISER TVM proactively implemented several flagship programs of Ministry of Human Resource Development for the benefit of community. The institute actively participated in programs such as Unnat Bharat Abhiyan (UBA), Global Initiative of Academic Network (GIAN), and Ishan Vikas Program, etc. Under UBA, the institute has undertaken several activities to foster relationship between IISER TVM and the local population. These activities included organizing medical camps for the local tribal community in the Vithura area, using services of medical officers and para-medical staff of the institute.

As part of the Swatch Bharat Pakhwada, a cleaning drive was also organized. To bridge the knowledge and expertise gap of Indian students and researchers, IISER TVM is proactive in implementing GIAN and Ishan Vikas Programs, and is organizing visits of faculty members of IISER TVM to various colleges in south India, to inculcate scientific temperament in young minds.

Finally, at IISER TVM, our students continue to be active in other activities like “Ishya”, the cultural festival, “Sopanam”, the student-run magazine, and Anvesha, the Science Club. These extracurricular platforms provide avenues for students to develop their artistic and organizational talents. IISER TVM students continue to exhibit good performance in inter IISER sports 2016 and won three gold, five silver and four bronze medals in various events. IISER TVM students also actively participated in SBI Life TRIVANDRUM 2017 marathon (10 kilometer endurance run) and secured second, seventh, thirteenth, and thirty eighth positions. Students also enthusiastically organize blood donation drive and science day.

# 1. PREAMBLE

## Introduction

The Indian Institutes of Science Education & Research were established by Government of India between 2006, 2008 and 2015 at Kolkata, Pune, Mohali, Bhopal, Thiruvananthapuram and Tirupathi with the objectives mainly related to capacity enhancement for producing high calibre scientific manpower and the commensurate necessary reforms in the institutional framework for that purpose in the field of higher education and research in basic sciences.

The creation of Indian institute of science education and research Thiruvananthapuram (IISER-TVM) was notified by Government of India vide no. 22-6/2007-TS. I dated 28th February, 2008 of Department of Higher Education, Ministry of Human Resource Development as an autonomous organisation.

The Institute came into being on 20th February, 2008 when it was registered as a society under the Travancore - Cochin Literary Scientific and Charitable Society Registration Act (12 of 1955) vide no. T.342/08 dated 20th February, 2008.

The statute for the existence and functioning of the institute has been approved by the parliament and governed by the National Institute of Technology (Amendment) Act 2012.

The institute's setting up is also owed to the support of Government of Kerala that has provided 200 acres of land in Vithura Panchayat in Thiruvananthapuram district for its permanent campus and also handed over premises in the College of Engineering Trivandrum for transit campus to start functioning in June 2008.

## Board of Governors

The composition of the Board of Governors according to NITSER Act 2012 is as follows:-

### Chairman

Dr. Tessy Thomas, Project Director for Agni-IV missile, Defence Research & Development Organisation (DRDO), Hyderabad

## Members

Secretary, Department of Higher Education, MHRD, Govt. of India

Director, Indian Institute of Science Education and Research Thiruvananthapuram

Director, Indian Institute of Science Bangalore

Chief Secretary, Govt. of Kerala

Joint Secretary & Financial Advisor, MHRD, Govt. of India

Prof. Srinivasa Murty Srinivasula, School of Biology, IISER Thiruvananthapuram

Prof. Vijayalakshmi Ravindranath, Honorary Professor, School of Biology,

IISER Thiruvananthapuram - till 31 Jan 2017

Prof. M.S Ramachandra Rao, Visiting Professor, School of Physics,

IISER Thiruvananthapuram - from 01 Feb 2017

Registrar, Indian Institute of Science Education & Research Thiruvananthapuram - Secretary

The board met on 26.05.2016, 25.11.2016, 26.02.2017 during the period of report.

## Finance Committee

### Chairman

Chairman, Board of Governors, IISER Thiruvananthapuram

### Members

Director, Indian Institute of Science Education and Research Thiruvananthapuram

Joint Secretary (Admin) DHE, MHRD, Govt. of India

Joint Secretary & Financial Advisor, MHRD, Govt. of India

Dr. Suresh Das, Former Director, NIIST, Thiruvananthapuram

Prof. Srinivasa Murty Srinivasula, School of Biology, IISER Thiruvananthapuram

Prof. M. P. Rajan, School of Mathematics, IISER Thiruvananthapuram

Shri. Harikumar S, Chief Engineer (Civil) (Retd), BSNL

Registrar, IISER Thiruvananthapuram -Secretary

The finance committee met on 26.05.2016, 25.11.2016 and 26.02.2017 during the period of report.

## Building and Works Committee

### Chairman

Director, Indian Institute of Science Education and Research Thiruvananthapuram

### Members

Shri. V. R. Rengasamy, Head, EM&C, NCBS-TIFR, Bangalore

Shri. P. Raveendran, Dy Head, CMD (E), CMG, VSSC

Smt. Poornima U. B, Head Architect, NCBS-TIFR, Bangalore

Prof. Srinivasa Murty Srinivasula, Professor, School of Biology, IISER TVM



Shri. M. Radhakrishnan, Registrar, IISER Thiruvananthapuram

Project Engineer-cum-Estate Officer, IISER Thiruvananthapuram - Member Secretary

The committee met on 25.07.2016 and 11.01.2017 during the period of report.

## Senate

### Chairman

Director, Indian institute of Science Education and Research Thiruvananthapuram

Prof. K. George Thomas, School of Chemistry, IISER Thiruvananthapuram

Prof. Srinivasa Murty Srinivasula, School of Biology, IISER Thiruvananthapuram

Prof. M.S. Raghunathan, Honorary Professor, School of Mathematics, IISER Thiruvananthapuram

Prof. N. Mukunda, Honorary Professor, School of Physics, IISER Thiruvananthapuram

Prof. R. Balasubramanian, Honorary Professor, School of Mathematics, IISER Thiruvananthapuram

Prof. Vijayalakshmi Ravindranath, Honorary Professor, School of Biology, IISER Thiruvananthapuram

Prof. K.Dharmalingam, Honorary Professor, School of Biology, IISER Thiruvananthapuram

Prof. M.S.Gopinathan, Emeritus Professor, School of Chemistry, IISER Thiruvananthapuram

Prof. Bharat B Chattoo, Visiting Professor, School of Biology, IISER Thiruvananthapuram

Prof. M.S Ramachandra Rao, Visiting Professor, School of Physics, IISER Thiruvananthapuram

Prof. S. Sampath, Visiting Professor, School of Chemistry, IISER Thiruvananthapuram

Prof. C. Chandrasekhar, Dept. of Computer Science & Engg., IIT-M, Chennai

Prof. M.P. Rajan, Dean (Academic Affairs), IISER Thiruvananthapuram

Dr. Anil Shaji, Associate Dean (P&D), IISER Thiruvananthapuram

Dr. Hema Somanathan, Associate Dean (R&D), IISER Thiruvananthapuram

Dr. Ramesh Chandranath, Associate Dean (Students Affairs), IISER Thiruvananthapuram

Dr. Utpal Manna, Head, School of Mathematics, IISER Thiruvananthapuram

Dr. Tapas Kumar Manna, Head, School of Biology, IISER Thiruvananthapuram

Dr. Mahesh Hariharan, Head I/c, School of Chemistry, IISER Thiruvananthapura

Dr. Shankaranarayanan, Associate Professor, SoP, IISER Thiruvananthapuram

Dr. Amal Medhi, Assistant Professor, SoP, IISER Thiruvananthapuram

Dr. Suhesh Kumar Singh, Assistant Professor, SoP, IISER Thiruvananthapuram

Dr. Ullasa Kodandaramaiah, Assistant Professor, SoB, IISER Thiruvananthapuram

Dr. Sainul Abideen, Assistant Librarian, IISER

Dr. K.Shadak Alee, Assistant Professor (Contract), SoP, IISER Thiruvananthapuram

Dr. Viji Z Thomas, Warden, HoRs, IISER Thiruvananthapuram

Shri. M. Radhakrishnan, Registrar, IISER Thiruvananthapuram- Secretary

The senate met on 30.4.2016, 27.8.2016, 28.11.2016, 31.1.2017 and Special Senate Meeting on 9.4.2016 during the period of report.

## 2. HUMAN RESOURCE

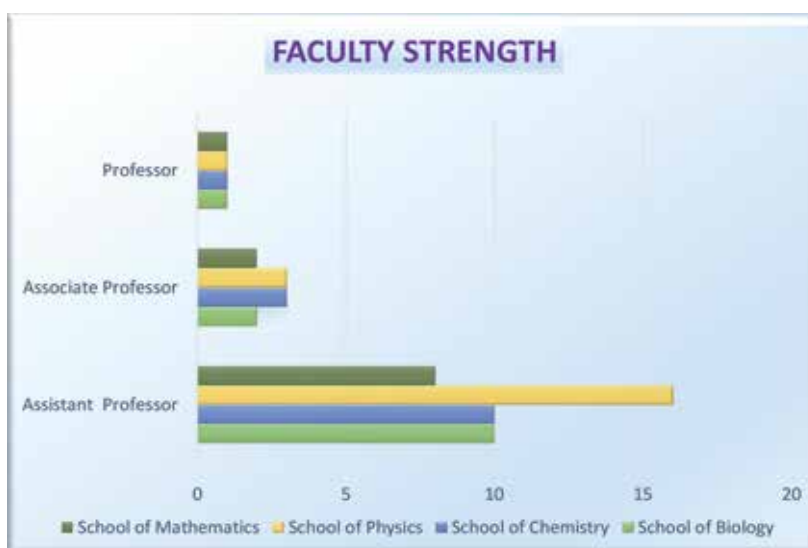
Human resources of the institute in 2016 - 17 comprised the following:-

Faculty	Regular Faculty		59
	Emeritus/ Honorary/Visiting/Adjunct Faculty		25
Technical and Non-Teaching Personnel	Officers	Regular	12
		Contractual	2
	Subordinate	Regular	40
		Temporary & Contract	37

### Faculty

School-wise lists of faculties and their names and research areas are given below.

Assistant Professor	School of Biology	10
	School of Chemistry	10
	School of Physics	16
	School of Mathematics	08
Associate Professor	School of Biology	02
	School of Chemistry	03
	School of Physics	03
	School of Mathematics	02
Professor	School of Biology	01
	School of Chemistry	01
	School of Physics	01
	School of Mathematics	01



## School of Biology

The School of Biology has been engaged in carrying out cutting-edge research in the areas spanning from single molecules to ecosystems. At present the School comprises of 13 faculty members, Ph.D. students, Post-Doctoral fellows, Technical Assistants and Project Assistants. Research programmes in the School are funded by IISER, Wellcome Trust/DBT India Alliance, The Royal Society UK, Dupont Inc, CSIR, DST, DAE and DBT. Our state-of-art research laboratories are well equipped for imaging, molecular biology, animal tissue culture, biochemical and biophysical work. The IISER campus under construction at Vithura located in the Western Ghats is also ideal for field biology. Our teaching curriculum aims to provide students an exposure to a broad range of subjects in biology and gain experience in research in the frontier areas along with faculties and PhD students.

Name	Position	Area of Research
Dr.S.Murty Srinivasula	Professor	Immunology, Imaging, Mammalian Cell Biology and Biochemistry. Host-microbial interactions, Cell Signaling Mechanisms, Apoptosis, Autophagy and NF-kappaB Signaling.
Dr.Tapas Kumar Manna	Associate Professor	Microtubule cytoskeleton, mitosis, centrosome and spindle pole regulation, drug development, and ciliogenesis.
Dr.Hema Somanathan	Associate Professor	Insect navigation and sensory ecology; insect-plant interactions.
Dr.Sunish Kumar Radhakrishnan	Assistant Professor	Prokaryotic development and genetics.
Dr.Kalika Prasad	Assistant Professor	Plant molecular genetics-patterning, stem cell and regeneration, evolutionary developmental biology.
Dr.Nishant.K.T	Assistant Professor	Meiotic recombination, genome stability, mutation rates.
Dr.Ramanathan Natesh	Assistant Professor	Molecular structural biology- protein crystallography, single particle cryoEM.
Dr.Ullasa Kodandaramaiah	Assistant Professor	Prey-predator interactions, wolbachia in insects, secondary sexual characters, phylogenetic patterns, diversity of Indian butterflies.
Dr.Ravi Maruthachalam	Assistant Professor	Plant centromere biology, uniparental genome elimination, genome stability, aneuploidy, haploid genetics, and minichromosome biology.
Dr.Jishy Varghese	Assistant Professor	Nutrient and energy homeostasis, gene regulation in neuroendocrine centers, neural circuitry of feeding.
Dr. Satish Khurana	Assistant Professor	Hematopoietic stem cells, bone marrow niche, developmental hematopoiesis.
Dr.Nisha.N.Kannan	Assistant Professor	Circadian clock, neuropeptides and sleep, post-transcriptional regulation of circadian rhythm etc.
Dr.N. Sadananda Singh	Assistant Professor	Molecular Biology, Biochemistry, Microbiology.

## School of Chemistry

The School of Chemistry established in the year 2008 at IISER Thiruvananthapuram has a vibrant academic and research ambience with 14 faculties, 71 PhD students, 3 research associates, 3 project assistants and 4 technical assistants. The school also hosts a large number of under graduate students for short projects. The research activities of the school cover a wide range of areas in chemistry (inorganic, organic, physical and theoretical chemistry). The department is actively involved in research in the areas of inorganic and organometallic chemistry, physical organic chemistry, supramolecular chemistry, DNA nanotechnology, photophysics and photochemistry of nanomaterials and hybrid materials, NMR spectroscopy, theoretical chemistry, computational chemistry, electrochemistry and non-linear dynamics. On the experimental front, the department has a large number of state-of-the-art research facilities including 500 and 700 MHz NMR (CIF Facility), single crystal X-ray diffractometer (CIF Facility), powder X-ray diffractometer, scanning electron microscope (CIF Facility), atomic force microscope, UV-Vis and UV-Vis NIR absorption spectrophotometers, emission spectrophotometer, FT infrared spectrophotometer, Raman spectrometer, circular dichroism spectrometer, vibrational circular dichroism spectrometer, circularly polarized luminescence spectrometer, fluorescence microscope, confocal fluorescence microscope, femtosecond transient absorption, picosecond fluorescence, gas chromatography-mass spectrometry, differential scanning calorimetry, thermogravimetric analyzer, electrochemical system, DNA and peptide synthesizers. The computational facilities include 3 clusters with a total of 120 processors.

Name	Position	Area of Research
Dr.K.George Thomas	Professor	Photochemistry & photophysics, Hybrid nanomaterials, Light-matter interactions at nanoscale, Raman Spectroscopy using nanomaterials, Organized surfaces
Dr.Kana.M.Sureshan	Associate Professor	Medicinal Chemistry, Chemical Biology, Organic Synthesis, Carbohydrate Chemistry, Supramolecular Chemistry, Methodology Development
Dr.Mahesh Hariharan	Associate Professor	Physical organic chemistry, biophysical chemistry
Dr.Sukhendu Mandal	Associate Professor	Biomass to liquid transportation fuel, Alkane metathesis, Cluster-Assembled Materials
Dr.R.S.Swathi	Assistant Professor	Theoretical Chemistry
Dr.Vinesh Vijayan	Assistant Professor	NMR spectroscopy, structure determination of macromolecules
Dr.Reji Vargese	Assistant Professor	Supramolecular chemistry with DNA, and Functional DNA nanotechnology
Dr.Ajay Venugopal	Assistant Professor	Inorganic and Organometallic chemistry
Dr.Thirumurugan Alagarsamy	Assistant Professor	Materials Chemistry - Metal organic frameworks, metal oxide clusters and nanocomposites for molecular separation, optical and conducting properties.

Dr.Yapamanu Adithya Lakshmanan	Assistant Professor	Non-linear Optical Spectroscopy, Understanding ultrafast dynamics involved in various chemical and biological systems
Dr.Vennapusa Sivaranjana Reddy	Assistant Professor	Theoretical and Computational Chemistry
Dr.Ramesh Rasappan	Assistant Professor	Asymmetric Catalysis and Natural Product Synthesis
Dr.Alagiri Kaliyamoorthy	Assistant Professor	Developing new methods, Activation and functionalization of relatively unreactive C-H bonds, Asymmetric Catalysis, Synthesis of Natural Products
Dr.Gokulnath Sabapathi	Assistant Professor	Macrocyclic systems, Bioinorganic Chemistry, Planar Aromatic and Antiaromatic systems, Porphyrin based Dye-Sensitized Solar cells (DSSC)

## School of Mathematics

The establishment of Indian Institutes of Science Education and Research (IISERs) is an innovative concept of the Ministry of Human Resource Development, Government of India, aimed at providing quality education in the basic sciences and fostering research in frontier areas of science. In tune with this objectives, the School of Mathematics at IISER Thiruvananthapuram offers courses in basic and advanced areas of mathematics at the undergraduate and postgraduate levels. At present, there are eleven full time faculty members, and one visiting faculty member affiliated to the School of Mathematics.

In addition to teaching, the faculties are engaged in research in their respective areas of specialization. We also have with us two senior mathematicians, Professor R. Balasubramanian from the Institute of Mathematical Sciences and Professor M. S. Raghunathan from the Indian Institute of Technology Mumbai, as honorary faculties. In the past, we also had the privilege of availing the services of Professors M. I. Jinnah, Jothilingam, Tara Nanda, K. Sandeep, C. S. Aravinda and Mythily Ramaswamy for our teaching. The areas of research represented at present include commutative algebra, combinatorics, control theory, linear algebra, financial mathematics, group theory, functional analysis, harmonic analysis, homological algebra, number theory, cryptography, numerical analysis, partial differential equations and scientific computing, complex dynamics and ergodic theory. Although a small team, we try our best to organize seminars and discussion meetings to keep ourselves abreast of current developments in mathematics. We hope to induct people with varied interests in mathematics, both pure and applied, that will help in setting up a department with a vibrant teaching and research programme.

Name	Position	Area of Research
Dr.M.P.Rajan	Professor	Numerical Functional Analysis/ Functional Analysis; Financial Engineering/Mathematical Finance; Mathematical Biology.
Dr.Utpal Manna	Associate Professor	Stochastic Partial Differential Equations, Stochastic Processes, Stochastic and Harmonic Analytic Approaches to FluidDynamics Models.

Dr.Shrihari Sridharan	Associate Professor	Complex Dynamics and Ergodic Theory
Dr.K. R. Arun	Assistant Professor	Hyperbolic Systems of Conservation Laws, Finite Volume Schemes, Asymptotic Preserving Schemes, Nonlinear Waves.
Dr.Sachindranath Jayaraman	Assistant Professor	Linear Algebra -Non negative Matrices, Generalized Inverses and Applications.
Dr.Sheetal Dharmatti	Assistant Professor	Differential equations, control and game theory, Navier Stokes' equations and image processing.
Dr.Viji.Z. Thomas	Assistant Professor	Group theory, Commutative Algebra and Homological Algebra.
Dr.Saikat Chatterjee	Assistant Professor	Differential geometry, Higher Catogory theories, Gerbes.
Dr.P.Chiranjeevi	Assistant Professor	Dynamical Systems.
Dr.Midhun Mukherjee	Assistant Professor	Operator theory, operator algebra, non-cumulative dynamics.
Dr.Sarbeswar Pal	Assistant Professor	Algebraic Geometry

## School of Physics

School of Physics is committed for high quality research and teaching in basic physics and inter-disciplinary subjects. Research should and does influence teaching (and vice versa), but the gulf between the two can at times seem large. Our teaching curriculum for the undergraduate and graduate courses are designed so as to bridge this gap. We have developed world class undergraduate teaching laboratories which are fully equipped with advanced equipment. The quality of our teaching is reflected from the performance our students at various national and international examinations. In the last four years, we have witnessed several of our students securing top ranks in national level examinations such as CSIR, JEST, GATE etc. After securing BS-MS degree, most of our students have taken up PhD positions in leading institutions both in India and abroad (USA, Europe, UK etc).

At present, School of Physics has 19 faculty members apart from director, 6 of them working on theoretical physics and remaining 13 working on experimental physics. Many of the faculty members have received national and international recognitions. The expertise of our faculty members range over wide areas including condensed matter physics, optics, nano-science, quantum computation, gravitation and cosmology, and string theory. State of the art research laboratories are developed by our faculty members with the help of external and internal funding, for cutting edge research in advanced and applied research topics. In spite of being in a transit campus and with severe space constraint, our faculty members have proven their excellence by publishing results in high quality international journals. With a full-fledged permanent campus coming up at Vithura, the research activities of School of Physics is expected to enhance many fold.



Name	Position	Area of Research
Dr.V.Ramakrishnan	Professor	Optical spectroscopy, nanomaterials, semiconductor heterostructures.
Dr.Anil shaji	Associate Professor	Quantum Information theory and open quantum systems.
Dr.S.Shankarnarayanan	Associate Professor	Black-holes, Cosmology, Classical and quantum gravity.
Dr.Ramesh Chandra Nath	Associate Professor	Magnetism and Superconductivity.
Dr.Archana Pai	Assistant Professor	Gravitational Wave Physics, Statistical Signal Processing, Optics.
Dr.Manoj.A.G.Namboothiri	Assistant Professor	Organic and hybrid optoelectronics, Spintronics, Metamaterials, Thermoelectrics, Application of Physics to biology and device applications, Solar Cell.
Dr.Sreedhar Dutta	Assistant Professor	Non-equilibrium Physics, Statistical and Quantum Field-theories.
Dr.M.M.Shaijumon	Assistant Professor	Multifunctional nanostructured materials- Graphene, 2-dimensional layered nanostructures; Energy storage - Lithium ion batteries, Supercapacitors; Gas storage.
Dr.Rajeev.N.Kini	Assistant Professor	Ultrafast optical studies of semiconductor nanostructures Terahertz spectroscopy & imaging.
Dr.Joy Mitra	Assistant Professor	Scanning probe microscopy, tunnelling induced luminescence, metal-semiconductor junctions.
Dr.Deepshika Jaiswal Nagar	Assistant Professor	Quantum Phase transitions in low dimensional and low spin organic insulators as well as Heavy Fermions, Phase diagram of weakly pinned Type-II superconductors, Multiferroics.
Dr.Madhu Thalakulam	Assistant Professor	Low temperature electron transport on nanoscale devices: Quantum dots, Quantum point contacts, Nanowires & Superconducting tunnel junction systems and Topological insulators: etc.
Dr.Amal Medhi	Assistant Professor	Topological insulators, Fractional quantum Hall state, Strongly correlated electron systems.
Dr.Bindusar sahuo	Assistant Professor	Black hole entropy in supergravity and string theory, Supergravity, AdS-CFT correspondence, Higher-Spin holography.
Dr.Ravi Pant	Assistant Professor	Nanophononics, Stimulated Brillouin/Raman scattering, Opto-mechanical interactions, Slow-light, Nonlinear optical phenomenon and devices, Soliton self-frequency shift.

Dr.Bikas Chandra das	Assistant Professor	Novel charge transfer composite nanomaterials based thin film device applications.
Dr . K. Shadak Ale	Assistant Professor	Random Lasing, Photonic crystals, PT symmetric Optics
Dr.M.Suheshkumar singh	Assistant Professor	Photoacoustic imaging (microscopy and tomography), speckle contrast imaging, spectroscopy for Biomedical applications.
Dr.Vinayak Banudas Kamble	Assistant Professor	(On Contract) Nanostructures and thin films, Surfaces and Interfaces, Defect induced properties of materials, Dilute Magnetic Semiconductors, Thermoelectric materials, Semiconducting Met etc.
Dr.Senthilkumar.D.V	Assistant Professor	Nonlinear Dynamics : Non-integrable systems, Chaotic Dynamics Bifurcation and Stability Analysis Synchronization Network Theory Complex Systems Time-delay Systems Delay-induce etc.

### Emeritus / Honorary / Visiting / Adjunct Faculty

The following Emeritus / Honorary / Visiting / Adjunct Faculty have contributed for the academic enrichment of the Institute during 2016-17 :-

Prof. Mathew M Oommen	Biology
Prof. Bharat B Chattoo	Biology
Prof. S. Mahalingam	Biology
Prof. Vijayalakshmi Ravindranath	Biology
Prof. K. Dharmalingam	Biology
Dr. T. Ganga Devi	Biology
Dr. M. D Ajitha Bai	Chemistry
Dr. G. Jayakumar	Chemistry
Prof. M. S. Gopinathan	Chemistry
Prof. S Natarajan	Chemistry
Prof. S. Sampath	Chemistry
Dr. Tony Thomas	Mathematics
Dr. Guram Donatze	Mathematics
Prof. M. S. Raghunathan	Mathematics
Prof. R. Balasubramaniam	Mathematics
Prof. A. K.Nandakumaran	Mathematics



Prof. M. S. Ramachandra Rao	Physics
Prof. P Gopkumar	Physics
Dr. Thanu Padmanabhan	Physics
Prof. N. Mukunda	Physics
Shri. P. Vijayakumar	Humanities
Dr. Antony Palackal Varghese	Humanities
Dr. D. Narayana	Humanities
Dr. Hrushikesh Mallick	Humanities
Mr. Jeejo Varghese	German Language

### Administrative & Support Personnel :-

The Institute is having 54 regular and 2 contractual staff non-teaching administrative and support personnel. 05 personnel have joined during the period 2016-17 and two personnel have left the Institute. The details are as follows:-

#### Administration

1. Shri. M. Radhakrishnan, Registrar
2. Shri. Sudin B Babu, Deputy Registrar (Purchase & Stores)
3. Shri. Siva Dutt V K, Project Engineer-cum-Estate Office
4. Dr. Sainul Abideen P, Assistant Librarian
5. Shri. B. V. Ramesh, Deputy Registrar (Finance & Accounts)
6. Shri. Hariharakrishnan, Deputy Registrar (Academics)
7. Shri. P. Y. Sreekumar, Scientific Officer (IT)
8. Shri. Priji. E. Moses, Assistant Executive Engineer (Civil)
9. Shri. Sreehari. S, Assistant Executive Engineer (Electrical)
10. Dr. Goldwin Hemalatha. M, Medical Officer
11. Dr. Thiraviam. P, Medical Officer
12. Shri. Bhaskara Rao, Assistant Registrar (General Administration)
13. Smt. Navya Paul, Technical Assistant
14. Smt. Divya V. J, Technical Assistant
15. Shri. Krishna Kumar, Junior Engineer (Civil)
16. Smt. Nimi Joseph Chaly, Accountant
17. Smt. Nafeesa C. K, Library Information Assistant
18. Shri. Jayaraj J. R, Library Information Assistant
19. Shri. Alex Andrews. P, Technical Assistant
20. Shri. Vijesh. K, Technical Assistant

21. Smt. Darli K. G, Private Secretary to Director
22. Shri. Manoj M. T, Office Assistant (Multi Skill)
23. Smt. Suja V. R, Office Assistant (Multi Skill)
24. Smt. Vidya Senan. I, Office Assistant (Multi Skill)
25. Smt. Archana P. R, Office Assistant (Multi Skill)
26. Smt. Beena N. K, Office Assistant (Multi Skill)
27. Shri. Muruganandam. A, Office Assistant (Multi Skill)
28. Shri. Rajesh A. P, Office Assistant (Multi Skill)
29. Shri. Satheesh. R, Office Assistant (Multi Skill)
30. Shri. Sudeep. S, Junior Engineer (HVAC)
31. Shri. Satya Srinivas Narahariseti, Superintendent (Hostel & Hospitality)
32. Shri. Praveen Peter, Junior Engineer (Civil)
33. Smt. Mini Philip, Personal Assistant
34. Shri. Manoj Kumar. S, Superintendent (Office)
35. Smt. Veena P. P, Office Assistant (Multi Skill)
36. Shri. Sangeeth. M, Junior Engineer (Electrical)
37. Shri. Jins Joseph, Nurse
38. Smt. Divya A. T, Nurse
39. Shri. Adarsh. B, Technical Assistant
40. Shri. Anilkumar. P .R, Technical Assistant
41. Shri Naveen Sathyan, Technical Assistant
42. Shri. Ajith Prabha, Office Assistant (Multi Skill)
43. Shri. Arun Kumar M, Attendant -Electrical
44. Shri. Ratheesh C, Attendant -Plumber
45. Shri. Arun Reghunath, Superintendent
46. Shri. Rakesh M V, Office Assistant(Multi Skill)
47. Ms. Sarika Mohan, Junior Technical Assistant
48. Shri. Vivek V G, Junior Technical Assistant
49. Shri. Pradeep Kumar G T, Junior Technical Assistant
50. Shri. Nibith Kumar K P, Junior Technical Assistant
51. Ms. Lakshmi C, Junior Technical Assistant
52. Ms. Sandhya P S, Junior Technical Assistant
53. Shri. Packiya Rajan, Junior Technical Assistant
54. Shri.Muthukumaran A, Junior Technical Assistant

#### **Consultants and Contractual Officers**

1. Shri. Gopakumar. G, Asst.Security Officer
2. Shri Jayan V, Asst.Security Officer

### 3. ACADEMIC PROGRAMMES & STUDENTS

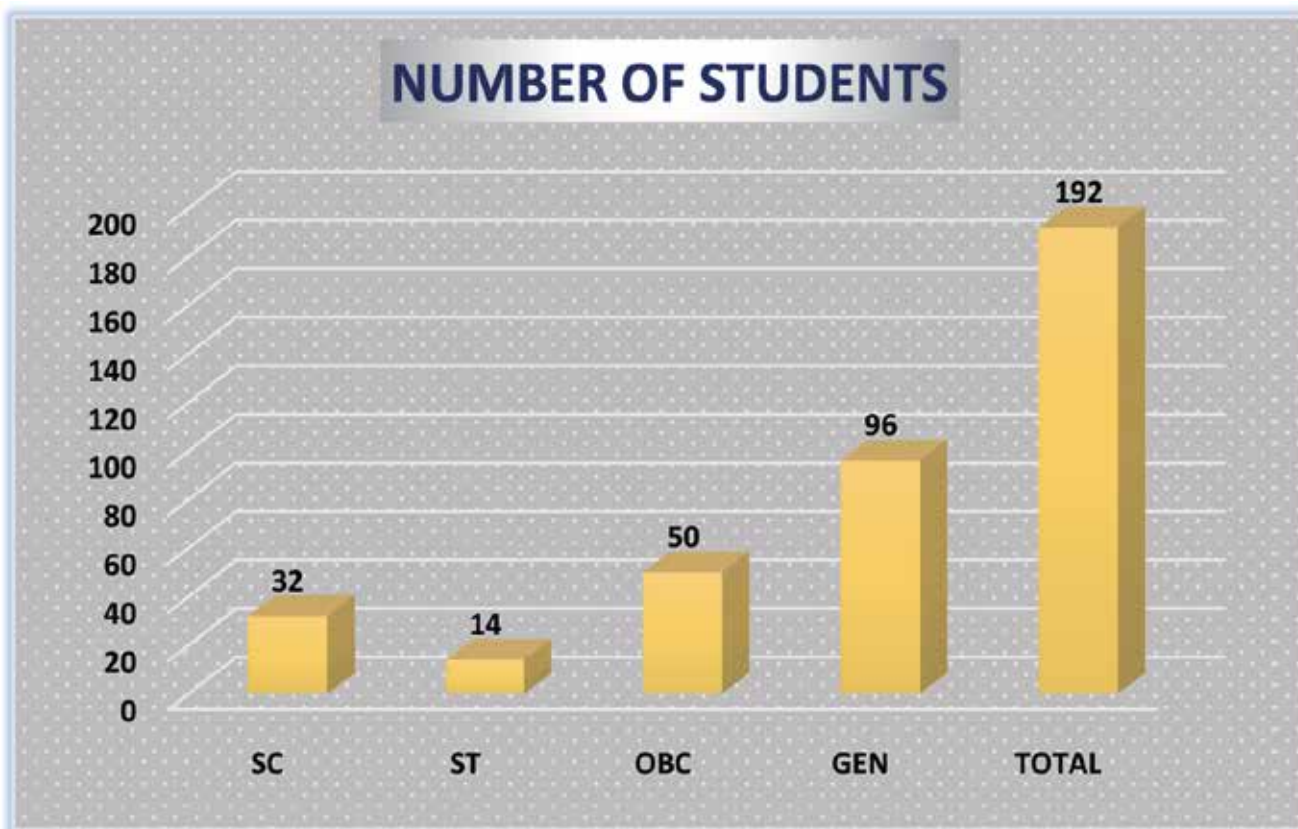
#### Students BS-MS Dual Degree Programme

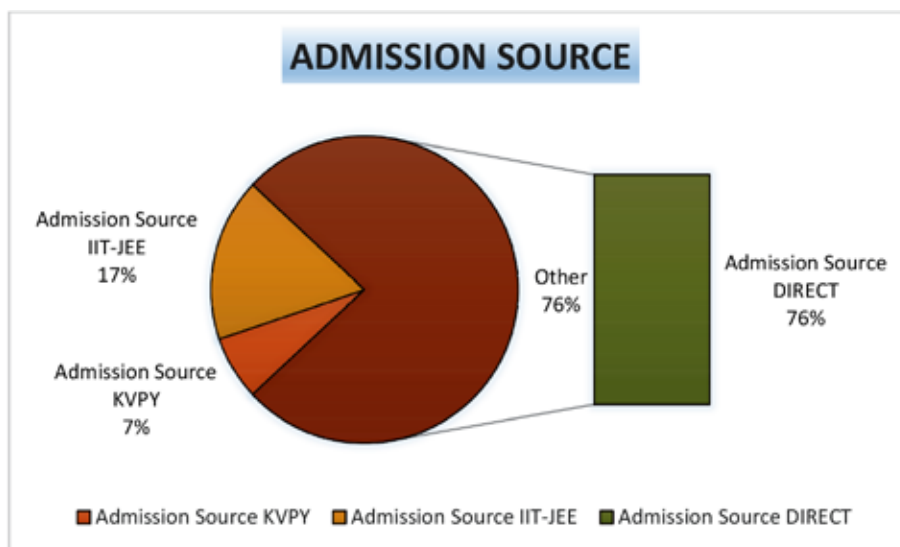
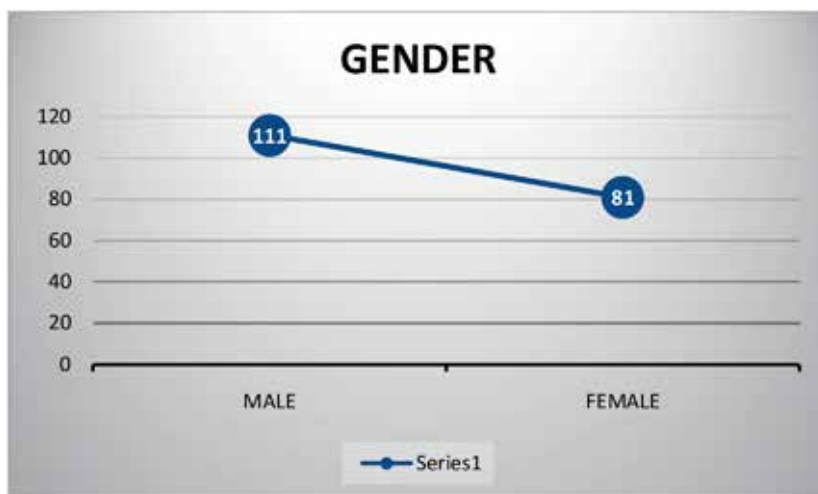
The Fourth Convocation of IISER-TVM was held on 27 May 2016, in the permanent vithura campus. The function was presided by Shri. Kris Gopalakrishnan, Co-founder Infosys and Chairman, Axilor Ventures. The fourth batch of Five Year BS-MS Dual Degree Programme consisting of 78 students, 1 MS and 10 Ph.D. students were graduated on the occasion.

192 students joined the eighth batch of Five Year BS-MS Dual Degree Programme in August 2016 at the Transit Campus in the College of Engineering Trivandrum, who were selected through three channels respectively KVPY, IIT-JEE merit list and the Aptitude Test for the top 1% students of class XII exams of all the State Boards, CBSE and ICSE.

The category distribution is as follows

SC	ST	OBC	GEN	TOTAL	MALE	FEMALE	Admission Source		
							KVPY	IIT-JEE	DIRECT
32	14	50	96	192	111	81	13	33	146





## Ph.D. Programme

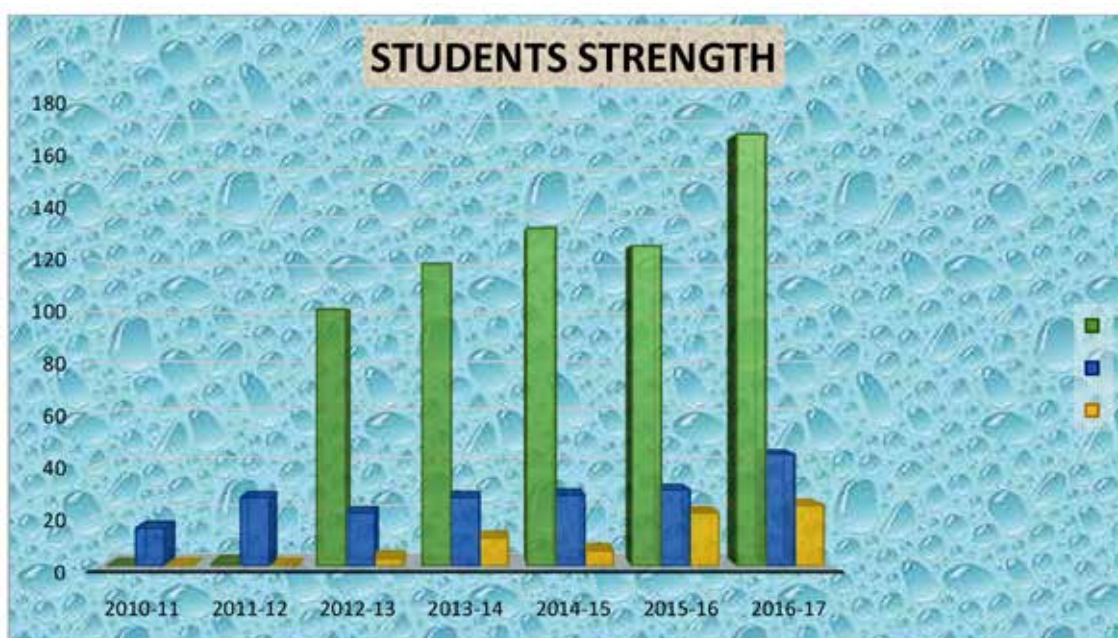
45 students were admitted to Ph.D. Programme during the academic year 2016-17. Students admitted to the doctoral program are those qualified in one of the National Eligibility Tests such as UGC-CSIR JRF/DBT-JRF/GATE/INSPIRE-Ph.D./NBHM/ICMR/JEST/JGEEBILS etc. 6 students from IPHD were promoted to PhD programme.

## Int. Ph.D. Programme

24 students were admitted to the programme during the academic year 2016-17 through written exam/ JEST and interview.

Total student strength in 2016-17 is given below.

Programme	2010-11 admissions	2011-12 admissions	2012-13 admissions	2013-14 admissions	2014-15 admissions	2015-16 admissions	2016-2017 admissions	Total
5Yr Integrated BS-MS	-	1	101	119	133	126	170	650
Ph. D.	15	27	21	27	28	30	44	192
Int. Ph.D.	-	-	3	11	6	21	24	65
Total	15	28	125	157	167	177	238	907



## 4. RESEARCH AND DEVELOPMENT ACTIVITIES

The institute has been active in frontier areas of research across fields. Faculty members have set up experimental and theoretical research groups and have been publishing actively in reputed peer-reviewed journals. Several scientific collaborations with researchers in premier institutions in India and abroad were initiated. A number of new PhD students and post-doctoral fellows joined various research groups. Joint activities between several Institute and universal above were initiated during the period.

### Collaboration with Foreign Institution with MoU

Two faculty members visited the institute aboard as part of MoU signed earlier during Presidential visit.

Sl. No	Foreign university	Faculty	Foreign Collaborator	Date of Visit
1.	Institute for Energy Technology (IFE), Norway	Dr. M. M. Shaijumon	Dr. Jan Petter Mahhlen	May 16-20, 2017
2.	Lund University, Sweden	Dr. Hema Somanathan	1. Prof. Almut Kelber 2. Dr. Niklas Wahlberg	Apr 20-21, 2017

## New Sponsored Projects

Sl. No.	Name of the Project	Principal Investigator	Co-Investigator	Sponsoring Agency	Amount Sanctioned (Rs. in Lakh) Amount	Duration
1.	Wavelet Graph Strategy for the Coherent Search of the Compact Binary Coalescences	Dr. Archana Pai	None	CEFIRPA	29.8 lakhs	2016-2019
2.	A Detail Study of Electrolyte-Gated Organic Field-effect transistors	Dr. Bikas C Das	None	SERB	49.5 lakhs	2016-2019
3.	Development of hydrogen sensors for extended range of temperatures from 100K to 300K using 2D nano cluster assembled films of Palladium	Dr. Deepshikha Jaiswal Nagar	None	ISRO	23.8 lakhs	2016-2019
4.	Effect of size on the superconducting properties of films assembled in nanocluster form in elemental superconductors Al, Pb and Nb	Dr. Deepshikha Jaiswal Nagar	None	DST	23.07 lakhs	2016-2019
5.	Dipolar and Multipolar Interactions in Assembled Molecules and		(i) Mahesh Hariharan			



	Nanostructures: Developing a General Description and its Applications	Prof.K.George Thomas	(ii) R. S. Swathi (iii) Y.Adithya Lakshmanna	DST- Nanomission	561.21 lakhs	2016-2019
6.	Design of a Surface-Enhanced Spectroscopy based Device for the Rapid Detection of Organ- ophosphate Pesticides and Pyrethroid Insecticides in Fruits and Vegetables	Prof.K.George Thomas	(i) Y. Adithya Lakshmanna (ii) Anil Shaji (iii) K. R. Arun (iv) Sheetal Dharmatti v) R. S Swathi (incollaboration with Kerala Agriculture University)	DST-IMPRINT	296 lakhs	2016-2019
7.	Genetic control of floral organ positioning in rice	Dr.Kalika Prasad	Dr. Ravi Maruthachalam	DBT	115 lakhs	2016-2021
8.	Early Career Research Award (ECRA) by DST-SERB	Dr.Rajendar Goreti	None	DST-SERB	35.4 Lakhs	2017-2020
9.	Ramanujan Research Award	Dr.Rajendar Goreti	None	DST-SERB	35 Lakhs	2016-2021
10.	Solid State Structural Analysis of Photoactive Molecular Assemblies on DNA Scaffold through Single Crystal X-ray Diffraction	Dr.Reji Varghese	None	KSCSTE, Kerala	28 lakhs	2016-2019
11.	Genome-scale screening for response to drug treatment	Dr.N.Sadananda Singh	None	DST	40lakhs	2017-2020
12.	Hybrid Energy Storage Devices based on Multifunctional Nanocomposite Materials	Dr. M. M. Shaijumon	A. Thirumurugan	DST	110 lakhs	2017-2020
13.	Molecular dissection of the role of intracellular redox in bacterial cell	Dr.Sunish Kumar Radhakrishnan	None	DST	25.7 Lakhs	2016-2021

	cycleprogression and pathogenesis					
14.	Cost-effective hand-held medical device for real-time intraoperative scanning applications at operation bedside	Dr.M.Suhesh Kumar Singh	None	DST- SERB	49.83 lakhs	2016-2019
15.	Tunable azacrown-based graphene nanomeshes for gas separation	Dr.R.S.Swathi	None	DST-SERB	18 Lakhs	2017-2020
16.	Determining the role of microtubule plus tip protein EB1 in regulation of spindle-kinetochore associated protein complex Ska: the mechanism underlying the stabilization of spindle-kinetochore attachment	Dr.Tapas K. Manna	None	DBT	59 lakhs	2016-2019
17.	Vanadium Based Hybrid Materials for Electrochemical Energy Storage	Dr. A. Thirumurugan	None	SERB	46 lakhs	2017-2020

## Ongoing Sponsored Projects

Sl. No.	Name of the Project	Principal Investigator	Co-Investigator	Sponsoring Agency	Amount Sanctioned (Rs.in Lakh) Amount	Duration
1.	Molecular Magnesium Hydrides: Hydrogen Storage	Dr.Ajay Venugopal	None	DST	35 lakhs	2013-2018
2.	Cationic Bismuth Complexes in Hydroamination	Dr.Ajay Venugopal	None	CSIR	14 lakhs	2014-2017
3.	Early Career Research Award (ECR)-SERB	Dr.Alagiri Kaliyamoorthy	None	SERB	40.9 lakhs	2016-2019



4.	Centre for Computation, Modeling and Simulations	Dr.Amal Medhi	Dr. Anil Shaji, Dr. Archana Pai, Dr. K. R.Arun, Dr. Nishant, Dr.R. S.Swathi, Dr.S.Shankara- narayanan	MHRD	400 lakhs	2014-2019
5.	Max Planck Partner group(of Albert Einstein Institut, Germany)	Dr.Archana Pai	German PI-Prof. Bernard Schutz, Director, Albert Einstein Institute	DST -Max Planck	125 lakhs	2011-2016
6.	DST - JC Bose Fellowship 2014-2019	Prof.K.George Thomas	None	None	68 lakhs	2014-2019
7.	Synthesis and molecular recognition properties of novel ditopic ion receptors derived from crown ether and carbazole or calix[n]phyrin subunits	Dr.S.Gokulnath	None	DST	35 lakhs	2013-2018
8.	Planarization of Porphyrin Dimers and Trimers for Near-IR Applications	Dr.S.Gokulnath	None	SERB	26 Lakhs	2016-2019
9.	MicroRNAs and nutrient homeostasis	Dr.Jishy Varghese	None	SERB	73 lakhs	2013-2018
10.	Nanoscale Schottky junctions for sub ppm hydrogen detection.	Dr.Joy Mitra	None	SERB	40 lakhs	2014-2017
11.	Physics and applications of high aspect ratio Schottky Junction Devices	Dr.Joy Mitra	Dr.Madhu Thalakulam	UKIERI	6 lakhs	2014-2016
12.	Interplay between auxin and patterning regulators to control organ polarity	Dr.Kalika Prasad	Dr.S.Murty Srinivasula	DBT	80 lakhs	2013-2016

13.	Chemical Biological intervention in cell signaling	Dr.Kana.M. Sureshan	None	DST	245 lakhs	2015-2020
14.	Quantum point contact-double quantum dot system: A lab on chip for quantum measurement and back action	Dr.Madhu Thalakualm	None	SERB	50 lakhs	2014-2017
15.	Mechanistic Investigations on Light Induced Crosslinking of DNA Protein Nanostructures	Dr.Mahesh Hariharan	None	DBT	53.76 lakhs	2013-2016
16.	Design, synthesis and photocatalytic water splitting properties of functional cobalt based inorganic-organic hybrids	Dr.Mahesh Hariharan	None	Kerala State Council for Science Technology and Environment	45.20 Lakhs	2015-2018
17.	Incorporation of Plasmonic Structures to Improve organic Photovoltaics	Dr.Manoj A.G Namboothiry	Dr.M M Shaijumon	DST	183.76 lakhs	2012-2015 (extended 6 months)
18.	Genetic analysis of crossover assurance mechanisms facilitating meiotic chromosome segregation	Dr.Nishant.K. T	None	Wellcome Trust- DBT India Alliance	330.3 lakhs	2012-2017
19.	Ultrafast optical and terahertz studies of the dilute bismide alloys, GaN : Bi and GaAs:Bi	Dr.Rajeev.N Kini	None	SERB	27 lakhs	2013-2016
20.	Stereoconvergent Cross-Coupling : Asymmetric Synthesis of Boronic Esters and Silanes	Dr.Ramesh Rasappan	None	SERB	35 lakhs	2016-2021

21.	Asymmetric Catalysis: Exploring Organosilanes in Stereospecific and Convergent Reactions	Dr.Ramesh Rasappan	None	SERB	55lakhs	2015-2018
22.	Generation and characterization of minichromosomes and neocentromere formation in plant	Dr.Ravi Maruthachalam	None	DBT	82.5 lakhs	2013-2018
23.	Identification and characterization of kinetochore proteins with special emphasis on in vivo haploid induction in plants	Dr.Ravi Maruthachalam	None	Dupont Inc. USA	15 lakhs	2014-2017
24.	DNA Based Addressable Functional Nanomaterials:Design, Synthesis and Self-assembly of Novel DNARigid Rod Block Copolymers	Dr. Reji Varghese	None	SERB	73 lakhs	2011-2016
25.	Synchronization of complex Networks with delay	Dr.D.V. Senthilkumar	None	SERB	19.8 lakhs	2014-2017
26.	DST-Max Planck Partner group	Dr.S.Shankaranarayanan	None	DST India and Max Planck Socieity, Germany	520 lakhs	2011-2016
27.	Derivatives of Lyapunov exponents, structural stability of systems and the pressure function	Dr.Shrihari Sridharan	None	DST, Gol	12.36 lakhs	2013 -2016
28.	Synthesis, Structural Evolution and Physical Properties Tuningof Cluster-Assembled Materials	Dr.Sukhendu Mandal	None	SERB	50 lakhs	2014-2017

29.	Metathesis of Alkanes Using Transition Metal Catalysts	Dr.Sukhendu Mandal	None	CSIR	11 lakhs	2014-2017
30.	INSPIRE Faculty Award	Dr.Ullasa Kodandaramaiah	None	DST	35 lakhs	2013-2018
31.	Morphometry and phylogeography of Honey Bees and Stingless Bees in India Phase-II	Dr.Ullasa Kodandaramaiah	Network-Project with many institutions across India	DBT	33.73 lakhs	2015-2018
32.	Study of Stochastic Analysis and Control of Certain Hydrodynamic Models	Dr.Utpal Manna	None	NBHM	2 lakhs	2014-2017
33.	Graphene based Shear Harmonic - Surface Acoustic Wave Devices for Toxic Gas Detection	Dr.Vinayak Kamble	Dr.Palash Kumar Basu (IIST)	ISRO, Respond programme	70.5 lakhs	2015-2018
34.	Development of Novel metal oxide-graphene based nanocomposite materials for Microsensors and Nanoelectronics device Applications.	Dr.Vinayak Kamble	None	DST	35 lakh	2016-2021

## Completed Sponsored Projects

Sl. No.	Name of the Project Investigator	Principal Agency	Amount Co-Investigator (Rs.in Lakh) Amount	Sponsoring	Sanctioned	Duration
1.	Lewis Acidic Molecular Bismuth Alkyls and Hydrides	Dr.Ajay Venugopal	None	SERB, DST	25.8 Lakhs	2013-2016
2.	Effects of forest fragmentation on pollination in agricultural landscapes	Dr.Hema Somanathan	Natalie Hempel de Ibarra	UKIERI	32 lakhs	2015-2017

3.	DNA Based Addressable Functional Nanomaterials: Design, Synthesis and Self-assembly of Novel DNA-Rigid Rod Block Copolymers	Dr.Reji Varghese	None	SERB	78 Lakhs	2011-2016
4.	A multilayered approach to decipher uncharted mechanisms of asymmetric cell division	Dr. Sunish Kumar Radhakrishnan	None	Wellcome Trust/DBT India Alliance	267.62 Lakhs	2011-2016
5.	Determining the role of centrosome protein TACC3 in regulation of microtubule nucleation and elucidating its molecular mechanism.	Dr. Tapas K. Manna	Dr.Vinesh Vijayan	DAE, Govt. of India	24.86 lakhs	2014-2017

### 1. Lewis Acidic Molecular Bismuth Alkyls and Hydrides

We have been successful in preparing three stable bismuth complexes  $[\text{TpMe}_2\text{Bi}][\text{TpMe}_2\text{BiCl}_3]$ ,  $[\text{TpMe}_2\text{Bi}_5\text{Cl}_{13}]$  and  $[\text{TpMe}_2\text{BiCl}(\mu\text{-Cl})]_2$  supported by the scorpionate  $\text{TpMe}_2$  ligand in a facile manner without decomposition.  $[\text{TpMe}_2\text{BiCl}(\mu\text{-Cl})]_2$  can serve as a starting point to explore the reactivity of trispyrazolylborate bismuth compounds as Lewis acids. Reactivity of  $[\text{TpMe}_2\text{BiCl}(\mu\text{-Cl})]_2$  with group 13 metal chlorides infers that it is Lewis acidic enough to abstract chloride from  $\text{AlCl}_3$  and  $\text{GaCl}_3$ .  $[\text{TpMe}_2\text{BiCl}(\mu\text{-Cl})]_2$  aggregates with  $\text{BiCl}_3$  in the presence of  $\text{AlCl}_3$  to form the one-dimensional polymer  $[\text{TpMe}_2\text{Bi}_5\text{Cl}_{13}]$ . Our investigations indicate  $[\text{TpMe}_2\text{BiCl}(\mu\text{-Cl})]_2$  can be a potential precursor in further investigating the coordination chemistry and reactivity of tris(pyrazolyl)borate bismuth complexes. We have quantitatively investigated the Lewis acidity in the two organobismuth cations. Significantly smaller bite angles are observed in cationic bismuth complexes bearing 2-[(dimethylamino)]phenyl ( $\text{Me}_2\text{NC}_6\text{H}_4$ ) ligand as compared to 2-[(dimethylamino)methyl]phenyl ( $\text{Me}_2\text{NCH}_2\text{C}_6\text{H}_4$ ) ligand. Decrease in the chelate ring size in the cationic bismuth complexes leads to a notable increase in Lewis acidity at bismuth demonstrating that the bite angle is as important a ligand-parameter in main group chemistry as in transition metals. Preliminary investigations on the reactivity studies of  $[(\text{Me}_2\text{NC}_6\text{H}_4)(\text{Mesityl})\text{Bi}]^+$  point out that the cation can initiate ring opening polymerisation in THF and  $\epsilon$ -caprolactone under mild conditions.

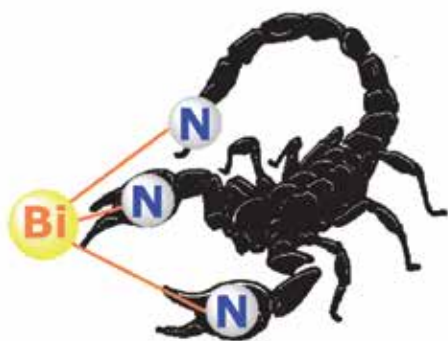


Figure 1. Pictorial representation of scorpionate  $Tp^{Me_2}$  ligand chelating to bismuth.

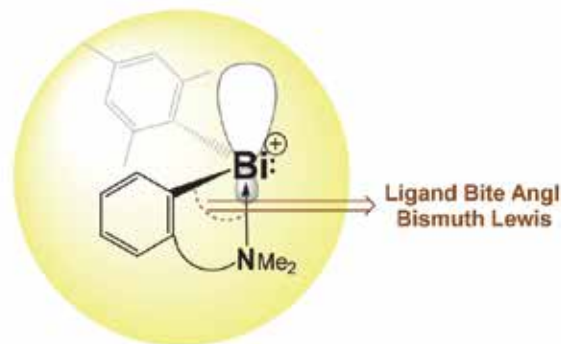


Figure 2. Consequence of ligand bite angle on bismuth Lewis acidity

## 2. Effects of forest fragmentation on pollination in agricultural landscapes

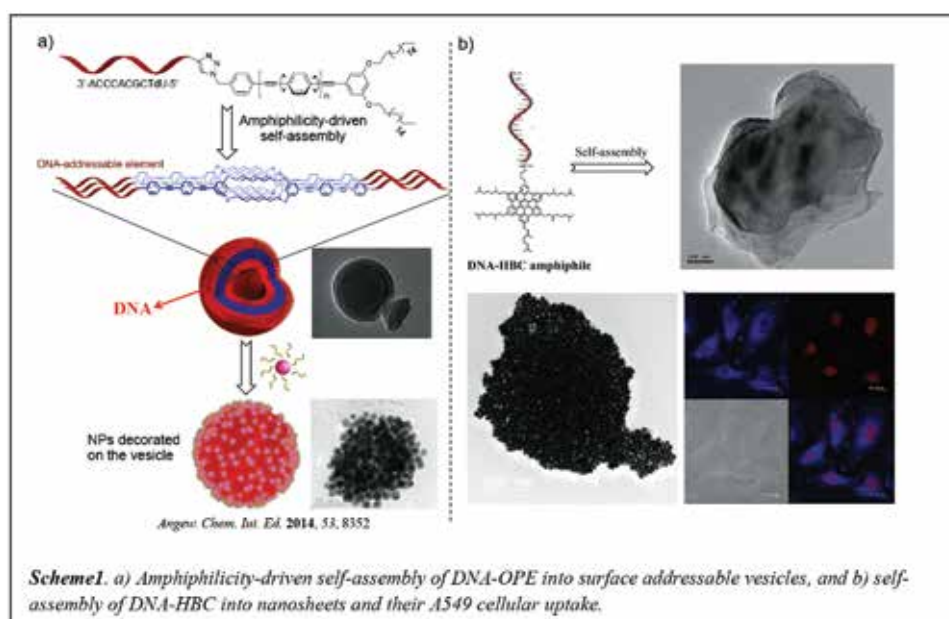
We have made good and timely progress anticipating successful outputs for scientific dissemination and for outreach and impact on the wider society. Despite the delays in transferring funding and change in the start date from the original submission, we managed to adjust our work plan to accommodate the monsoon season 2015. Data were collected from common bees of different body size, e.g. honeybees (*Apis cerana*, *A. mellifera*) and stingless bees (*Trigona iridipennis*) in open and tree-dominated habitat fragments in urban and agricultural environments in the Western Ghats. Bee activity was tracked using RFID (radio-frequency identity tagging), a new technique with equipment bought for this project by funds from the University of Exeter, and also using visual markings, at the hive entrance and at artificial feeders. We determine quantities and quality of resources collected by bees (sampling nectar and pollen for analysis), onset of foraging behaviour, foraging distances and weather-dependent activity patterns. This work covers a fundamental gap of knowledge about the foraging bees in the tropical Asia, including South India and the Western Ghats. As a next step from our empirical work, these measured parameters will be modelled in pollinator networks and mapped onto the geographical features of the landscape of the Western Ghats to understand the challenges that bees face for finding flowers with increasing habitat fragmentation. In Exeter, the Indian students were successfully trained with different experimental methods for studying bee foraging behaviour and navigation, collected data, participated in fieldwork and excursions and learnt about habitats, behaviour and ecology of bees in the UK. They also went to the COPI's lab at the Royal Kew Gardens, and visited the Eden Project, an educational, internationally well-known charity that is partnered with the University of Exeter, with whom we have started to establish a relationship to support our impact programme. UK students have conducted successfully their research in India.

Review of progress towards the achievement of the UKIERI objectives - Long term sustainability, Mutuality and Complementarity, Inclusion and Capacity Building Both PIs have established successful a long-term research programme in this topic. We aim to continue attracting students from both institutions into this research and apply for new funding. Based on the results emerging from the UKIERI project, we can now look into long-term effects on the role of bees in relation to fragmentation and land-use patterns as well as in the context of climate change. We will also have applied for grant funding to continue working in this field. - 2016: Hempel de Ibarra, Somanathan, Stevenson, Wilfert-Bayer, Funder: GCRF BBSRC, Behaviour, nutritional chemistry and health of managed Asian bees as

determinants of crop security and sustainable agriculture in tropical India, £717K, unsuccessful - 2017 Hempel de Ibarra, Somanathan, Stevenson, Devine-Wright, Kurz, Gaston, GCRF British Academy, Pollinating tropical roof-top gardens: increasing food security and providing new habitats for cities , £299K, submitted and currently under evaluation). - 2016/17: We have received PhD studentship funding from the BBSRC South-West Doctoral Training Partnership at the University of Exeter (supervisory team: Hempel de Ibarra, Bayer-Wilfert, Somanathan). Owen Wright will start his PhD research in September 2017 investigating the Behaviour and health of Asian tropical bees , using facilities and supervision at IISER Trivandrum. We have built a network of contacts with stakeholders through the UKIERI project through which we will continue to build capacity working with agriculturists, beekeepers and policy makers in the field of agriculture, land development and forestry. Involvement with corporate sponsors outside the UKIERI programme. Are there any organisations or companies involved in the project which are assisting with the funding? Jawaharlal Nehru Tropical Botanical Garden and Research Institute (JNTBGRI) sponsored the venue and rooms for the 5-day workshop in January 2016. The University of Exeter and JNTBGRI have signed in 2016 an MOU in order to continue this collaboration in research and impact activities. JNTBGRI holds also an MOU with IISER Trivandrum.

### 3. DNA Based Addressable Functional Nanomaterials: Design, Synthesis and Self-assembly of Novel DNA-Rigid Rod Block Copolymers

This research proposal aims at the development of DNA based surface addressable nanostructures through DNA based amphiphilicity-driven self-assembly approach. Since the nanostructures derived from the self-assembly of DNA amphiphiles consists of hydrophobic core and hydrophilic DNA shell, undoubtedly, these nanostructures could be a potential candidate as nanocarriers for drug delivery applications. This is because hydrophobic core of the nanostructure allows efficient encapsulation of hydrophobic drugs during the self-assembly while the DNA shell provides excellent biocompatibility for the system. More importantly, DNA shell of these nanostructures offer the unique opportunity for targeted drug delivery by incorporating specific cell targeting ligands onto the surface of the nanocarrier through DNA hybridization or by replacing the random DNA sequence with DNA or RNA





aptamer for a specific target. As a proof-of-concept for the design of DNA based amphiphile and their self-assembly into surface addressable nanostructures, we have shown the synthesis and self-assembly of DNA-oligo(phenylenethynylene) (DNA-OPE) based hybrid amphiphiles, and demonstrated their amphiphilicity-driven self-assembly into vesicular nanostructures. The most remarkable feature of this kind nanostructure is the DNA based surface addressability, which was demonstrated through the surface decoration of the nanostructures with Au-NPs. This was achieved by the surface modification of the Au-NPs with a DNA sequence, which is complementary to the DNA on the surface of the vesicle (Scheme 1a). Motivated from these results, we envisioned that the replacement of alkyl chains tethered OPE segment of the amphiphile with a strongly  $\pi$ -stacking hydrophobic core such as alkyl chains tethered hexa-peri-benzocoronene (HBC) could lead the self-assembly of the amphiphile into DNA decorated nanosheets due to the strong  $\pi$ -stacking of HBC core in one dimension and the van der Waals interaction of the alkyl chains in other dimension. Keeping this in mind, we have designed a series of DNA-HBC hybrid amphiphiles. Microscopic analyses have shown that DNA-HBC amphiphiles self-assemble into high-aspect-ratio nanosheets with remarkable thermal stability. Nanosheets consist of graphite-like core made of  $\pi$ -stacked HBC with interdigitated alkyl chains, which is decorated with ultra-dense array of hydrophilic DNA on either faces of the sheet. The most attractive feature of the nanosheet is the DNA-directed surface addressability that allows the reversible decoration of the sheet surface with other functional molecules through sequence specific DNA hybridization. We have also exploited the surface addressability of the nanosheets for the integration of cancer cell (A549) targeting ligands (biotin) on their surface, and demonstrate their efficient cellular uptake through the receptor-mediated endocytosis mechanism (Scheme 1b). No cell permeability was observed for a biotin-receptor negative cell line (WI38). These results clearly suggest that the dense display of biotin on the surface of the sheet efficiently guide the nanostructure to A549 cell line, and thus suggest that this would be an ideal candidate for the targeted cancer therapy. Currently, we are exploiting the potential of these systems in targeted delivery of anticancer drugs.

#### 4. A multilayered approach to decipher uncharted mechanisms of asymmetric cell division

Through the work done using the fellowship grant we have made three important discoveries that will further our understanding of the mechanisms controlling cell cycle and development in bacteria:

- (i) With the discovery of NstA we have answered the long-standing question of how the DNA decatenation activity of topoisomerase IV (a type II topoisomerase in bacteria), a potent antibiotic target, is modulated during the early stages of cell cycle.
- (ii) We have demonstrated for the first time a cell cycle-dependent oscillation of the cytoplasmic redox in bacteria. Furthermore, we have defined the importance of this oscillating cytoplasmic redox in bacterial cell cycle progression and development. This discovery not only has long-term implications but also has opened up a unique niche, and tools, in the study of bacterial pathogenesis, cell cycle and development that we plan to pursue.
- (iii) Finally, our discovery of SpmY that plays a crucial role in regulating the development of the dimorphic bacterial model organism, *Caulobacter crescentus*, by modulating the activity of a highly conserved  $\sigma$ 54-activator, has allowed us to make inroads in our quest to understand the signaling mechanisms during asymmetric developmental and cell-fate determination.



## 5. Determining the role of centrosome protein TACC3 in regulation of microtubule nucleation and elucidating its molecular mechanism.

The project was aimed to determine the role of human transforming acidic coiled-coil 3 (TACC3) in centrosome mediated microtubule nucleation and organization. We have demonstrated that TACC3 activates microtubule nucleation and it does so by stabilizing the assembly of the microtubule nucleation regulator, gamma tubulin ring complex at the centrosomes. We have shown that in cultured cells, depletion of TACC3 specifically induces loss of astral microtubule assembly during mitosis. We have also shown that the conserved coiled-coil C-terminal TACC domain plays an additional role in directly promoting microtubule assembly. Subsequently, we have also shown that depletion of TACC3 induces a centrosome-damage responsive checkpoint activation by upregulating p38MAPK and p53 activation at the centrosomes, which ultimately result in apoptotic cell death in animal cells. These results have been published. To further understand the molecular mechanism underlying TACC3-mediated astral microtubule and gamma tubulin ring complex regulation, we investigated the role of Aurora A kinase targeting TACC phosphorylation. Cellular and biochemical results have unravelled that phosphorylation at a conserved site, Ser 558 is essential for astral microtubule assembly and centrosomal integration of the gamma tubulin ring complex proteins in cells. A manuscript on these results is under preparation and will be communicated shortly. Overall, the results of this project have provided newer molecular insights of the function of TACC3 in human cells and are expected to stimulate further research in the field.

## 5. RESEARCH PUBLICATIONS

### Journal Articles

1. S. Lekshmi, N. Shaji and **Anil Shaji**, Weak measurements and non-Classical correlations, *Annals of Physics*, 376, 448, 2017.
2. Varad Pande and **Anil Shaji**, Minimum disturbance rewards with maximum possible classical correlations, *Physics Letters A*, 381, 2045, 2017.
3. S. Pandey, A. Nair, A. P. Andrews, **Ajay Venugopal**, 2,6-Diisopropylanilinium Bromobismuthates, *Eur. J. Inorg. Chem.*, 798-804, 2017.
4. J. A. Johnson, A. Ashokan, A. K. Chalana, A. P. Andrews, **Ajay Venugopal**, Neutral and Cationic B-Ketoiminato Bismuth Complexes *ZAAC*, 643, 607-611, 2017.
5. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Benjamin P, Upper Limits on the Stochastic Gravitational-Wave Background from Advanced LIGO's First Observing Run. By LIGO Scientific and Virgo .*Phys.Rev.Lett.* 118, no.12, 121101, 2017.
6. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), K. Haris, Tito Dal Canton, Henning Fehrmann, Badri Krishnan, Andrew Lundgren, Alex B. Nielsen, Stochastic template bank for gravitational wave searches for precessing neutron-star-black-hole coalescence events. By Nathaniel Indik, *Phys.Rev. D*95, no.6, 064056, 2017.
7. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Directional Limits on

- Persistent Gravitational Waves from Advanced LIGO's First Observing Run. By Phys.Rev.Lett. 118, no.12, 121102, 2017.
8. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Effects of waveform model systematics on the interpretation of GW150914. By Class.Quant.Grav. 34, no.10, 104002, 2017.
  9. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), All-sky search for short gravitational-wave bursts in the first Advanced LIGO run. By Phys.Rev. D95, no.4, 042003, 2017.
  10. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Exploring the Sensitivity of Next Generation Gravitational Wave Detectors. By Class.Quant.Grav. 34, no.4, 044001, 2017.
  11. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Upper Limits on the Rates of Binary Neutron Star and Neutron Star-black Hole Mergers From Advanced Ligo's First Observing run. By Phys.Rev.832, no.2, L21, 2016.
  12. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Search for continuous gravitational waves from neutron stars in globular cluster NGC 6544. By, .Phys.Rev. D95, no.8, 082005, 2017.
  13. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Results of the deepest all-sky survey for continuous gravitational waves on LIGO S6 data running on the Einstein@Home volunteer distributed computing project. By Phys.Rev. D94, no.10, 102002, 2016.
  14. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Binary Black Hole Mergers in the first Advanced LIGO Observing Run. By Phys.Rev. X6 no.4, 041015, 2016.
  15. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Observation of Gravitational Waves from a 22-Solar-Mass Binary Black Hole Coalescence. By Phys.Rev.Lett. GW151226: 116, no.24, 241103, 2016.
  16. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Supplement: The Rate of Binary Black Hole Mergers Inferred from Advanced LIGO Observations Surrounding GW150914. By Astrophys. J. 227, no.2, 14, 2016.
  17. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Directly comparing GW150914 with numerical solutions of Einstein's equations for binary black hole coalescence. By Phys.Rev. D94 no.6, 064035, 2016.
  18. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Improved analysis of GW150914 using a fully spin-precessing waveform Model. By Phys.Rev. X6 no.4, 041014, 2016.
  19. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Comprehensive all-sky search for periodic gravitational waves in the sixth science run LIGO data. By Phys.Rev. D94 no.4, 042002, 2016.
  20. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), A First Targeted Search for Gravitational-Wave Bursts from Core-Collapse Supernovae in Data of First-Generation Laser Interferometer Detectors. By Phys.Rev. D94 no.10, 102001, 2016.

21. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Search for transient gravitational waves in coincidence with short-duration radio transients during 2007-2013. By Phys.Rev. D93 no.12, 122008, 2016.
22. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**) Supplement : Localization and broadband follow-up of the gravitational-wave transient GW150914. By ASKAP and BOOTES and DES and DEC and Fermi-GBM and Fermi-LAT and GRAWITA and INTEGRAL and iPTF and InterPlanetary Network and J-GEM and La Silla-QUEST Survey and Liverpool Telescope and LOFAR and MASTER and MAXI and MWA and Pan-STARRS and PESSTO and Pi of the Sky and SkyMapper and Swift and TAROT and Zadko and Algerian National Observatory and C2PU and TOROS and VISTA Collaborations Astrophys. 225 no.1, 8, 2016
23. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Sensitivity of the Advanced LIGO detectors at the beginning of gravitational wave astronomy. By Phys.Rev. D93 no.11, 112004, 2016.
24. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Localization and broadband follow-up of the gravitational-wave transient GW150914. By ASKAP and BOOTES and DES and DEC and Fermi GBM and Fermi-LAT and GRAWITA and INTEGRAL and iPTF and InterPlanetary Network and J-GEM and La Silla-QUEST Survey and Liverpool Telescope and LOFAR and MASTER and MAXI and MWA and Pan-STARRS and PESSTO and Pi of the Sky and SkyMapper and Swift and C2PU and TOROS and VISTA Collaborations, Astrophys. no.1, L13, 2016.
25. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), GW150914: Implications for the stochastic gravitational wave background from binary black holes. By Phys.Rev.Lett. 116, no.13, 131102, 2016.
26. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Calibration of the Advanced LIGO detectors for the discovery of the binary black-hole merger GW150914. By Phys. Rev. D95 no.6, 062003, 2017.
27. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Characterization of transient noise in Advanced LIGO relevant to gravitational wave signal GW150914. By Class. Quant.Grav. 33, no.13, 134001, 2016.
28. J.aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Observing gravitational-wave transient GW150914 with minimal assumptions. By Phys.Rev. D93 no.12, 122004, Addendum: Phys.Rev. D94, no.6, 069903, 2016.
29. J.aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), The Rate of Binary Black Hole Mergers Inferred from Advanced LIGO Observations Surrounding GW150914. By Astrophys.J. 833, no.1, L1, 2016.
30. J. aasi et al (The LIGO Scientific and Virgo Collaborations, **Archana pai**), Neutron Star Physics in the SKA Era : An Indian Perspective, Sushan Konar, Manjari Bagchi, Debades Bandyopadhyay, Sarmistha Banik, Dipankar Bhattacharya, Sudip Bhattacharyya, R. T. Gan- gadhara, A. Gopakumar Yashwant Gupta, B. C. Joshi, Yogesh Maan, Chandreyee Maitra, Dipanjan Mukherjee, Archana

- Pai, Biswajit Paul, Alak Ray and Firoza Sutaria, *J. Astrophys. Astr.* 37 36, arXiv:1610.08175, 2016.
31. **Bikas C. Das**, Redox-gated 3-terminal organic memory devices: Performance with future prospects, *Proc. of the Intl. Conf. on Nanotechnology for Better Living: Vol. 3, No. 1*, p. 263, 2016.
  32. D. Butter, F. Ciceri, B. de Wit and **Bindusar Sahoo**, All N=4 Conformal Supergravities, *Phys. Rev. Lett.* 118, no. 8, 081602, 2017.
  33. Bhagya Uthaman, P.Manju, Senoy, Thomas, **Deepshikha Jaiswal Nagar**, K.G.suresh and Manoj Raama Varma, *Physical Chemistry Physics*, 19, 12282, 2017.
  34. J. Kumar, **K.George Thomas**, L. M. Liz-Marzan, Nanoscale chirality in metal and semiconductor nanoparticles, *Chem.Commun*, 52, 12555-12569, 2016.
  35. M.Shanthil, H. Fathima, **K.George Thomas**, *ACS Appl. Mater. Interfaces*, DOI: 10.1021/acsami.6b12478, 2016.
  36. S. Borra, D. Chandrasekhar, S. Adhikary, S. Rasala, **Gokulnath Sabhabathi**, and R. A. Maurya, Visible-Light Driven Photocascade Catalysis: Union of N,N-Dimethylanilines and  $\alpha$ -Azidochalcones in Flow Microreactors, *J. Org. Chem.* 82, 2249-2256, 2017.
  37. **Guram Donadze**, N. Innasaridze, M. Ladre, Non-abelian tensor and exterior product of multiplicative Lie rings, *Forum Mathematicum*, Vol., 29, 563-575, 2017.
  38. **Guram Donadze**, The Anderson-Badawi conjecture for commutative algebras over infinite fields, *Indian J. Pure Appl. Math.*, Vol. 47, 691-696, 2016.
  39. **Ravi Maruthachalam** and Bondada, **Hema Somanathan**, Borges RM, Warrant EJ, Kelber A. Visual Adaptations for Mate Detection in the Male Carpenter Bee *Xylocopa tenuiscapa*. *PloS* 12(1):e0168452, 2017.
  40. Krishna S. and **Hema Somanathan** Spatiotemporal strategies that facilitate recruitment in a habitat specialist tree species. *AoB Plants*, 8, p.plw033, 2016.
  41. Borges RM, **Hema Somanathan**, and Kelber A. Patterns and Processes in Nocturnal and Crepuscular Pollination Services. *The Quarterly Review of Biology* 91.4: 389-418, 2016.
  42. S.R. Sudhakar and **Jishy Varghese**, Insulin signalling triggers hunger induced feeding in *Drosophila* through multiple feedback signaling mechanisms, *Metabolism in Time and Space: Emerging Links to Cellular and Developmental Programs*, EMBO-EMBL Symposia, Heidelberg, Germany, 2017.
  43. EB1 regulates attachment of Ska1 with microtubules by forming extended structures on the microtubule. Geethu E. Thomas, K. Bandopadhyay, Sabyasachi Sutradhar, M.R. Renjith, Puja Singh, K.K. Gireesh, Steny Simon, Binshad Badarudeen, Hindol Gupta, Manidipa Banerjee, Raja Paul, **Joy Mitra** and **Tapas .K. Manna** (*Nature Communications* 7, 11665; DOI: 10.1038/ncomms11665, 2016.
  44. Thomas GE, Bandopadhyay K, Sutradhar S, MR Renjith, Singh P, KK Gireesh, Simon S, Badarudeen Binshad, Gupta H, Banerjee M, Paul R, **Tapas .K. Manna**, Manna TK EB1 regulates attachment

- of Ska1 with microtubules by forming extended structures on the microtubule lattice. *Nature Communications*, doi:10.1038/NCOMMS11665, 2016.
45. L.Santuari, G. F. Sanchez-Perez, M. Luijten, B. Rutjens, I. Terpstra, L. Berke, M. Gorte, **Kalika Prasad**, D. Bao, J. L. Timmermans-Hereijgers, K. Maeo, K. Nakamura, A. Shimotohno, A. Pencik, O Novak, K. Ljung, S. van Heesch, E. de Bruijn, E. Cuppen, V. Willemsen, A.P. Mähönen, W. Lukowitz, B. Snel, D. de Ridder, B. Scheres, R. Heidstra, The PLETHORA Gene Regulatory Network Guides Growth and Cell Differentiation in Arabidopsis Roots. *Plant Cell*. 28(12), 2937-2951, 2016.
  46. Kareem, D. Radhakrishnan, Y. Sondhi, M. Aiyaz, M. V. Roy, K. Sugimoto, **Kalika Prasad**, De novo assembly of plant body plan: a step ahead of Deadpool. *Regeneration (Oxf)*. 3(4), 182-197, 2016.
  47. Kareem, D. Radhakrishnan, X. Wang, S. Bagavathiappan, Z. B. Trivedi, K. Sugimoto, J. Xu, A. P. Mähönen, **Kalika Prasad**, Protocol: a method to study the direct reprogramming of lateral root primordia to fertile shoots. *Plant Methods*. 12, 27, 2016.
  48. Abin Varghese, Chithra H. Sharma, **Madhu Thalakulam**, Topography preserved microwave plasma etching for top-down layer engineering in MoS<sub>2</sub> and other van der Waals materials, *Nanoscale*, 9, 3818-3825, 2017.
  49. Chithra H Sharma and **Madhu Thalakulam**, Split-gated point-contact for electrostatic confinement of transport in MoS<sub>2</sub>/h-BN hybrid structures, *Scientific Reports*, 7, 735, 2017.
  50. Minu Mohan, Vikas Nandal, Sanish Paramadam, Kasala Prabhakar Reddy, Sekar Ramkumar, Sumanshu Agarwal, Chinnakonda S. Gopinath, Pradeep R. Nair, and **Manoj A. G. Namboothiry**, Efficient Organic Photovoltaics with Improved Charge Extraction and High Short-Circuit Current, *J. Phys. Chem. C*, 121, 5523-5530, 2017.
  51. B. G. Ganga, S. M. Seetharaman, P. C. R. Varma, **Manoj A. G. Namboothiry**, and P. N. Santhosh, Photovoltaic properties of low temperature solution processed earth abundant CuO nanocrystal-based hybrid solar cells, *Phys. Status Solidi A* 214, No. 1, 1600671, 2017.
  52. Bhat, B.V.R., Lindsay, **Mithun Mukherjee**, Additive units of product system, To appear in *Trans. Amer. Math. Soc*, 204, 2017.
  53. **Mithun Mukherjee**, Structure Theorem of the generator of a norm continuous completely positive semigroup : alternative proof using Bures distance, To appear in *Positivity*, 2017.
  54. Parijat Chakraborty, Ajith V.P., Lin Gen, Abhishek Dutta, Krishnaprasad G.N., Tekkedil M.M., Shinohara, A., Lars M. Steinmetz and **Nishant K.T** Modulating Crossover Frequency and Interference for Obligate Crossovers in *Saccharomyces cerevisiae* Meiosis. *G3 (Bethesda)* 7: 1511-1524, 2017.
  55. D. Pradeep and **M.P. Rajan**, An optimal order a posteriori parameter choice strategy with modified Newton iterative scheme for solving nonlinear ill-posed operator equations, *International Journal of Computing Science and Mathematics (Inderscience)*, DOI:10.1504/IJCSM.2018.10005797, 2017.



56. K. S. Asha, R. Khoj, N. Ahmed, Ramesh Chandra Nath and **Sukendu Mandal**, Monocarboxylic Acid Driven Structural Transformation in Manganese Based Metal-Organic Frameworks *Cryst. Growth & Des.*, 17, 982-989, 2017.
57. K. S. Asha, N. Ahmed, A. C. Reber, **Ramesh Chandra Nath**, S. N. Khanna, S. Mandal, The Effect of Substituted Benzene Dicarboxylic Acid linkers on the Optical Band Gap Energy and Magnetic Coupling in Manganese Trimer Metal Organic Frameworks, *Journal of Materials Chemistry C*, 5, 539-548, 2017.
58. Structural and magnetic properties of spin-1/2 dimer compound  $\text{Cu}_2(\text{IPA})_2(\text{DMF})(\text{H}_2\text{O})$  with a large spin gap, S. Thamban, U. Arjun, M. Padmanabhan, and **Ramesh Chandra Nath**, *J. Phys.: Condens. Matter*, 29, 255801, 2017.
59. S. Nandi, Y. M. Jana, D. Swarnakar, J. Alam, P. Bag, and **Ramesh Chandra Nath**, Magnetization process and specific heat properties of geometrically frustrated pyrochlores  $\text{R}_2\text{FeSbO}_7$  ( $\text{R}^{3+} = \text{Dy}, \text{Y}$ ) and spin-ice magnetic phase in  $\text{Dy}_2\text{FeSbO}_7$ , *J. Alloy. Compd.* 714, 318, 2017.
60. P. R. Baral, N. Ahmed, J. Kumar, S. Nair and **Ramesh Chandra Nath**, Synthesis and physical properties of spin-1 honeycomb lattice  $\text{Pb}_6\text{Ni}_9(\text{TeO}_6)_5$ , *J. Alloy. Compd.* 711, 568, 2017.
61. K. M. Ranjith, K. Brinda, U. Arjun, N. G. Hegde, and **Ramesh Chandra Nath**, Double phase transition in the triangular antiferromagnet  $\text{Ba}_3\text{CoTa}_2\text{O}_9$ , *J. Phys.: Condens. Matter* 29, 115804, 2017.
62. Pallab Bag and **Ramesh Chandra Nath**, Path dependent magnetic states and evidence of kinetically arrested states in Nd doped  $\text{LaFe}_{11.5}\text{Al}_{1.5}$ , *J. Magn. Magn. Mater.* 426, 525, 2017.
63. S.K. Albert, M. Golla, H. V. P. Thellu, N. Krishnan, **Reji Varghese**, Modular synthesis of supramolecular DNA amphiphiles through host-guest interactions and their self-assembly into DNA-decorated nanovesicles, *Nanoscale*, 9, 5425-5432, 2017.
64. S. K. Albert, M. Golla, H. V. P. Thellu, N. Krishnan, **Reji Varghese**, Synthesis and self-assembly of DNA-chromophore hybrid amphiphiles, *Org. Biomol. Chem.* 14, 6875-7120, 2016.
65. Lahiri, Amitabha; Sengupta, Ambar N, **Saikat Chatterjee**, Construction of categorical bundles from local data. *Theory Appl. Categ.* 31, No. 14, 388-417, 2016.
66. **Saikat Chatterjee**, Lahiri, Amitabha; Sengupta, Ambar N. Connections on decorated path space bundles. *J. Geom. Phys.* 112, 147-174, 2017.
67. J. K. Manesia, M. Franch, D. Tabas-Madrid, R. Nogales-Cadenas, T. Vanwelden, E. Van Den Bosch, Z. Xu, A. Pascual-Montano, **Satish Khurana**, C. M. Verfaillie, Distinct Molecular Signature of Murine Fetal Liver and Adult Hematopoietic Stem Cells Identify Novel Regulators of Hematopoietic Stem Cell Function, *Stem Cells Dev.* 26, 573, 2017.
68. **Satish Khurana**, S. Schouteden, J. K. Manesia, A. Santamaria-Martínez, J. Huelsken, A. Lacy-Hulbert, C. M. Verfaillie. Outside-in integrin signalling regulates haematopoietic stem cell function via Periostin-Itgav axis, *Nat. Commun.* 7, 13500, 2016.
69. **Satish Khurana**, The effects of proliferation and DNA damage on hematopoietic stem cell function determine aging, *Dev. Dyn.* 245, 739, 2016.

70. N. Nagananda, A. M. Ali, I. M. Roy, C. M. Verfaillie, **Satish Khurana**, Physico-chemical properties of the stem cell niche. In A. Mukhopadhyay ed. Regenerative Medicine, Springer India Pvt. Ltd. In Press, 2016.
71. D. Damien, A. Anil, D. Chatterjee and **M. M. Shaijumon**, Direct deposition of MoSe<sub>2</sub> nanocrystal onto conducting substrates: Towards ultra-efficient electrocatalysts for hydrogen evolution reaction, J. Mater. Chem. A DOI: 10.1039/c6a09645j, 2017.
72. B. Babu and **M. M. Shaijumon**, High performance sodium-ion hybrid capacitor based on Na<sub>2</sub>Ti<sub>2</sub>O<sub>4</sub>(OH)<sub>2</sub> nanostructures, J. Power Sources, DOI: 10.1016/j.powsour.03.143, 2017.
73. O. V. Manila, A. Anil, **M. M. Shaijumon**, V. K. Pillai and S. Alwarappan, "A single step electrochemical synthesis of WS<sub>2</sub> quantum dots", Chem. Eur. J, DOI: 10.1002/chem.201701277, 2017.
74. B. Vedhanarayanan, B. Babu, **M. M. Shaijumon** and A. Ajayaghosh, "Exfoliation of reduced graphene oxide with self-assembled  $\pi$ -gelators for improved electrochemical performance", ACS Appl. Mater. Interfaces, DOI: 10.1021/acsami.6b09418, 2017.
75. Binson Babu, P. G. Lashmi, and **M. M. Shaijumon**, "Li-ion capacitor based on activated rice husk derived porous carbon with improved electrochemical performance", Electrochim. Acta, 211, 289-296, 2016.
76. Ganesan, A. Varzi, S. Passerini and **M. M. Shaijumon**, "Graphene derived carbon confined cathodes for Li-S batteries: Electrochemical impedance studies", Electrochim. Acta, 214, 129-138, 2016.
77. S. Santhosh Kumar, **S. Shankaranarayanan**, Role of spatial higher order derivatives in momentum space entanglement., Phys. Rev. D 95 no. 6, 065023. 10.1103/PhysRevD.95.065023, 2017.
78. Swastik Bhattacharya, **S. Shankaranarayanan**, Negative specific heat of black-holes from Fluid-Gravity Correspondence. Class. Quant. Grav. 34 no. 7, 075005. 10.1088/1361-6382/aa601a, 2017.
79. Bethan Cropp, Swastik Bhattacharya, **S. Shankaranarayanan**, Hints of quantum gravity from the horizon fluid. Phys. Rev. D 95 no. 2, 024006. 10.1103/PhysRevD.95.024006, 2017.
80. Debottam Nandi, **S. Shankaranarayanan**, JCAP 1610 no. 10, 008. 10.1088/1475-7516/2016/10/008, 2016.
81. Jose Mathew, **S. Shankaranarayanan**, Astropart. Phys. 84 1-7. 10.1016/j.astropartphys.2016.07.004, 2016.
82. Statistical modeling of the fluid dual to Boulware-Deser Black hole. J. L. López, Swastik Bhattacharya, **S. Shankaranarayanan**, Phys. Rev. D 94 no. 2, 024029. 10.1103/PhysRevD.94.024029, 2016.
83. Debottam Nandi, **S. Shankaranarayanan**, Complete Hamiltonian analysis of cosmological perturbations at all orders. JCAP 1606 no. 06, 038. 10.1088/1475-7516/2016/06/038, 2016.
84. Abhishek, Basak, Ophélie Fabre, **S. Shankaranarayanan**, Gen. Rel. Grav. 48 no. 10, 123. 10.1007/s10714-016-2116-4, 2016.
85. Bethan Cropp, Stefano Liberati, Rodrigo Turcati, **S. Shankaranarayanan**, Analogue black

- holes in relativistic BECs: Mimicking Killing and universal horizons. By Phys. Rev. D94 no.6, 063003.10.1103/PhysRevD.94.063003, 2016.
86. Bethan Cropp, Stefano Liberati, **S.Shankaranarayanan**, Vorticity in analog gravity. By Rodrigo Turcati, Class.Quant.Grav. 33 no.12, 125009. 10.1088/0264-9381/33/12/125009, 2016.
  87. Sudarshan Ananth, Lars Brink, Sucheta Majumdar, Mahendra Mali, Nabha Shah **S.Shankaranarayanan**, Gravitation and quadratic forms. By, JHEP 1703 169. 10.1007/JHEP03169, 2017.
  88. K. Suresh, **D.V.Senthilkumar**, M. Lakshmanan and J. Kurths, Emergence of a common generalized synchronization manifold in network motifs of structurally different time-delay systems, Chaos, Solitons and Fractals, 93, 235(1-11), 2016.
  89. K. Sathiyadevi, S. Karthiga, V. K. Chandrasekar, **D.V.Senthilkumar**, and M. Lakshmanan, Spontaneous Symmetry Breaking due to the trade-off between attractive and repulsive couplings, Physical Review E, 95, 042301(1-11), 2017.
  90. A.Bharali, G. and **Shrihari Sridharan**, The dynamics of holomorphic correspondences of  $P^1$ : Invariant measures and the normality set, Complex Variables and Elliptic Equations, 61, (1587 - 1613), 2017.
  91. H. V. P. Thellu, S. K. Albert, M. Golla, N. Krishnan, S. B. Yamijala, S. V. Nair, **Srinivasa Murthy**, Reji Varghese, DNA-Decorated Luminescent Vesicles as Drug Carriers, ChemistrySelect, 1, 5389 - 5396, 2016.
  92. H.V.P. Thelu, S. K. Albert, M. Golla, N. Krishnan, S. B. Yamijala, Sreeja V. Nair, **S. Murty Srinivasula** and **Reji Varghese**, DNA-Decorated Luminescent Vesicles as Drug Carriers ChemistrySelect, 1, 5388, 2016.
  93. Asha P, M. Sinha, **Sukhendu Mandal**, Effective removal of chemical warfare agent simulants using water stable metal-organic frameworks: mechanistic study and structure-property correlation, RSC Advances, 7, 6691-6696, 2017.
  94. P.C. Rao, **Sukhendu Mandal**, Friedel-Crafts Alkylation of Indoles with Nitroalkenes through Hydrogen-Bond-Donating Metal-Organic Framework ChemCatChem, 9, 1172-1176, 2017.
  95. P. C. Rao, S. P. Chaudhary, D. Kuznetsov, **Sukhendu Mandal**, Transformation of One-Dimensional Achiral Structure to Three- Dimensional Chiral Structure: Mechanistic Study and Catalytic Activities of Chiral Structure, Inorg. Chem, 55, 12669-12674, 2016.
  96. K. S. Asha, R. Bhattachrjee, **Sukhendu Mandal**, Complete Transmetalation in a Metal-Organic Framework by Metal Ion Metathesis in a Single Crystal for Selective Sensing of Phosphate Ions in Aqueous Media, Angew Chem. Int. Ed. 55, 11528, 2016.
  97. George, H. Gopalakrishnan, **Sukhendu Mandal**, Surfactant Free Platinum Nanocluster as Fluorescent Probe for the Selective Detection of Fe (III) Ions in Aqueous Medium” Sensors & Actuators: B. Chemical, 243, 332-337, 2017.
  98. B. Janakiraman, J. Mignolet, S. Narayanan, P. Viollier, and **Sunish.K.Radhakrishnan**. In-phase oscillation of global regulons is orchestrated by a pole-specific organizer. PNAS, USA. 44: 12550-12555, 2016.



99. S Chandra Shekar, Sanjay Kumar Meena and **R.S.Swathi**, Interlocked Benzenes in Triangular pi-architectures: Anchoring Groups Dictate Ion Binding and Transmission, *Phys. Chem. Chem. Phys.* 19, 10264, 2017.
100. T G Thomas, S Chandra Shekar, **R.S.Swathi** and K R Gopidas, Triazatruxene Radical Cation: A Trigonal Class III Mixed Valence System, *RSC Advances*, 7, 821, 2017.
101. Rohini K and **R.S.Swathi**, Tunable Azacrown-embedded Graphene Nanomeshes for Ion Sensing and Separation, *ACS Applied Materials & Interfaces*, 9, 999, 2017.
102. Reshmi Thomas and **R.S.Swathi**, Linear and Polygonal Assemblies of Plasmonic Nanoparticles: Incident Light Polarization Dictates Hot Spots, *J. Phys. Chem. C*, 120, 18733, 2016.
103. U. Arjun, V. Kumar, P. K. Anjana, **A. Thirumurugan**, J. Sichel Schmidt, A. V. Mahajan and **Ramesh Chandra Nath**, Singlet ground state in the spin-1/2 weakly coupled dimer compound  $\text{NH}_4[(\text{V}_2\text{O}_3)_2(4,4'\text{-bpy})_2(\text{H}_2\text{PO}_4)(\text{PO}_4)_2] \cdot 0.5\text{H}_2\text{O}$ , *Phys. Rev. B* 95, 174421 2017.
104. E. van Bergen, H. Barlow H, O. Brattström, H. Griffiths, **Ullasa Kodandaramaiah**, C. Osborne and P. M. Brakefield The stable isotope ecology of mycalesine butterflies: implications for plant-insect co-evolution. *Func. Ecol.* 30, 1936-1946, 2016.
105. R. K. Sahoo, A. D. Warren, N. Wahlberg, A. V. Z. Brower, V. A. Lukhtanov and **Ullasa Kodandaramaiah**. Higher level relationships among skipper butterflies (Hesperiidae) resolved by ten genes. *PeerJ* 4:e2653. 2016.
106. E. van Bergen, D. Osbaldeston, **Ullasa Kodandaramaiah**, O. Brattström, K. Aduse-poku and P. M. Brakefield, Conserved patterns of integrated developmental plasticity in a group of polyphenic tropical butterflies. *BMC Evol. Biol.* 17:59. 2017.
107. H. V Mayekar and **Ullasa Kodandaramaiah**, Pupal Colour Plasticity in a Tropical Butterfly, *Mycalasis mineus* (Nymphalidae: Satyrinae). *PLoS ONE* 12, 2, e0171482, 2017.
108. B. F. Simões, F. L. Sampaio, R. H. Douglas, **Ullasa Kodandaramaiah**, N. R. Casewell, R. A. Harrison, N. S. Hart, J. C. Partridge, D. M. Hunt, D. J. Gower. Visual Pigments, Ocular Filters and the Evolution of Snake Vision. *Mol. Biol. Evol.* 33, 2483-2495, 2016.
109. Guram Donadze, M. Ladra, **Viji Z. Thomas**, On some Closure properties of the non-abelian tensor product, *J. Algebra* 472, 399-413, 2017.
110. A. E. Antony, Guram Donadze, V. Prasad, **Viji Z. Thomas**, The second stable homotopy group of the Eilenberg-MacLane space, *Mathematische Zeitschrift*, DOI 10.1007/s00209-017-1870-7, 2017.
111. A.C. Jiji, A.Shine, **Vinesh Vijayan** Direct Observation of Aggregation-Induced Backbone Conformational Changes in Tau Peptides, *Angew. Chem. Int. Ed.*, 55, 11562, 2016.

## International Conference

1. Jaise Jose and **M.P. Rajan**, Finite dimensional approximation of simplified Landweber iteration for solving nonlinear ill-posed problems, International conference on Advances in Scientific Computing, 2016.

## Book Chapter

1. **Anil Shaji**, Non-Classical correlations in information processing , Book Chapter in “Lectures on General Quantum Correlations and their Applications”, Fanchini, Felipe Fernandes, SoaresPinto, Diogo de Oliveira, Adesso, Gerardo (Eds.). Springer 2017.

## Any Other (Special Mention)

- a) IISER Thiruvananthapuram conducted for the first time the Cryo Electron Microscopy and 3D Image Processing (CEM3DIP 2016) practical course in India. We conducted such an extensive course on single particle cryoEM and cellular tomography for the first time in India, this was a unique opportunity for IISER Thiruvananthapuram in the history of Structural Biology using cryoEM in India. This is a unique and upcoming field especially in India with only 6 to 7 PI's having this expertise in India.

## 6. AWARDS AND HONOURS

Sl. No	Faculty	Honors/ Awards
1.	Dr.Hema Somanathan	Erasmus Plus Teaching Exchange with European Union from 17-23 April 2017 to Lund University. Sweden
2.	Dr.N.Sadanantha Singh	Ramalingaswami fellowship
		Early career research award
3.	Dr.Sunish Radhakrishnan	DST SwarnaJayanti Fellowship Award 2015
4.	Dr.R.S.Swathi	Women Excellence Award, DST-SERB
		Young Scientist Award, Indian National Science Academy

## 7. OTHER ACADEMIC ACTIVITIES

The faculties of the institute have participated in various national and international conferences as listed below

### Conferences/Workshops/Symposia Attended

Sl. No	Faculty/Student	Conference/Workshop	Venue	Date	International/ National
1.	Dr. Adithya Lakshman	Spectroscopy and Dynamics of Molecules and Clusters 2017	Pondicherry	Feb 16-19, 2017	International
2.	Dr. Ajay Venugopal	27th International Conference on Organometallic Chemistry 2016	Melbourne Australia2016	Jul 17-22,	National

3.	Dr.Archana Pai	Special Session on Gravitational Waves, Astronomical Society of India Meeting	University of Kashmir, Srinagar	May 20, 2016	National
		One day Symposium on Gravitational Waves	ARIES, Nainital	Oct 26, 2016	National
		Time Series Analysis for Synoptic Surveys and Gravitational Wave Astronomy	ICTS-TIFR, Bangalore	Mar 20, 2017	National
4.	Dr.Bikas C. Das	International conference on Macromolecules: Synthesis, Morphology, Processing, Structure, Properties and Applications (ICM-2016)	Mahatma Gandhi University, Kottayam, Kerala.	May 13-15, 2016	International
		Third International Conference on Nanotechnology for Better Living (ICNBL-2016)	Jointly by Indian Institute of Technology Kanpur (IITK) & National Institute of Technology Srinagar	May 25-29, 2016	International
		National Symposium on Nano Science & Technology (NSNST-2016)	CeNSE at IISc Bangalore under the Indian Nanoelectronics Users Program (INUP)	Jun 29 -30, 2016	National
5.	Dr.Bindusar Sahoo	Indian Strings Meeting	IISER Pune	Dec 15 -21, 2016	International
6.	Dr.Deepshikha Jaiswal-Nagar	Statphys26	Lyon, France	Jul 18-22, 2016	International
7.	Dr.Joy Mitra	Science and Technology for Society Forum 2016	Colombo, Sri Lanka	Sep 7-10, 2016	International
		European MRS Spring Meeting	Lille, France	May 2-6, 2016	International
8.	Dr. Manoj A G Namboothiry	MRS Spring Meeting & Exhibit 2016, Phoenix, Arizona, USA	Phoenix, Arizona, USA	Mar 28- Apr-1, 2016	International
9.	Prof.S. Murty Srinivasula	Indo-Irish Biosciences Research and Innovation Conference	NUI Galway	Jun 8-9, 2016	International

		Chromosome Stability -2016	KTDC Samudra Convention Centre, Kovalam, Kerala	Dec 15-18, 2016	International
10.	Prof.M.P. Rajan	Optical Imaging and Inverse Problem	IMA, University of Minnesota, USA	Feb 13-17, 2017	International
		International Conference on Advances in Scientific Computing	IIT Madras	Nov 28-30, 2016	International
11.	Dr. Ramanathan Natesh	CEM3DIP 2016 - GIAN	IISER Thiruvananthapuram	Jul 2- 13, 2016	International
		Second International Conference on Structural and Functional Genomics	JVC Auditorium Sastra University, Thanjavur.	Aug 19, 2016	International
		National Workshop on Integrative Biology	Seminar Hall, Department of Botany, University of Thiruvananthapuram	Feb 23, 2017	National
12.	Dr.Ramesh Chandra Nath	International Meeting on Highly Correlated Systems-2017	MG University, Kottayam, India	Mar 24-26, 2017	International
13.	Dr.Ravi Maruthachalam	6th Ramalingaswami Fellows Conclave	IISER- Pune	Jan 04-06, 2017	National
		20th Annual convention of ADNAT(Association for promotion of DNA Fingerprinting and other DNA Technologies) with theme "Genome editing technologies and their applications in Biology, Medicine and Agriculture	KIIT University, Bhubaneshwar, Orissa	Feb 16-18, 2017	National
14.	Dr.Ravi Pant	Asia Communication and Photonic	Wuhan, China	Nov 2-6, 2016	International
		Australian Conference on Fiber Optics Technology (ACOFT)	Sydney, Australia	Sep 5-9, 2016	International
15.	Dr.Reji Varghese	International Conference of Young Researchers on Advanced	IISc, Bangalore	Dec 2016	International

		Materials (IUMRS-ICYRAM 2016), IISc Bangalore			
		JSPS-DST 2016 Asian Academic Seminar	University of Tokyo, Japan	Dec 2016	International
		International Conference on Polymer Science and Technology	Uday Samudra, Kovalam	Jan 2017	International
16.	Dr. D.V.Senthilkumar	Faculty Development Program	IISER-TVM	Jul 14-16, 2016	National
17.	Dr.M. M. Shaijumon	IUMRS-ICYRAM 2016	IISc Bangalore	Dec 11-15, 2016	International
		18th International Meeting on Lithium Batteries	Chicago, USA	Jun19-24, 2016	International
		7th Trilateral Conference on Nanoscience: Energy, Water & Healthcare	NTU Singapore	Dec 5-7, 2017	International
		ICCON 2017	SSIHL, Puttaparthi India	Mar 10-12, 2017	National
		FUNMAT2016 Symposium on Advanced Functional Materials	CSIR-CECRI, Karaikudy	May 26-28, 2016	National
18.	Dr.S. Shankara narayanan	ASI-2017	Kashmir	May 2017	National
		EMN meeting on Quantum Information	Berlin	Aug 2016	International
		III Saha Theory Workshop On Cosmology	SINP	Jan 2017	International
		Aspects of Gravity and Cosmology	IUCAA Pune	Mar 2017	International
19.	Dr. Sukhendu Mandal	5th International conference on Metal-Organic Framework	Long Beach, California, USA	Sep 11-15, 2016	International
20.	Dr.Sunish Kumar Radhakrishnan	Gordon Research Conference on Bacterial Cell Surfaces.	Mount Snow, Vermont, USA	Jun 26 - Jul 1 2016	International
		ASM Microbe 2016	Boston, USA	Jun 16-20, 2016	International

21.	Dr.R.S.Swathi	Workshop on High Performance Scientific Computing	MHRD	Jun 2016	National
22.	Dr.Tapas K. Manna	Chromosome Stability 2016	KTDC Samudra, Trivandrum	Dec 14-16, 2016	International
		Computational and experimental studies of microtubules and microtubule based motor proteins	IIT Bombay	Dec 14, 2016	International
23.	Dr.A. Thirumurugan	12th JNC conference on the Chemistry of Materials	Trivandrum	Sept 23-25, 2016	National
		Rational Designing of Catalysts for the Sustainable Production of Fuels and Chemicals - Indo-UK workshop	Chennai	Nov 1-4, 2016	International
		Fifth International Conference on Multifunctional, Hybrid and Nanomaterials 2017	Lisbon	Mar 6-10, 2017	International
24.	Dr.Viji Z Thomas	Closure Properties of the non-abelian tensor product of groups	Adelphi University, NY, USA2016.	Jun 10-12,	International
		The second stable homotopy group of the Eilenberg-Maclane space and the Schur Multiplier	Binghamton University, NY, USA	May 26-28, 2017	International
		The Second Stable homotopy group of the Eilenberg-Maclane space	University at Altoona	Apr 28, 2017	International
		The second stable homotopy group of the Eilenberg-Maclane space and the Bogomolov multiplier.	Lafayette College, Easton, PA	May 24, 2017	International
25.	Dr.Vinesh Vijayan	Asia-Pacific conference	NMR Bangalore	Feb 16-19, 2017	International

## Invited Lectures and Seminars Delivered

Sl No.	Name of Faculty	Title of Lecture	Venue
1.	Dr. Adithya Lakshman	Photo-acidic behavior of 3 and 4-hydroxystilbenes using femtosecond time-resolved vibrational spectroscopy	Osaka University, Japan
2.	Dr. Anil Shaji	Quantum States of Light - Applications, Challenges and opportunities	Bangalore
3.	Dr. Archana Pai	From Copernicus to Einstein	IISER Thiruvananthapuram
		Compact Binaries in the GW Band	Kerala Science and Technology Museum, Trivandrum
		GW150914: Listening to the Symphony of the Universe by LIGO detectors	ISRO Inertial System Units, Trivandrum
		LIGO detectors observe the first black hole binary merger	Rajiv Gandhi Institute of Technology, Kottayam
		LIGO detectors observe the first black hole binary merger	Periyar University
		LIGO detectors observe the first black hole binary merger	CUSAT, Cochin
4.	Dr. Bindusar Sahoo	Advances in N=4 Conformal Supergravity	IISER Pune
5.	Dr. Deepshikha Jaiswal-Nagar	Growth of high quality single crystals of high temperature superconductors YBa <sub>2</sub> Cu <sub>3</sub> O <sub>6+x</sub> and Bi <sub>2</sub> Sr <sub>2</sub> CaCu <sub>2</sub> O <sub>8+x</sub> using self-flux technique	Université Paris Sud, Paris, France
6.	Prof.K. George Thomas	Photochemistry and Photophysics in the Plasmonic Field (Invited Lecture)	Mount Holyoke College South Hadley, USA
		Playing with Excitons: Photoinduced Processes in Semiconductor Nanostructures (ANL Seminar)	Argonne National Laboratory, USA
		Playing with Excitons: Photoinduced Processes in Semiconductor Nanostructures (Invited Lecture)	Hongo Campus of the University of Tokyo, Japan
		Quantum Dots for Light Energy Harvesting and Conversion (Invited Lecture)	The Plaza Hotel, Seoul, Korea
		Photo-responsive Nanomaterials and Nanobiosensors (Invited Lecture)	All India Institute of Medical Sciences, New Delhi



		Symmetric and Asymmetric Dipolar Coupling: Drawing Parallels Between Excitons and Plasmons (Plenary Lecture)	Nanyang Technological University, Singapore
		Playing with Plasmons and Excitations (Lead Lecture)	Marthoma College, Thiruvalla
7.	Dr. S. Gokulnath	Why Porphyrins are Pigments of Life	St. Joseph's college Idukki, Kerala
		International Symposium on Frontiers in Novel Functional Molecules	Tokyo, JAPAN
8.	Dr. Hema Somanathan	Visual ecology and resource use in carpenter bees.	Wurzburg. Germany
9.	Dr. Jishy Varghese	Developmental Biology: principles, Diseases and Model Organisms	All Saints College, Trivandrum
10.	Dr. Joy Mitra	Tunnel Current Fluctuations	University Belfast UK
		Luminescence	SB College, Kottayam
		Designing Defects in ZnO	Centre For Nano & soft matter science, Bangalore
		ZnO Its Many Unanswered Questions	University of surrey, UK
		Designing Defects: A few curious aspects of ZnO nanostructures	Indian Association for the Cultivation of Science, India
11.	Dr. Kalika Prasad	Self-organisation in regeneration	RIKEN, Japan, Tokyo
		Dynamics of cellular and molecular Events in plant regeneration	Science University, Japan Tokyo
		Self-organisation: a kick start followed by assembly of regulatory interactions	IISc Bangalore
12.	Dr. Madhu Thalakulam	National Seminar on Recent progresses in chemistry (RCPC-2016)	Govt college, Kasargod
13.	Dr. Manoj A G Namboothiry	Organic Semiconductors - Fundamentals and Applications	IISER Thiruvananthapuram
14.	Prof.S. Murty Srinivasula	Immune-related Autophagy	National University of Ireland, Galway
15.	Dr. Nisha N Kannan	Okinawa Institute of Science and Technology (OIST), Japan	Okinawa Institute of Science and Technology (OIST), Japan

16.	Dr. Nishant K.T	The effect of variations in meiotic crossover frequency on chromosome segregation in <i>Saccharomyces cerevisiae</i>	Cornell University USA
		Optimizing crossover frequency for crossover assurance in yeast meiosis	National cancer institute, USA
17.	Prof. M.P. Rajan	Regularization Techniques for solving singularly perturbed problems	IIT Madras
18.	Dr. Rajendar Goretti	The art Organic Sythesis	The Cochin College, kochi
		The Science and Art of The Organic Synthesis	St. Thomas College, Thrissur
19.	Dr. Ramesh Chandra Nath	Magnetic phase transition in spin-1/2 frustrated triangular lattice antiferromagnet $\text{Li}_2\text{CuW}_2\text{O}_8$	MG University, Kottayam
		Magnetic phase transitions in spin-1/2 and spin-1 frustrated triangular lattice antiferromagnets $\text{Li}_2(\text{Cu},\text{Ni})\text{W}_2\text{O}_8$	IMSC Chennai
		Magnetic phase transitions in spin-1/2 and spin-1 frustrated triangular lattice antiferromagnets $\text{Li}_2(\text{Cu},\text{Ni})\text{W}_2\text{O}_8$	Max Planck Institute of Chemical Physics of Solids
20.	Dr. Ravi Maruthachalam	Approaches to identify novel kinetochore proteins with special emphasis towards improving in vivo haploid induction in plants	Dupont Knowledge Centre, Hyderabad
		Advances in haploid breeding - an insight into CENH3 mediated in vivo haploid production via seeds.	MCRC, Hyderabad,
		Engineering centromeres to produce haploids in plants	KIIT Bhubaneswar
		Science and Serendipity: My personal experience	Bharathiyar University Coimbatore
21.	Dr. Ramanathan Natesh	Single Particle Cryo Electron Microscopy: the recent revolution in structural biology.	JVC Auditorium, Sastra University
		Seeing is believing!! The Amazing World of Biological Nanomachines within your cells	St. Thomas College, Thrissur
		Integrative Structural Biology	University of Kerala, Thiruvananthapuram
		EM sample, specimen preparation methods	IISER Thiruvananthapuram

		Refinement of Classifications, Dealing with orientation and Heterogeneity of particles	IISER Thiruvananthapuram
		Hybrid methods: Protein Crystallography, computational methods and Cryo EM	IISER Thiruvananthapuram
22.	Dr. Ravi Pant	Invited talk in Asia Communication and Photonics Conference	Wuhan, China
23.	Dr. Reji Varghese	DNA-Based Surface Engineered Nanostructures	IISc Bangalore
		DNA-decorated Soft Nanostructures	University of Tokyo, Japan
		DNA-decorated Soft Nanostructures	NIIMS, Japan
		DNA-based Soft Materials	MG University, Kottayam
24.	Dr. M. M. Shaijumon	Controllable growth of 2D layered nanomaterials	CECRI
		Nanoarchitectures for Energy Applications	NIT Calicut
		2D materials beyond Graphene	IISER Thiruvananthapuram
		Controllable growth of 2D layered nanomaterials	IISER Thiruvananthapuram
		2D Nanomaterials for Hydrogen Evolution Reaction	IISER Thiruvananthapuram
25.	Dr. S. Shankaranarayanan	Low Scale Higgs Inflation	Srinagar
		Primordial Magentogenesis during recombination	IIT-Bombay
		Higher derivatives and Quantum Phase Transitions	EMN meeting, Berlin
		Hamiltonian formulation of higher order cosmological perturbations	SINP, Kolkata
		Fluid-Gravity correspondence: A degrees of freedom new way to understand black-hole	IUCAA, Pune
26.	Dr. Sukhendu Mandal	Electrochemical oxygen reduction catalyzed by $[\{Co_3(\mu_3 OH)(BTB)_2(BPE)_2\} \{Co_{0.5N} (C_5H_5)\}]$	USA
		Structural Evolution of Atom-precise Metal Nanocluster	Moscow Russia
		Metal nanocluster	St. Joseph College, Cochin

27.	Dr. M Suheshkumar Singh	Photoacoustic imaging, A boon to health care imaging technology	IISc, Bangalore
28.	Dr. Sunish Kumar Radhakrishnan	Topoisomerase IV activity in bacteria gets a redox switch	Bengaluru
		Topoisomerase IV activity in bacteria gets a redox switch	IISER Thiruvananthapuram
		Topoisomerase IV activity in bacteria gets a redox switch	Bhubaneswar, India
		Topoisomerase IV activity in bacteria gets a redox switch	ILS university Bhubaneswar, India
		Topoisomerase IV activity in bacteria gets a redox switch	IISER, Pune
29.	Dr.R.S. Swathi	Recent Advances in Theoretical Chemistry	IISc, Bangalore
		365Indo-Japan Discussion Meeting on Theory and Experiment in Spectroscopy	IIT, Kanpur
		International Conference of Young Researchers on Advanced Materials (IUMRS)	IISc, Bangalore
		Theoretical Chemistry Symposium 2016	University of Hyderabad
		Science Academies' Lecture Workshop on Computational Quantum Chemistry	Sacred Heart College, Thevara
		National Seminar on Advanced Functional Materials	Bharatiar University, Coimbatore
30.	Dr. Tapas K. Manna	Architecture of spindle-chromosome interface: How far we are to build it	RCG, Delhi
		Architecture of spindle-chromosome interface: How far we are to build it	IIT, Delhi
		Architecture of spindle-chromosome interface: How far we are to build it.	NISER, Bhubaneswar
		Microtubule tip protein in chromosome segregation: an emerging drug target	KIIT, Bhubaneswar
		Regulation of Mitotic Asters by a Coiled-coil Protein	IIT, Bombay
		Kinetochore capture by spindle microtubules: role of plus tip localizing signal motif	IISER Thiruvananthapuram
		Architecture of spindle-chromosome interface: How far we are to build it	IIT Madras

31.	Dr.Ullasa Kodandaramaiah	Phylogenies as a window into butterfly diversification	Pondicherry university, Pondicherry
		Understanding speciation and diversification using molecular phylogenies	AVC college, Myladuthurai
		Evolution of strategies against Predation	Calicut University
32.	Dr. Vennapusa Sivaranjana Reddy	Quantum Chemistry and Spectroscopy in Astrochemistry	Cohin college, mattanchery, kochi
33.	Dr. Vinesh Vijayan	NMR in structural biology	Mar Ivanious College, trivandrum
		Applications of High resolution NMR spectroscopy	Christ college, Trivandrum
34.	Dr.A. Thirumurugan	Rational Designing of Catalysts for the Sustainable Production of Fuels and Chemicals Indo UK workshop	IIT Madras

## Conferences and Workshops Organized

Sl. No	Name of Faculty	Name of Sem./Wor./Con.	Funded By	Date	International/ National
1.	Dr. Hema Somanathan	Comparative ecology of tropical and temperate pollination	Lund University, Sweden	Apr 20-21, 2017	International
2.	Dr. M. M. Shaijumon	MHRD-GIAN Workshop on Nanotechnology- From fundamentals to practice	MHRD	Jun 13-17, 2016	International
3.	Dr. Sunish Kumar Radhakrishnan	EMBO Conference on Bacterial Morphogenesis, Survival and Virulence: Regulation in 4D	European Molecular Biology Organization (EMBO), The Wellcome Trust /DBT India Alliance and Swissnex India	Nov 27 Dec-1 2017	International
4.	Dr. A. Thirumurugan	Science Writing Workshop	Vigyan Prasar	Oct 03-15, 2016	National

## FOUNDATION DAY LECTURE

The institute celebrated its eighth foundation day on October 14th 2016. Prof V. Ramakrishnan, Director, IISER-TVM welcomed the gathering and introduced the chief Guest. The chief guest Dr. R

Chidambaram, Principal Scientific Advisor to the Government of India and Chairman of the Scientific Advisory to the Cabinet of the Federal Government, delivered the foundation day lecture titled “Research & Innovation for a Knowledge Economy. Prof. Rajan M.P, Dean (Academics), IISER TVM expressed the vote of thanks.

### Colloquia

Sl. No.	Speaker	Institute	Title	Date
1.	Dr. Justin David	Center for High Energy Physics, IISc.	Entanglement entropy and Holography	06 Sept 16
2.	Prof. Yashwant Gupta	National Centre for Radio Astrophysics, Tata Institute of Fundamental Research, Pune	Probing the Universe at Radio Wavelengths : from the GMRT to the SKA	21 Oct 16
3.	Prof. Rajesh	International center for theoretical science ICTS - TIFR Bangalore	String Theory and Quest for Quantum Space time	04 Nov 16
4.	Prof. V. Ramgopal Rao	IIT-Delhi	Bridging Academic R&D with Product Innovation - a few case studies and a way forward.	25 Mar 2016
5.	Prof. V. Ramgopal Rao	Director, IIT-Delhi	Bridging Academic R&D with Product Innovation - a few case studies and a way forward.	24 Mar 2016
6.	Prof. Avadesha Surolia	Honorary Professor, Ph.D., D.Sc, D.M. (Hc., QUB-UK) Bhatnagar Fellow, (CSIR), Molecular Biophysics Unit, IISc, Bangalore	Glycobiology	08 Apr 2016
7.	Dr. S.Natarajan	Professor, IISc, Bangalore	Synthesis, Structure and properties of new functional inorganic Framework materials.	06 Jun 2016
8.	Dr. Partha Sarathy Mukherjee	Professor Inorganic and Physical Chemistry Department, IISc, Bangalore	Molecular Vessels and Molecular marriage	05 Jul 2016
9.	Prof. K. Muniyappa	IISc, Bangalore	Telomere and Telomerase: Their Implications in Human Health and Disease	19 Aug 2016
10.	Prof. Rajeeva L Karandikar	Mathematical Institute, Chennai	Power and Limitations of Opinion Polls	19 Aug 2016

11.	Dr. Nitin Patil	Senior Scientist, NCL Pune	Merged Gold-Organo/Photoredox Catalysis	6 Sep 2016
12.	Prof. Ramakrishna V Hosur	Department of Chemical Sciences, Tata Institute of Fundamental Research & University of Mumbai	Bio-macromolecular form and function: Insights from NMR	20 Sep 2016
13.	Prof. Alok Bhattacharya	Jawaharlal Nehru University, New Delhi	Deciphering mechanism of phagocytosis in the protozoan parasite <i>Entamoeba histolytica</i> .	23 Sep 2016
14.	Prof. Arun Chattopadhyay	Dept. of Chemistry & Centre for Nanotechnology, Indian Institute of Technology	Guwahati Three Reactions and Nano	23 Sep 2016
15.	Prof. Luise-Charlotte Kappe	Binghamton University	Cantor's diagonalization revisited: constructing transcendental numbers	23 Sep 2016
16.	Dr. Justin David	Center for High Energy Physics, IISc.	Entanglement entropy and Holography	26 Sep 2016
17.	Prof. Yashwant Gupta	National Centre for Radio Astrophysics, Tata Institute of Fundamental Research, Pune	Probing the Universe at Radio Wavelengths : from the GMRT to the SKA	21 Oct 2016
18.	Prof. Rajesh Gopakumar	International center for theoretical science (ICTS - TIFR ) Bangalore	String Theory and Quest for Quantum Space time	04 Nov 2016
19.	Prof. C S Sundar	Homi Bhabha National Institute with the Materials Science Group, IGCAR, Kalpakkam	The Colloquium is entitled: States of Matter: Traditional to Exotic	07 Nov 2016
20.	Prof. George O	Professor, Doherty Northeastern university, USA	The use of De Novo Synthesis in Carbohydrate and Natural Product Medicinal Chemistry	21 Nov 2016
21.	Prof. Rajeeva Karandikar,	CMI, Madras opinion polls	Power and limitations of	10 Feb 2017
22.	Eric J. Warrant	Professor of Zoology, University of Lund Sweden	Seeing at the limits: Vision and visual navigation in nocturnal insects	17 Mar 2017



## Seminars

Sl. No.	Speaker	Institute	Title	Date
1.	Prof.S.R P. Silva	University of Surrey, UK.	The Design of High Efficiency Solar Collectors for Technology Applications	01 Apr 16
2.	Prof.Hemanth Thayyullathil	Senior Specialist in Algorithms, Philips, Bangalore.	Magnetic Resonance Imaging - Physics and Imaging Principles	13 Apr 16
3.	Prof.Mansoor Hussain,	GM - Talent Acquisition, Philips, Bangalore.	Overview of business portfolio of Philips and Opportunities for Collaboration	13 Apr 16
4.	Prof. Luca Biotti	Osaka University, Japan.	General-relativistic astrophysics on supercomputers	22 Apr 16
5.	Prof. Avinash Deshpande,	RRI Cosmic Light-houses	Fascinating Life-stories of	03 May 16
6.	Dr.Mamatha Nagaraj	School of Physics and Astronomy University of Leeds	Liquid Crystals: From Molecular and Supra molecular Structures to Novel Devices	06 May 16
7.	Prof.Sulabha Kulkarni	IISER, Pune	Surfaces, interfaces and Bulk Analysis using X-ray Photoelectron Spectroscopy	11 May 16
8.	Dr.Jayan Thomas,	Associate Professor, University of Central Florida, USA	Polymers for 3D telepresence and electrical cables for energy storage	24 May 16
9.	Dr.Sreejith	MPI-PKS Dresden, Germany	Fractional angular momenta of impurity particles in a quantum Hall liquid	08 July 16
10.	Dr. G Rajasekaran	IMS Chennai	Hundred years of Fundamental Physics and a Crisis	18 July 16
11.	Dr. T.R Seshadri	University of Delhi	Generation of Magnetic Field in Early Universe	18 July 16
12.	Dr.SudiptaMukherji	Delhi	Black hole phase transitions via Bragg-Williams	21 July 16
13.	Dr.Anji Reddy Munnangi	Helmholtz Institute Ulm, Germany	Development of Metal Fluorides for Advanced Energy Storage Systems	02 Aug 16
14.	Prof. S.G.Rajeev	University of Rochester	Strongly Coupled Field Theory	12 Aug 16

15.	Prof. Arul Lekshminarayana	IIT Madras	Of quantum chaos, entanglement, and randomness	10 Nov 16
16.	Dr. BalaMurali Krishan	Delhi	Photocarrier dynamics in novel two-dimensional (2D) materials	13 Dec 16
17.	Dr.ChayabritaMaji	Department of Materials Science, Indian Association for the Cultivation of Science, Kolkata	Tale of two advanced functional material	06 Jan 17
18.	Prof.OndřejŠrámek	Department Of Geophysics, Charles University	Geoneutrinos: a new tool to study Earth's interior	07 Jan 17
19.	Dr.SoumenBasak	SISSA, Trieste, Italy	The Universe - as seen by Planck	30 Jan 17
20.	Dr.Kumaragurubaran Somu	Chennai	Power electronic materials and devices: some solved and unsolved issues	13 Feb 17
21.	Prof.ParthaPartim Modal	Dept. of Instrumentation and Applied Physics, IISc.	Spatio-Temporal Super-resolution Optical Microscopy and Applications	06 Mar 17
22.	Prof. T. R. Govindrarajan	IMSc., Chennai	Quantum black hole as an atom	24 Mar 17

### Short-Term Courses Organised

Sl. No	Name of Faculty	Name of the Programme	Duration	Venue
1.	Dr.S. Murty Srinivasula	GIAN Course on Speciation and the Web of Life	Aug 22 - Sept 09, 2016	IISER-TVM
2.	Prof.M.P. Rajan	Inverse and Control Problems	May 16-27, 2016	IISER TVM
3.	Dr. Ramanathan Natesh	CEM3DIP 2016 - GIAN Programme	July 02-13, 2016 UDS Kovalam	Seaview Hall,
4.	Dr.M.M.Shaijumon	GIAN Course on Nanotechnology-From FUNDAMENTALS TO PRACTICE	June 13-17, 2016	IISER-TVM
5.	Dr.Viji Z Thomas	GIAN Program on Class Field Theory	Dec 12-24, 2016	IISER-TVM
6.	Dr.Viji Z Thomas	AFS-I	Dec 5-31, 2016.	IISER TVM

### PATENT FILED

M. M. Shaijumon, D. Gopalakrishnan and D. Damien, "A method for the synthesis of layered luminescent transition metal dichalcogenide quantum dots" US Patent filed; Application No: 15224701, 2016.

## SUMMER PROGRAMME

### IISER Thiruvananthapuram Summer Visiting Programme IISER-TVM Fellowship :

1445 online applications were received for 2016 IISER TVM Summer visiting programme. School wise distribution of applications are Biology 517, Chemistry 328, Mathematics 143, Physics 457. A total of 30 students were selected by individual schools, based on merit out of which 26 students reported and have successfully completed the project.

### IISER Thiruvananthapuram - Own Fellowship :

A total of 11 (3 waiting List) students were selected by individual schools, based on merit out of which 4 students reported and have successfully completed the project.

### IISER Thiruvananthapuram - Prathibha Scholars :

A total of 5 students were selected by individual schools, based on merit out of which 5 students reported and have successfully completed the project.

### IASc-INSANA-NASI Project Fellowship :

26 selected students from Indian Academy of Science (IAS) have been allotted to IISER Thiruvananthapuram for the Academy summer programme and 18 have completed their project.

### External Students from other institutions :

According to present record, various individual laboratories from IISER Thiruvananthapuram selected 15 External Students from other institution and have carried out or are carrying out their project

### IISER Thiruvananthapuram students :

234 BS-MS & IPHD students from IISER Thiruvananthapuram have collected Registration Forms for carrying out projects during this summer in various laboratories.

### ANVESHA the science club of IISER-TVM

Keeping with traditions, Anvesha club organised the annual science fest of IISER Thiruvananthapuram in Varsha 2016, over a span of four days.

### Promo launch and Nobel exposition lectures (October 21st, 2016)

The promo launch of this years' anvesha fest was held in the CSB seminar room in the permanent campus and was attended by both student and faculty members. The honourable director, Prof. V Ramakrishnan inaugurated the programme by releasing the official promotional video of Anvesha 2016, which was conceived and produced by students of batch 15. A short introduction to the events chalked out for the fest was delivered, followed by the Nobel exposition lectures delivered by faculty members.

The first day of the three day long fest was kicked off with the revelation of the 'contraption' in the ground floor of the Prateeksha lab complex, an elaborate set-up marked by the use of various principles in physics and chemistry to culminate in a wonderful visual treat for all attendees. The design and development of the same was a monumental effort, undertaken by student members of batch 14. The lighting of the lamp by notable student and faculty members involved in ANVESHA activities marked the beginning of a three day long odyssey of fun filled science. The day also saw

witness to the premier attraction of anvesha 2016, Aficionados, the experiment demonstration competition and lab exposition.

The second day of the fest was devoted to three major competitions and informal games. Vagyuddha, the debate competition was also held and saw good participation from students. This year saw the introduction of the Model UN, a simulation of the discussions happening in the UN on global issues. The teams were expected to research and uphold the interests of their representative nation in the forum, while facing questions from both the judges and competing teams representing other member nations.

Day three of ANVESHA was held in the permanent campus in Vithura. The last day of the fest saw the finals of CSI, the crime scene investigation game. The game was organised by student members from batch 15, with the objective being to solve the clues to reach the final answer. The crowd was entertained with science based puzzles and games in a fun filled informal session that was organized by student members from batch 16. The programmes were brought to a close with the valedictory ceremony presided by Prof. V Ramakrishnan (Director, IISER TVM) and Dr.S.Aravamutthan, Deputy Director, VSSC.

### Counseling Center

With mental illness making up approximately one-third of diseases among the adolescent population, mental health continues to be an increasingly urgent issue that needs to be addressed. Here at the IISER Trivandrum Counselling center, we offer mental health services to the students in order to reduce the irpsychological problems and distress and enhance the irmental health,well-being,and quality of life. The center consists of a psychologist (Dr. NeelimaGopinath) and a psychiatrist (Dr.Mary P R) who provide effective counselling services to students who come to them with a wide range of problems.

In the beginning of the semester (1st of August-2016), an orientation program was conducted for the new comers in which the importance of counselling was briefed. Overall,the functioning of counselling center IISER Trivandrum for the last one year (June 2016-June2017) was good as per the student turn overand response. Student satisfaction seems to be adequate and majority of students are coming for regular follow-ups.

In total, 56 students came for counselling in the specified period. Some of them had to be seen more number of time as per their requirement. This year 208 counselling/ psychotherapy sessions was conducted.There were in total 41 BS-MS students and 15 others that included Ph.D, IPhd, Post Doc, and Project students. Out of the total 56 students, 7 have been referred to the psychiatrist for further evaluation and treatment.

As per the statistics of students who consulted the psychiatrist, there were in total 22 students and 112 sessions were conducted. One of them has been referred to CMC Vellore for expert management and in patient treatment. Detailed case files are being maintained for every student who comes for counseling/psychiatric consultation with at most confidentiality.

The pre dominant problems faced by students were stress related to academic issues as well as due to non-academic reasons, which includes relationship issues and other adjustment problems. Primary psychiatric illnesses are also detected in few of the students. There were 5 crisis cases and three were

admitted as inpatients is charged to our care, post-hospitalization. Students are given supportive counselling, psychotherapy, stress management programs as well as medication in indicated cases.

The center had conducted a seminar on “Introduction to Mindfulness and its role in Stress Management and Academic Achievement” by Dr. S. Krishnan Associate Professor of Psychiatry, Medical College Trivandrum, on 2nd January 2017. The talk was well accepted by students. There are plans for conducting further workshops and talks by prominent people in the field in the coming academic year.

A brochure has been prepared to be given to the incoming students joining in August 2017 so as to give them an overall idea about the functioning of the center and how they can make use of the facilities being provided to them.

In order to share information that promote mental health and bring awareness among students about the center, a counselling web page for is being created for the students. It is in its initial stage and we are working on building it up to ensure that more students are aware of our services and help reduce their main help seeking.

### **Outreach Activities**

The institute to be conducted the following outreach activities during the period.

- An outreach to a school in Palakkad under the leadership of Anzal KS, with the help of club members.
- A Science writing workshop was held here in IISER TVM from October 3rd to 15th, by professionals from Vigyan Prasar. Interactive sessions were arranged where students could learn more about science writing, which led to the creation of a small science writers club composed of around 10 IISER TVM students. They have to date engaged in multiple sessions of science journalism. Some of these articles were deemed good enough to include in the ‘Science Last Fortnight’ column in Current Science journal and were published.
- An outreach programme was taken up on 26th October 2016 to Evans HSS, Parassala, the alma mater to Dr. Praveen S Gopinathan who is a postdoctoral fellow here at IISER TVM. He accompanied student members of Anvesha to the school and talked to the students there about IISER Thiruvananthapuram, what we stand for, and careers in science. The student members of the club demonstrated many interesting experiments to the eager youngsters, who were curious to know more about what was happening. The programme was a hit among students, which has prompted the school to invite us over for another visit soon.

## **8. FACILITIES**

### **Laboratory**

The institute has dedicated laboratories for undergraduate program in addition to advanced level research labs maintained by faculty members of various schools.

#### **Biology Teaching Laboratory**

The BS-MS Biology laboratories of IISER-TVM are located in the Permanent Campus at Vithura where students of I year (approximately 172) & II year (approximately 140) are being trained in doing

projects and experiments related to Biological Diversity and Evolution (I Sem and III Sem), Biological structure and Function (II Sem) and Genetics and molecular Biology (IV Sem). The topics for project work are given by the concerned faculties. Experiments related to Ecology and Evolution (I & IIIrd Sem) are mostly performed in a field setting. Taking complexities involved in conducting biological experiments into consideration, all the experiments would be performed ahead of actual class experiment to standardize the protocols with each set of reagents, to ensure quality of reagents. Substantial amount of time is spent on preparations for the experiments before the arrival of the students. The students are provided with a Laboratory manual with all the necessary details of the experiments in the first class itself. In the laboratory, the students will get an opportunity to test theory experimentally, and confirm the facts related to the design of experiments critically and analytically. Students follow safe laboratory practices, maintains proper record of the experiments and take active participation in doing the experiments.

Lab sessions were also conducted for 3rd & 4th year Biology Major students (approximately 40 students in each year) as well as Integrated Phd students at the Advanced Biology Lab at Malayil Center, IISER-TVM located at Pongumoodu. From the academic year 2017 the major lab will be functioning in the permanent campus at Vithura. The experiments are of high standards and are designed to complement their theory courses and ongoing research in the Institute encouraging the students to have a better understanding of biological concepts laying emphasis on scientific planning, analysis and interpretation of data. The syllabi has been prepared in consultation with various experts in Advanced Biology teaching and also by incorporating experiments from MS lab courses offered at reputed International Universities/ Research Centers. The advanced course covers broader areas on Advanced Genetics, Advanced Cell and Molecular biology, Microbiology, Immunology, Biochemistry etc. Apart from a team of well-trained Technical Assistants the students are also assisted by PhD students under the concerned faculties in charge. The students work hand in hand with research labs of the institute and are exposed to sophisticated instruments such as Real Time PCR, Spectrophotometer, Microplate Reader, FPLC, Confocal microscopy, Stereomicroscopy, Flow Cytometry, Gel electrophoresis and techniques like PCR, quantitative real time PCR (qRT-PCR), Western Blotting, SDS-PAGE, Animal cell culture, In vitro transcription and translation, Chromatography, Microbiological and Immunological techniques.

### **Physics Teaching Laboratory**

The Experiments in the BS-MS Physics Teaching Laboratory are designed so as to provide hands on experience with the scientific principles that they learn in their theory classes. The theory courses and the experiment are scheduled in such a way that students perform the experiment only after learning the corresponding theory part. In the first four semesters, the students are given experiments based on the basic physics courses such as Mechanics, Electricity & Magnetism, Optics, and Heat & Thermodynamics. From the third year onwards i.e. in the Physics major labs, the students are given training to handle sophisticated instruments and to perform advance level experiments. Some of the sophisticated instruments include XRD, AFM, STM, Vacuum Coating Unit, Gamma Ray Spectrometer, NMR, EPR etc. The students are also given enough training to design their own experiment. The laboratory course help the students in understanding the basic concepts of Physics and in developing their research skills.



## Chemistry Laboratory

The first and second year students were given training in the fundamental aspects of inorganic, organic and physical chemistry experiments which help them to understand the basic concepts of chemistry. This include both qualitative and quantitative analysis. Ten to twelve experiments are done in each semester. The course covers principles and application of chemical laboratory techniques including safety, preparation, detection and estimation of chemical compounds. The students get accustomed in the measurement of pH, paper chromatography, thin layer chromatography, column chromatography, visible-ultraviolet spectrophotometry, infrared spectroscopy, chemical kinetics, data analysis, and elementary analysis. Experiments were done from refractometry, conductometry, potentiometry, and cryoscopy. Physical properties like surface tension, viscosity, dipole moment were measured and recorded for various organic compounds. Extensive hands-on laboratory training was provided to each student. This helped them to gain proficiency in basic laboratory techniques and experience in modern laboratory instrumentation. Some of the experiments done during the advanced courses were: Isolation and analysis of natural products and preparation of their derivatives, multi-step organic synthesis (Benzoin condensation, Perkin reaction, Grignard reaction etc.) for fifth semester. Synthesis of transition metal complexes (Cobalt, Nickel, Molybdenum etc.) with various ligands and study of their kinetic, magnetic and spectral properties with group theoretical interpretation were undertaken during sixth semester. This helps them to acquire practice in multistep inorganic synthesis of metal complexes and also to understand the magnetic and spectral properties of complexes aid in the determination of structure. Advanced physical chemistry experiments in polarimetry, conductometry, potentiometry, cyclic voltammetry, study of the rotational barrier using NMR, solvatochromism, single crystal XRD measurements, life-time measurements study by TCSPC, verification of adsorption isotherm by volumetric titration etc. were practiced in the seventh semester. The courses enabled the students to analyse, interpret and solve problems in chemistry, to integrate chemical knowledge in the successful conduct of research as well as work in team-based research.

## Library

Central library of the institute, supports the academic and research needs of the institute community. The state of the art library facilitates access to online and print resources to its users. Reputed international journals and online resources in science and allied areas have been made available. Library is successful in providing most of the resources in electronic format which facilitate 24X7 e-library.

The library's extensive online collection from more than 50 international scientific publishers and societies includes full-text e-journal databases, e-journal archives, video journal, e-books, bibliographic and review databases, etc. Major online full-text databases including AACR, ACS Web Edition, AIP, AMS, Annual Reviews, APS, ASM, Electro Chemical Society Digital Library, IEEE ASPP+POP, IOP, JSTOR, Nature, OpticsInfobase, OUP, Project Euclid, Project Muse, RSC Gold, Science Online, ScienceDirect, SIAM, Wiley Online Library, etc. are made available.

Online Access to Springer Journals, Blood Journal, Archive of Angewandte Chemie International Edition, e-books from Oxford University Press, Cambridge University Press, Lecture Notes in Physics, Lecture Notes in Mathematics, World e-book Library, eMRW - Encyclopedia of Life Science etc. were added to the Library collection during this period. Library also provides access to 'Grammarly' online



grammar checking and document authentication tool. Major bibliographic databases including, MathScinet, ScifinderScholar, Web of Science, J-Gate etc. are also made available. Apart from the online resources, library possesses print books, CD ROMs, thesis etc. in core and allied subjects.

Central Library has implemented OpenAthens remote login facility for online resources, which facilitates access to the e-resources remotely to the authenticated users of the library. The Central Library in the permanent campus of the institute was inaugurated by Prof. V Ramakrishnan, Director, IISER Thiruvananthapuram on 30th July 2016. The Library at the permanent campus hosts a Digital Library corridor with several computers for accessing the online resources.

## Computing and Networking Facility

The Internet connectivity at permanent campus is through two 100Mbps links from M/s BSNL and M/s RAILTEL. Additional bandwidth of 1Gbps leased line provided as part of the National Knowledge Network (NKN) also available. Department buildings and hostels are interconnected using fibre cable and covered by Wireless network.

There are common computer labs at permanent campus and transit campus. There is one computational cluster and several servers providing instructional and research support including Moodle course management suite, DNS, DHCP, NFS and other services. The IT personnel of the institute provide both hardware and software support to the faculty, staff and students in addition to making computational software like GAUSSIAN, MATLAB, QCHEM etc. available for use. The LAN of the institute has over 400 PCs. Licences are available for the software like Windows, Office, EndNote, Adobe Acrobat Pro, Origin and Seqrite Antivirus.

The institute has a fully functional virtual classroom funded by the NKN project. The classroom has been in use for course exchange between IISER Thiruvananthapuram, IISER Pune, IISER Bhopal, NCBS Bengaluru and TIFR Centre for Applicable Mathematics in Bengaluru as well as allowing for the streaming of research talks and colloquia from the premier institutes in the country. The virtual classroom facility also allows for the recording and storage of lectures and seminars organized by the institute.

During 2016-17, Institute started functioning from its permanent Campus at Vithura. Two Hall of Residences were operational to accommodate the students of two batches of BSMS Students.

A New gym with state of the art facilities has been operationalised for use of students and staff.

## Hostels

The hostels are furnished and have provisions for amenities like washing machine, Television, Indoor games and Internet facilities.

There are 17 rented buildings being used as hostels at Transit Campus. There are Eight ladies hostels and Nine gents hostels. A Swimming Pool and Outdoor game facilities are hired and functional at Transit Campus.

Being the Mentor Institute of Indian Institute of Information Technology Kottayam, Two of the hostels were allotted to IIITK Students.

## 9. SPORTS AND CULTURAL ACTIVITIES

### Sports

IISER TVM students have participated in two major sports events, Intra- and Inter IISER (ITSAB'16 and IISM'16), during the academic year 2016-2017. ITSAB'16, our institute annual sports meet, was conducted from 16th -18th September, 2016, in CET sports ground (outdoor events) & LNCP sports ground (indoor events). IISER Kolkata hosted IISM16 during 09th -13th December 2016. In both events, our students have participated with great zeal, spirit and enthusiasm.

### ITSAB'16

For ITSAB'16, students and faculties of our institute were divided into four groups to bring out a fierce competition. The event was started off proudly with an official March Past of around 200 students. Our honorable director Prof. V. Ramakrishnan inaugurated the meet by lighting the torch of IISER-TVM Sports. More than 20 sport events including cricket, football, throw ball, volleyball, kho-kho, basketball, table tennis, badminton, kabaddi and athletics were arranged.

### IISM'16

Nine institutes from all over India including 7 IISERs [Pune, Mohali, Kolkata, Bhopal, TVM, Tirupati and Berhampur], NISER Bhubaneswar and CBS Mumbai. Our contingent had a total strength of 117 students: including 83 boys and 34 girls. IISER TVM contingent secured 2 gold, 3 silver and 4 bronze in individual events, champions in 4x400m relay in boys category and runners up in throw ball and 4x400m relay girls category. IISER TVM contingent secured the fifth position overall with 4875 points.

### Other activities

#### Inter-batch tournaments

In addition to ITSAB'16 and IISM'16, students have actively participated in inter-batch tournaments of cricket, badminton, volleyball and table tennis. For the first time, staff team consisting teaching and non-teaching employees took part in cricket and badminton. And also for the first time, girls cricket tournament was conducted where two teams from Vithura campus and two teams from CET campus fought for the championship. Our director, Prof. Ramakrishnan, was the chief guest for the exciting final volleyball match between Batch 12 and Batch 16. The first edition of table tennis tournament was conducted at Vithura campus. Needless to say the level of competition has never been seen on such a scale before in our campus.

#### Marathon

On the occasion of the birth anniversary of Sardar Vallabhbhai Patel "Rashtriya Ekta Diwas", a run for unity was conducted on 31st October at Vithura Campus. 50 students and several faculty members participated in the 2 kilometer running event. IISER TVM students participated in SBI Life TRIVANDRUM 2017 marathon.

#### Yoga/Meditation

Yoga/meditation practice was conducted on 5 days per a week to integrate the physical and mental

elements of students. On the occasion of INTERNATIONAL DAY OF YOGA, 21st June, 2016, a Talk cum Demonstration titled “Importance of YOGA” was organized on 21st June 2016 in Anby Plaza, CET campus. The inaugural-address was delivered by our director, Prof. V. Ramakrishnan, and Shri Swamiji Sivamrita Chaitanya delivered a talk on Yoga. There were 15 school children from Mata Amritanandamayi Math and 30 participants from IISER TVM who took part in the program. Shri Swamiji Sivamrita Chaitanya was conducted yoga practice for the participants. This program was conducted by collaborating with Mata Amritanandamayi Math, Thiruvananthapuram.

### Awards

**Sports Color:** It recognizes a student’s extraordinary contribution towards institute sports. The praise worthy performances of the following students in the ITSAV’16 and IISM’16 has landed them this year’s Sports Color. They are -

Sreejith Allipra (PHD142005), Shubham Sewariya (IMS13125), Suryakant Tanty (IMS15142), Ajsal Shereef (IMS13009) Amit Kumar (IMS14011) Kalyan Singh (IMS14039), Anuja S (IMS13023), Elwina Thomas (IMS14047), Nethra R (IMS16130) and Jeysree K (IMS14065)

**Sports Citation:** The another prestigious award of Institute Sports, given only to the students of our passing out batch in recognition of a student’s consistent and remarkable performance in sports throughout the years for their unswerving dedication, admirable talent and sincerity to the games. They are-

Alex Johny (IMS12010), Nila Mohan (IMS12080), Sidhath Pillai (IMS12108) and Aparna D (IMS12027)

**Special Mention:** People who have performed extremely well but narrowly missed this year’s sports color deserve a special mention-

M S Ahmad Hussain (IMS15085), Sunil Kumar P S (PHD152010), Sreerag Sreedhar (IMS15139), Saddal Kuljeet Singh (IMS15199), Anagha Sivadas P (IMS16031) and Sharath Devdas (IMS14122)

**Sports Person of the Year:** Kedar Sharma (IMS14073) for his extraordinary performance and contribution towards the institute sports and performance in IISM’16.

**Roll of Honor:** The “Roll of Honor” is awarded to a student who has performed exceptionally well in Sports and Athletics at every platform and brought glory to the Institute. This year it goes to Alex Johny (IMS12010) who has been an integral part of almost all the sports in IISER-TVM. His extraordinary contributions are given below:

In IISM-2012 (Gold in 3000m, 800m, 4X400 relay, Silver in Football),

IISM-2013 (Gold in 3000m, 4x400 relay, Silver in 1500m, Bronze in 4x100 relay),

IISM-2014 (Silver in 5000m),

IISM-2015 (Gold in 800m, Gold in 4x400 m relay) and

IISM 2016 (Gold in 800m and 4x400m relay, Silver in 400m)

And to specially mention he was consistently the Gold medalist for 4x400m relay for all ITSAV held till now. He was the IISER TVM contingent leader for IISM’16 held at IISER Kolkata. He is Bengaluru Full Marathon and Trivandrum half Marathon finisher.

## Gym/Swimming

The state-of-the-art gymnasium facilities were regularly utilized by students both in CET and Vithura campuses. Two dedicated gym trainers oversee usage of gymnasiums. Also the swimming pool attached to the Clover Land Guest House is being used regularly by both students and staff. Two physical education trainers (Dr. Abhilash Solomon, CET campus and Mr. Eben John, Vithura Campus) are guiding students to improve the physical fitness levels during the entire year.

# 10. PERMANENT CAMPUS

## A. General & Master Plan

The permanent campus of IISER has been set up in an area of 200 acres of land at Vithura in the valley of scenic Ponmudi hills. The site at Vithura is 40km from Thiruvananthapuram. The land was handed over by Govt. of Kerala to the institute on 15.10.2008. The campus is highly uneven with smaller and larger hills and borders a reserve forest. Part of the area lies between an 800 m high steep sided hill Kottamala and a perennial stream called Makki.

The master plan has been prepared taking maximum advantages of the terrain.

- The Academic Complex has been located as a compact integrated cluster on the central plot midway between the lowest and highest elevations.
- The students' hostels have been located towards the south east periphery of the campus with covered pedestrian connectivity to all the academic complex.
- The residential zone of faculty members and staff is set up in the 35 acres of undulating terrain in the western portion of the campus and is separated by the Makki river with the academic zone.
- Construction has been done as per the plans with minimum foot print and retaining maximum green cover.

Master Plan has also taken into consideration energy conservation, rain water harvesting, waste water recycling etc and with a view to provide for future expansion.

- The Campus has been developed taking into account green building concepts and is aiming to achieve four star rating as per GRIHA (Green Rating for Integrated Habitat Assessment).
- The Campus area falls within the high rain fall zone of South Kerala. The total average annual rain fall is 300 mm and with 8 months of the year having rain fall over 20 cm. There are two streams passing through the project area having catchment of 200 ha and 100 ha respectively totally falling within the forest. This catchment is adequate to supply the entire water requirements for the Campus. Taking the average rainfall of 300 mm, the total water annually passing through the campus is 90 lakh m<sup>3</sup> while the annual water requirement for the Campus is only 3.65 lakhs m<sup>3</sup> which constitutes only about 4% of the water availability. In order to cater the water requirements for a period of 4 dry months a small reservoir of storage (50,000 m<sup>3</sup>) has already been constructed in the Vattakuzhy thodu on the southern part near the entrance to the Campus.

- A very good rain water harvesting system has been constructed for collecting water from roof of buildings for recharging the ground water.

The major facilities available includes:-

### **I. Academic Complex**

Administrative Block, Computer Centre, Lecturer Theatre Complex, Physical Science Block, Chemical Science Block, Biological Science Block, Mathematical Science Block, Humanities Block, Common Instrumentation & Workshop, Animal House, Solvent Store.

### **II. Faculty Residence**

Directors Bungalow, Type A,B,C,D, E, Quarters, Faculty Club, Health Centre.

### **III. Students Hostels**

M.S. Boys Hostel Cluster, Girls Hostel Cluster ( M.S & Ph.D), PhD Boys, Hostel cluster, Central Dining Hall.

### **IV. Recreation**

Sports ground, Indoor Stadium, Tennis Courts, Students Club, Coffee Shop.

### **V. Others**

Campus School, Shopping Centre, Guest House.

### **VI. Engineering Services**

Pump house, UG reservoir, Main receiving station & 4 other substations, Sewage Treatment Plant - 2 Nos, Effluent Treatment Plant - 1 No.

The total plinth area of academic complex proposed is 40523 sqm and residential complex is 76477 sqm totaling to 1,17,000 sqm Out of this, in the first phase Academic Complex with a plinth area of 31183 sqm and the Residential complex and other services with an area of 38188 totaling 69371 m<sup>2</sup> are in the verge of completion. The tendered cost of Phase-I work is Rs. 253 Crores.

### **B. PHASE I: BALANCE CONSTRUCTION OF BUILDINGS & STRUCTURES (PHASE I BALANCE BUILDING AND DEVELOPMENT WORKS & PHASE II WORKS) IN THE CAMPUS IISER TVM**

The 26th meeting of Buildings & Works Committee held on 14.11.2014 decided to recommend, entrusting the remaining works of Phase I and Phase II works to Central Public Works Department (CPWD). The MoU was entered with CPWD by IISER TVM on 15.01.2015.

The balance works undertaken by CPWD mainly comprises the following:-

Construction of Primary School, 4 No. Hostel Blocks (SB3, SB4, SB5, DB1), Indoor Stadium, Substation II, Overhead Tank-II, Entrance Gate, 5 Nos. Housing Blocks (C1, C2, C3, D1 & D2), Roads, Overhead Tank-III, Substation Building III, Physical Science Block, Biological Science Block, Animal House and Concourse.

Among the above, works in respect of Primary School and Double Bedded Hostel-1 has been completed on 30.08.2016. The hostel blocks SB3, SB4 & SB5 and the residence block C3 are nearing completion. Also, one wing of the Physical Science Block is getting ready for occupying.

In addition to the above, the works of Health Centre and Shopping Complex were also progressing under CPWD.

#### **C. PHASE-II - PACKAGE - I - WORK OF CONSTRUCTION OF HOSTELS AND DINING HALL**

The work was awarded to M/s RDS Project Limited for a value of Rs. 131, 22, 97,959/. The contractor has started work on 05.05.2015. The work was monitored by the department staff and is progressing steadily. Out of the 05 hostel blocks 02 blocks (A&B) along with the recreation facility has been completed.

The scheduled date of completion of the entire work is fixed as February 2018.

#### **D. DETAILS OF COMPLETED WORKS**

The following works have been completed and handed over for occupancy.

1. Chemical Science Block
2. Common Instrumentation Facility building
3. Single Bedded Hostel-1
4. Single Bedded Hostel-2
5. Double Bedded Hostel -1
6. B1 Residence
7. Primary School building
8. Water Treatment Plant
9. Main Receiving Sub Station
10. Substation -4
11. C3 Residence Block
12. Physical Science Block
13. Block A & B of Phase II Hostels

## 11. STATEMENT OF ACCOUNTS

The Annual Statement of Accounts of IISER Thiruvananthapuram for the year 2016-17 consists of Balance Sheet with Schedule forming part of Balance Sheet;

Income and Expenditure Account with supporting Schedules; and Receipts and Payments Account

### I. Grants & Receipts

#### A. Grants

- ❖ The unspent balance as on 01.04.2016 : Rs.157.79 crore
- ❖ The grants received from MHRD during the year : Rs.217.54 crore
  - Capital Grant : Rs. 188.99 crore
  - Revenue Grant : Rs. 28.55 crore
- ❖ Total fund available for the year 2016-17:Rs. 375.33 crore

#### Revenue Receipts

The revenue of the institute from Annual Fees & Others for the year is Rs. 1.21 crore.

### II. Expenditure

- ❖ The amount utilised for acquiring Capital Assets during the year :
  - Construction, Lab Equipment & Other Assets : Rs. 114.28 crore
- ❖ The amount utilised for Revenue Expenditure during the year:
  - Revenue Expenses : Rs. 60.66 crore
- ❖ Total expenditure for the year 2016-17 : Rs. 174.94 crore

### III. External Projects & Fellowships

- ❖ Total grant available during the year : Rs. 12.78 crore
- ❖ Utilisation : Rs. 5.38 crore
- ❖ Unutilised balance : Rs. 14.68 crore



## Separate Audit Report of the Comptroller & Auditor General of India on the accounts of the Indian Institute of Science Education and Research, Thiruvananthapuram for the year ended 31 March 2017

**W**e have audited the attached Balance Sheet of Indian Institute of Science Education and Research, Thiruvananthapuram as at 31 March 2017, the Income & Expenditure Account and Receipts & Payment Account for the year ended on that date under Section 19(2) of the Comptroller and Auditor General's (Duties, Powers and Conditions of Service) Act, 1971 read with Section 22 of the NIT Act. These financial statements are the responsibility of the Institute's management. Our responsibility is to express an opinion on these financial statements based on our audit.

2. This Separate Audit Report contains the comments of the Comptroller & Auditor General of India (CAG) on the accounting treatment only with regard to classification, conformity with the best accounting practices, accounting standards and disclosure norms etc. Audit observations on financial transactions with regard to compliance with the Law, Rules & Regulations (Propriety and Regularity) and efficiency-cum-performance aspects etc., if any, are reported through Inspection Reports / CAG's Audit Reports separately.
3. We have conducted our audit in accordance with auditing standards generally accepted in India. These standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatements. An audit includes examining, on a test basis, evidences supporting the amounts and disclosure in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of financial statements. We believe that our audit provides a reasonable basis for our opinion.
4. Based on our audit, we report that:
  - i. We have obtained all the information and explanations, which to the best of our knowledge and belief were necessary for the purpose of our audit.
  - ii. The Balance Sheet, Income & Expenditure Account and Receipt & Payment Account dealt with by this report have not been drawn up in the format approved by the Ministry of Human Resource Development, Government of India.
  - iii. In our opinion, proper books of accounts and other relevant records have been maintained by the Indian Institute of Science Education and Research, Thiruvananthapuram as required under Regulation 16.1 forming part of Memorandum of Association of the Institute in so far as it appears from our examination of such books.
  - iv. We further report that:

## A. Balance Sheet

### A.1 Sources of Funds

#### A.1.1 Current Liabilities and Provisions (Schedule 3) Rs.5481.50Lakh

This is understated by Rs. 89.68 lakh due to inclusion of debit balances under sponsored fellowships and scholarships (schedule 3 (b)). As per MHRD guidelines, debit balances in liability accounts should have been shown as receivable on the Assets side of the balance sheet. Inclusion of debit balances in liability accounts has also resulted in understatement of current assets, loan and advances by Rs. 89.68 lakh

#### A.1.2 Unspent balance of External Projects (Schedule 3): Rs. 1468.45 Lakh

This is understated by Rs.174.55 lakh due to netting of debit balances in 20 numbers of endowment funds (sponsored projects). According to the revised MHRD format credit balance should be shown on the liability side of the Balance sheet and debit balances to be shown in the Asset side. Due to netting of debit balances in the above account, the Current Assets also stand understated to the extent of Rs. 174.55 lakh.

### A.2 Application of Funds

#### A.2.1 Tangible Assets (Schedule 4)

##### A.2.1.1 Buildings: Rs. 1898.70 lakh

This is understated by Rs. 18.28 lakh due to non capitalization of replastering and retiling expenses at Vithura Campus amounting to Rs. 18.65 lakh, the work of which was completed in September 2016 but payment was made in May 2017. The above non capitalization has resulted in short provision of depreciation of 0.37 lakh in the Income & Expenditure Account. Current Liabilities also stand understated by Rs. 18.65 lakh.

##### A.2.1.2 Electrical Installations and Equipments: Rs. 150.69 lakh

- (i) This is understated by Rs. 5.98 lakh due to not including the value of 18 water coolers purchased in February 2017 at a cost of Rs. 6.30 lakh for which payment was made in May 2017. The non capitalization of water cooler has resulted in short provision of depreciation of Rs. 0.32 lakh in Income & Expenditure Account. Current liabilities also stand understated by Rs. 6.30 lakh.
- (ii) This is overstated by Rs. 1.82 lakh due to inclusion of the value of incomplete electrical works of Rs. 1.91 lakh. This has resulted in excess provision of depreciation of Rs. 0.09 lakh in Income & Expenditure Account. Capital work in progress also stand understated to the extent of Rs. 1.91 lakh

##### A.2.1.3 Scientific and Laboratory Equipments: Rs. 8740.17 lakh

This is understated by Rs. 16.03 lakh due to non capitalization of laboratory equipment costing Rs. 17.42 lakh purchased in March 2017 but payment for which was made in April-May 2017. The non capitalization of laboratory equipment has resulted in short provision of depreciation of Rs. 1.39 lakh in Income & Expenditure Account. Current liabilities also stand understated by Rs. 17.42 lakh.

##### A.2.1.4 Computers and Peripherals: Rs. 707.20 lakh

The is understated by Rs. 0.63 lakh due to not accounting of value of one Dell make computer costing

Rs. 0.79 lakh purchased in February 2017 but for which payment was made in April 2017. The non accounting of the computer has resulted in short provision of depreciation of Rs. 0.16 lakh in the Income & Expenditure Account. Current liabilities also stand understated by Rs. 0.79 lakh.

#### **A.2.1.5 Furniture, Fixtures and Fittings: Rs. 641.07 lakh**

- (i) The above stands understated by Rs. 7.10 lakh due to non capitalization of Godrej make work stations costing Rs. 7.68 lakh received in March 2017 but for which payment was made in May 2017. The non capitalization of work stations has resulted in short provision of depreciation of Rs. 0.58 lakh in the Income & Expenditure Account. Current liabilities also stand understated by Rs. 7.68 lakh.
- (ii) This is understated by Rs. 1.50 lakh due to not capitalizing the cost of reception counter cum work station amounting to Rs. 1.62 lakh completed in July 2016 for which payment was made in April 2017. The above non accounting has resulted in short provision of depreciation of Rs. 0.12 lakh in Income & Expenditure Account. Current Liabilities also stand understated by Rs. 1.62 lakh.

#### **A.2.2 Current Assets (Schedule 7): Rs. 6152.47 lakh**

##### **Bank balances-Institute balance**

##### **Term Deposits with SBI Sree Kariyam: Rs.1041.35 lakh**

This is overstated to the extent of Rs. 1.04 lakh due to not deducting the amount of Tax deducted at Source (TDS) on interest earned at the time of maturity of 3 fixed deposits during 2016-17. IISER being exempt from Income Tax should have shown TDS as an item receivable under the head Loans and Advances (schedule 8).

### **B. Income & Expenditure Account**

#### **B.1 Expenditure**

##### **B.1.1 Academic Expenses (schedule 16): Rs. 2294.91 lakh; Laboratory Expenses : Rs. 1349.81 lakh**

This is understated by Rs. 25.70 lakh due to noninclusion of lab consumables purchased and issued to labs in March 2017 but payment for which was made in April - May 2017. This has resulted in understatement of Excess of Expenditure over Income (deficit) by Rs. 25.70 lakh. Current Liabilities also stand understated by Rs. 25.70 lakh.

##### **B.2 Administrative and General Expenses (schedule 17): Rs. 1446.78 lakh**

##### **B.1.2.1 Electricity and Power: Rs. 330.24 lakh**

This is overstated to the extent of Rs. 8.48 lakh due to not setting of the electricity charges recovered from users which was shown as "Other Income" in the Income & Expenditure Account. As a result, balance under the head "Other Income" (schedule 13) also stands overstated.

##### **B.1.2.2 Depreciation (schedule 4): Rs. 1401.56 lakh**

This is understated by Rs. 378.89 lakh due to short provision of depreciation on tangible and intangible assets on account of applying depreciation on the net value of assets. According to the guidelines issued by MHRD, depreciation on fixed assets has to be provided on Straight Line Method (i.e.

applying depreciation rates on the gross value of the assets not fully written off) and depreciation on additions has to be provided for the whole year. The short provision of depreciation has resulted in understatement of excess of expenditure (deficit) over income transferred to Corpus Fund.

### C.General

- (1) The liability for unutilised grant was not made in the accounts as prescribed in MHRD format.
- (2) No provisions was seen made in the annual accounts for retirement benefits on the basis of actuarial valuation as prescribed in AS-15.
- (3) As per the revised Format of Financial Statement for Central Higher Education Institutions issued by MHRD, the Accounting Policies in respect of Court cases filed against the institute by former/ present employees, students and contractors and arbitration cases with contractors with amount involved as on 31.03.2017 require disclosure in the financial statements. No disclosure was seen made by IISER in the accounts.
- (4) CCC Ltd abandoned the work of IISER Vithura Campus in 2014 and the company was duly terminated from work by the Institute on 28.02.2014. On verification of the Annual Accounts it was revealed that the Institute had extended Advance Payment of Rs. 22.71 lakh, Mobilisation Advance of Rs. 856.2 lakh and Secured Advance of Rs. 621.19 lakh to the Contractor which is yet to be settled. This has not been disclosed in notes on accounts.

### D.Grants in aid

Out of the grants in aid Rs.248.42 crore (including Rs.21.29 crore brought forward from previous year), the institute could utilize a sum of Rs.178.96 crore leaving a balance of Rs.69.46 crore as unutilized Grants as on 31 March 2017.

- v. Subject to our observations in the preceding paragraphs, we report that the Balance Sheet, Income & Expenditure Account and Receipt & Payment account dealt with by this report are in agreement with the books of accounts.
  - vi. In our opinion and to the best of our information and according to the explanations given to us, the said financial statements read together with the Accounting Policies and Notes on Accounts, and subject to the significant matters stated above and other matters mentioned in Annexure I to this Audit Report, give a true and fair view in conformity with accounting principles generally accepted in India.
- a. In so far as it relates to the Balance Sheet, of the state of affairs of the Indian Institute of Science Education and Research, Thiruvananthapuram as at 31 March 2017; and
  - b. In so far as it relates to Income & Expenditure Account of the deficit for the year ended on that date.

For and on behalf of the C & AG of India

Place: Chennai

Sd/-

Date: 20 December 2017

Principal Director of Audit (Central), Chennai

## ANNEXURE I

### (i) Adequacy of Internal Audit System

The Internal audit system is carried out by engaging a Chartered Accountant and completed for the period upto the financial year 2016-17.

### (ii) Adequacy of Internal Control System :

IISER has not prepared Accounting Manual. Management Information System (MIS) is also not implemented. Fixed asset register is not maintained in accordance with the GFR Provisions. Hence Internal Control System is weak.

### (iii) System of Physical Verification of Fixed Assets:

IISER is not maintaining Fixed Asset Register in conformity with the generally accepted accounting procedure as per GFR 40 & AS 10. As per the normal procedure, the Fixed Asset Register should show the details of date of deletion, depreciation rate, if an item is written off such details etc and in the case of land, details of area, type of possession, survey number, value etc which were not complied with.

The IISER has not carried out annual physical verification of fixed assets for the period 2016-17.

### (iv) System of Physical Verification of Inventories

The procurement of inventories was made on need basis and issued to concerned department/labs. Hence, physical verification of inventory does not happen.

### (v) Regularity in payment of Statutory Dues:

IISER is regular in payment of statutory dues.

Sd/-

Deputy Director / DT (II)

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Balance Sheet As At 31<sup>st</sup> March 2017

SOURCES OF FUNDS	Amount in Rupees		
	Schedule No	2016-17	2015-16
<b>UNRESTRICTED FUND</b>			
Corpus/ Capital Fund	1	6,365,976,822	4,798,460,116
Designated/ Earmarked Funds	2	-	-
Current Liabilities And Provisions	3	548,149,958	516,125,263
Unspent Balance Of External Projects	3A	146,845,385	72,821,692
<b>TOTAL</b>		<b>7,060,972,165</b>	<b>5,387,407,071</b>
<b>APPLICATION OF FUNDS</b>			
Fixed Assets	4		
Tangible Assets		1,267,213,230	777,695,461
Intangible Assets		49,570,141	35,841,365
Capital Work-In-Progress		2,547,444,810	2,048,023,083
<b>INVESTMENTS FROM EARMARKED / ENDOWMENT FUNDS</b>	5	-	-
Long Term Investment			
Short Term Investment			
Investment - Others	6	-	-
Current Assets	7	615,247,712	1,096,144,111
Loans, Advances & Deposits	8	2,581,496,272	1,429,703,051
<b>TOTAL</b>		<b>7,060,972,165</b>	<b>5,387,407,071</b>
Significant Accounting Policies	23		
Contingent Liabilities And Notes To Accounts	24		

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Income and Expenditure Account for the Period/Year Ended 31<sup>st</sup> March 2017

PARTICULARS	Amount in Rupees		
	Schedule	2016-17	2015-16
<b>INCOME</b>			
Academic Reciepts	9	12,187,523	11,682,700
Grants & Subsidies	10	646,764,507	464,566,062
Income from Investments	11	-	-
Interest Earned	12	9,353,408	6,765,462
Other Income	13	59,495,690	66,395,461
Prior Period Income	14	-	-
Depreciation Added Back due to change in adopting depreciation rates from Income Tax Act to Companies Act			
<b>TOTAL (A)</b>		<b>727,801,128</b>	<b>549,409,685</b>
<b>EXPENDITURE</b>			
Staff Payments & Benefits	15	235,144,234	168,514,409
Academic Expenses	16	229,491,485	157,928,086
Administrative & General Expenses	17	144,677,828	114,184,548
Transportation Expenses	18	22,488,540	16,337,281
Repairs & Maintenance	19	14,796,364	7,480,113
Finance cost	20	166,057	121,624
Other Expenses	21	-	-
Depreciation	4	140,155,690	144,523,431
Prior Period Expenses	22	-	-
<b>TOTAL (B)</b>		<b>786,920,198</b>	<b>609,089,492</b>
Balance being excess of Income over Expenditure (A-B)		<b>(59,119,070)</b>	<b>(59,679,807)</b>
Transfer to/ from Designated Fund			
Building Fund			
Others (Specify)			
<b>BALANCE BEING SURPLUS/(DEFICT) CARRIED TO CAPITAL FUND</b>		<b>(59,119,070)</b>	<b>(59,679,807)</b>
Significant Accounting Policies	23		
Contigent Liabilities & Notes on Accounts	24		



# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Receipts and Payments for the Period/Year Ended 31<sup>st</sup> March 2017

				Amount in Rupees	
RECEIPTS	2016-17	2015-16	PAYMENTS	2016-17	2015-16
I. Opening Balance			I. Expenses		
a) Cash in hand			a) Establishment Expenses	233,955,139	162,490,139
b) Bank Balances			b) Academic Expenses	234,291,485	162,594,690
i) In current accounts			c) Administrative Expenses	145,635,009	110,657,881
Canara Bank	3,257	4,493	d) Transportation Expenses	22,488,540	14,764,671
State Bank of India					
ii) Deposit/Savings accounts			e) Repair & Maintenance Expenses	12,796,364	6,999,472
State Bank of Travancore	387,994,925	358,858,410	f) Prior period Expenses		
Canara Bank	548,081,711	(79,306,631)			
State Bank of India	94,829,038	56,315,750	II. Payments made against earmarked endowment funds		
Canara Bank Project A/c	65,235,180	78,822,993			
II. Grants Received			III. Payment against Sponsored Projects	43,899,776	39,813,997
a) From Government of India	2,175,400,000	1,550,000,000	IV. Payment against Sponsored Fellowships		
b) From State Government			V. Investments and deposits made		
c) From other sources (details)			a) Out of Earmarked/Endowment funds		
DST	86,307,309	1,685,200	b) Out of Own Funds (Investments-Others)		
CSIR	1,861,609	13,100,213			
KVPY	2,028,000	1,863,000	VI. Term Deposits with Scheduled Banks		
UGC	5,423,044	-			
DBT					
ICMR	319,952	79,142	VII. Expenditure on Fixed Assets & Capital		
External Projects (including interest)	127,836,639	55,772,470	Work-in-Progress		
III. Academic Receipts	17,833,385	24,210,052	Purchase of Fixed Assets and	2,051,235,068	694,439,506
IV. Receipts against Earmarked/ Endowment Fund			Expenditure on Capital Work-in-progress		
V. Receipts against Sponsored Projects			VIII. Other payment including Statutory payment		
VI. Receipts against Sponsored Fellowships and Scholarships			IX. Refunds of Grants		
VII. Income on Investments from			X. Deposits & Advances	2,076,239,577	1,056,841,448
a) Earmarked/Endow. Funds			XI. Other payments		
b) Own Funds			XII. Closing Balances		
VIII. Interest Received			a) Cash in hand		
a) On Bank deposits	71,625,365	79,610,162	b) Bank Balances		
b) Loans. Advances etc.			i) In current accounts		
c) Saving Bank Account	9,353,408	6,765,462	a) Canara Bank A/c	21,735,457	3,257
IX. Investment encashed			b) State Bank of India	9,500	377,793
X. Term Deposits with Schedule bank encashed	906,196,220	990,361,299	e) IDBI	3,872,785	-
XI. Other Income			ii) In deposit /savings accounts		
(Including prior period income)	16,598,524	14,931,059	a) SBT	101,531,897	387,994,925
XII. Deposits & Advances	918,861,104	191,672,841	b) Canara Bank	230,719,282	548,081,711
XIII. Miscellaneous receipts including Statutory receipts			c) SBI	104,305,960	94,451,245
XIV. Any other receipts			d) Canara Bank Project A/c	5,262,454	65,235,180
<b>Total</b>	<b>5,435,788,670</b>	<b>3,344,745,915</b>	e) IDBI – Project Account	147,810,377	-
			<b>Total</b>	<b>5,435,788,670</b>	<b>3,344,745,915</b>

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Schedules Forming Part of Balance Sheet As At 31<sup>st</sup> March 2017

SCHEDULE 1- CORPUS/CAPITAL FUND :			Amount in Rupees	
	2016-17		2015-16	
Balance as at the beginning of the year	-	4,798,460,116	-	3,755,978,429
Add: Contributions towards Corpus/Capital Fund	2,271,339,914	-	1,566,727,555	-
Add: Grant from UGC, Government of India and State Government to the extent utilised for capital expenditure	1,142,823,961	-	762,082,722	-
Add: Assets purchased out of Earmarked funds	-	-	-	-
Add: Assets purchased out of sponsored projects, where ownership vests in the institution	-	-	-	-
Add: Assets donated/ gifts received	-	-	-	-
Add: Other additions	2,060,369	-	-	-
Add: Excess of income over expenditure transferred from income and expenditure account	(59,119,070)	-	(59,679,807)	-
<b>Total</b>	-	<b>8,155,565,290</b>	-	<b>6,025,108,899</b>
Less: Deficit transferred from the income and expenditure account	-	-	-	-
Less: Utilised during the year	-	1,789,588,468	-	1,226,648,783
<b>BALANCE AT THE YEAR-END</b>	-	<b>6,365,976,822</b>	-	<b>4,798,460,116</b>

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Schedules Forming Part of Balance Sheet as At 31<sup>st</sup> March 2017

SCHEDULE 3- CURRENT LIABILITIES AND PROVISIONS	Amount in Rupees		
	SubSch No.	2016-17	2015-16
<b>A. CURRENT LIABILITIES</b>			
1. Deposits from staff		-	-
2. Deposits from students		-	-
3. Sundry Creditors :			
a) For Goods & Services		-	74
b) Others		94,833,392	73,050,882
4. Deposits Others (including EMD, Security Deposits)	2	61,951,807	52,855,960
5. Statutory Liabilities(GPF,TDS,WC TAX, CPF, GIS,NPS) :			
a) Overdue		-	-
b) Others	3	4,639,419	5,780,589
6. Other current Liabilities	4	386,725,340	384,437,758
a) Salaries		-	-
b) Receipts against sponsored projects		-	-
c) Receipts against sponsored fellowships and scholarships		-	-
d) Unutilised Grants		-	-
e) Grants in advance		-	-
f) Other Funds		-	-
g) Other liabilities		-	-
<b>Total (A)</b>		<b>548,149,958</b>	<b>516,125,263</b>
<b>B. PROVISIONS</b>			
1. For Taxation		-	-
2. Gratuity		-	-
3. Superannuation/Pension		-	-
4. Accumulated Leave Encashment		-	-
5. Trade Warranties/Claims		-	-
6. Others (Specify)		-	-
<b>Total (B)</b>		<b>-</b>	<b>-</b>
<b>Total (A+B)</b>		<b>548,149,958</b>	<b>516,125,263</b>

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

Schedules Forming Part of Balance Sheet as at 31<sup>st</sup> March 2017

SCHEDULE 3 (a)-ENDOWMENT FUNDS (Sponsored Projects)								
Amount in Rupees								
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Sl. No.	Name of the Project	Opening Balance 2015-16		Receipts/ Recoveries during the year	Total	Expenditure during the year	Total	
		Credit	Debit				Credit	Debit
1	CEFIPRA- Dr. Archana Pai - IFC/A/5504-1/2016/11	543,400	-	10,652	554,052	-	554,052	-
2	CSIR Project of Dr. Ajay Venugopal	903,870	-	180,630	1,084,500	917,116	167,384	-
3	CSIR Project of Dr. Sukhendu Mandal	-	272,813	-	(272,813)	141,927	-	414,740
4	DAE Project of Dr.M.M.Shaijumon	-	232,704	155,222	(77,482)	-	-	77,782
5	DAE NBHM Project of Dr.Utpal Manna	116,386	-	-	116,386	-	116,386	-
6	DAE Project of Dr.Tapas Kumar Manna	380,442	-	745,151	1,125,593	943,272	182,321	-
7	DBT Project of Dr.Kalika Prasad	-	703,024	-	(703,024)	197,539	-	900,563
8	DBT Project of Dr.M.M.Shaijumon	-	254,324	-	(254,324)	70,000	-	324,324
9	DBT Project of Dr.Reji Varghese	7,526,423	-	9,282	7,535,705	11,045,639	-	3,509,934
10	DBT Project of Dr.Mahesh Hariharan	-	514,951	-	(514,951)	101,452	-	616,403
11	DST FT Dr. Ayan Datta	136,490	-	-	136,490	-	136,490	-
12	DST FT Project of Dr. K. M. Sureshan	-	1,196,840	-	(1,196,840)	-	-	1,196,840
13	DST FT Project of Dr. Anil Shaji	36,605	-	-	36,605	-	36,605	-

14	DST INDO-Europe Project of Dr.K.George Thomas	-	59,147	-	59,147	180,140	-	239,287
15	DST MPG PROJECT OF Dr. Archana Pai	34,360	-	23,000	57,360	-	57,360	-
16	DST MPG Project of Dr. Shankara Narayanan	501,526	-	1,450,211	1,951,737	1,244,836	706,901	-
17	DST SERB Project of Dr. Tapas K Manna	-	139,308	732,367	593,059	-	593,059	-
18	DST SERB Project of Dr. Mahesh Hariharan	523,928	-	-	523,928	523,928	-	-
19	DST SERB Project of Dr. Rajeev Kini	-	317,615	-	(317,615)	256,196	-	573,811
20	DST SERB Project of Dr. Madhu Thalakulam	2,164,204	-	3,027,099	5,191,303	3,037,861	2,153,442	-
21	DST SERB Project of Dr. Sukhendu Mandal	703,016	-	-	703,016	1,261,927	-	558,911
22	DST SERB Project of Dr. Joy Mitra	440,516	-	-	440,516	402,426	38,090	-
23	DST SERI Project of Dr. Manoj Namboothiry	160,353	-	-	160,353	133,712	26,641	-
24	DST UKIERI Project of Dr. Rajeev Kini	-	129,434	153,000	23,566	-	23,566	-
25	DST FT Project of Dr. Archana Pai	18	-	-	18	-	18	-
26	DST-INDO-Japan Project of Dr. K. George Thomas	68,733	-	68,733	-	-	-	-
27	DST-JSPS of Dr. Nishant. K. T	37,350	-	-	37,350	-	37,350	-
28	DST-RFBR Project of Dr. Ullasa. K	-	1,203,279	-	(1,203,279)	279,478	-	1,482,757
29	DST SERB Project of Dr. Ajay Venugopal	54,744	-	157,735	212,479	-	212,479	-
30	DU-Pont Young Prof. Programme of Dr. Ravi Maruthachalam	1,293,881	-	-	1,293,881	-	1,293,881	-
31	Inspire Faculty Award of Dr. Ajay Venugopal	86,111	-	-	86,111	730,701	-	644,590

32	Inspire Faculty Award of Dr. Ullasa Kodandaramaiah	211,181	-	-	211,181	821,295	-	610,114
33	JC Bose Fellowship of Dr. K George Thomas	-	390,999	2,004,866	1,613,867	1,073,853	540,014	-
34	Max Planck Project of Dr. Archana Pai	2,874,626	-	545,825	3,420,451	1,687,425	1,733,026	-
35	MHRD COE Project of Dr. Amal Medhi	15,000,000	-	288,830	15,288,830	618,100	14,670,730	-
36	MPG Project of Dr. Shankara Narayanan	493,204	-	88,519	581,723	1,444,155	-	862,432
37	NISSAN Project of Dr. M. M. Shaijumon	-	62,580	-	(62,580)	37,466	-	100,046
38	Ramalinga Swamy Fellowship of Dr. Ramanathan Natesh	57,473	-	419	57,892	57,892	-	-
39	Ramalinga Swamy Fellowship of Dr. Ravi Maruthachalam	-	165,428	1,610,000	1,444,572	1,713,695	-	269,123
40	Ramanujan Fellow. of Dr. Anil Shaji	827,747	-	-	827,747	-	827,747	-
41	Ramanujan Fellow. of Dr. Shankara Narayanan	780,526	-	-	780,526	196,000	584,526	-
42	Ramanujan Fellow. of Dr. Reji Varghese	669,870	-	-	669,870	406,163	263,707	-
43	Ramanujan Fellow. of Dr. K M Sureshan	-	1,764,476	-	(1,764,476)	-	-	1,764,476
44	Ramanujan Fellowship of Dr. Jishy Varghese	1,448,528	-	31,755	1,480,283	161,867	1,318,416	-
45	Swarna Jayanti Fellowship of Dr. K M Sureshan	13,374,035	-	247,088	13,621,123	2,893,307	10,727,816	-
46	UGC UKIERI Project of Dr. Joy Mitra	159,414	-	-	159,414	340,589	-	181,175
47	Welcome Trust DBT Project of Dr Nishant K. T.	-	2,867,536	4,757,130	1,889,594	4,829,916	-	2,940,322
48	WT/ DBT Project of Dr. Sunish R	1,596,049	-	855,818	2,451,867	2,451,867	-	-
49	DBT-A1- Dr. Hema Somanathan	497,526	-	129,000	626,526	269,542	356,984	-
50	DBT-A2- Dr. Hema Somanathan	970,195	-	104,000	1,074,195	424,020	650,175	-

51	DBT-A3- Dr. Ullasa Kodandaramiah	741,564	-	456,000	<b>1,197,564</b>	730,490	467,074	-
52	DST-Ramanujan- Dr. Ravi Pant	695,135	-	6,436	<b>701,571</b>	548,238	153,333	-
53	SERB- Dr. Ravi Pant	5,733,333	-	112,213	<b>5,845,546</b>	204,334	5,641,212	-
54	DST-UKIERI Project Of Fr. Hema Somanathan	-	45,482	384,920	<b>339,438</b>	179,989	159,449	-
55	DBT- Dr. Ullasakodanda Ramaiah	766,917	-	-	<b>766,917</b>	625,468	141,449	-
56	SERB-Ramesh Rasappan	4,485,300	-	83,708	<b>4,569,008</b>	492,953	4,076,055	-
57	KSYS-Project- Dr. Mahesh Hariharan	3,065,952	38,000	55,453	<b>3,083,405</b>	404,118	2,679,287	-
58	IUSSTF-Dr. M M Shaijumon	285,757	-	-	<b>285,757</b>	-	285,757	-
59	SERB-Dr. Vinesh Vijayan	1,029,299	-	14,839	<b>1,044,138</b>	1,232,112	-	187,974
60	DBT- Dr. Kalikaprasad - Research Associateship Programme	3,176,000	-	52,011	<b>3,228,011</b>	1,791,492	1,436,519	-
61	Ramanujan Fellow. of Dr. Ramesh Rasappan	700,000	-	11,401	<b>711,401</b>	360,871	350,530	-
62	DBT- IISC- Mohammed Aiyaz	529,381	-	597,200	<b>1,126,581</b>	574,829	551,752	-
63	WT-DBT-Nisha Kannan	-	-	1,337,981	<b>1,337,981</b>	300,887	1,037,094	-
64	WT-DBT-Dr. Satish Khurana	-	-	11,063,464	<b>11,063,464</b>	80,345	10,983,119	-
65	SERB- Thirumurugan A	-	-	2,852,800	<b>2,852,800</b>	138,500	2,714,300	-
66	SERB- Ramanujan- Rajender Goreti	-	-	760,000	<b>760,000</b>	62,007	697,993	-
67	SERB- Project- Saikat Chatterje	-	-	200,000	<b>200,000</b>	-	200,000	-
68	SERB - Dr. Suhesh Kumar	-	-	1,550,000	<b>1,550,000</b>	-	1,550,000	-
69	SERB - Dr. V. Sivaranjana	-	-	2,023,909	<b>2,023,909</b>	70,400	1,953,509	-
70	SERB - Dr. R. S. Swathi	-	-	100,000	<b>100,000</b>	-	100,000	-
71	SERB- Dr. A. Kaliyamoorthy	-	-	2,409,527	<b>2,409,527</b>	1,488,292	921,235	-
72	SERB- Bikas Chandra Das	-	-	4,090,000	<b>4,090,000</b>	112,000	3,978,000	-
73	SERB- Chiranjeevi. P	-	-	465,000	<b>465,000</b>	42,000	423,000	-
74	DST Inspire Faculty Award Mamtha Sahoo	-	-	1,003,852	<b>1,003,852</b>	528,951	474,901	-



75	DST Inspire Dr. S. Gokulnath	-	-	1,459,745	1,459,745	67,105	1,392,640	-
76	DST Inspire Faculty Dr Vinayak K	-	-	1,936,091	1,936,091	873,597	1,062,494	-
77	DST Inspire Faculty Mithun Muharjee	-	-	301,596	301,596	107,913	193,683	-
78	DST (NANOMISSION) K George Thomas	-	-	46,421,688	46,421,688	111,401	46,310,287	-
79	DST-SERB-Dr. Deepshikha Jaiswal Nagar	-	-	1,257,187	1,257,187	276,592	980,595	-
80	DST- SERB-Dr. Gokulnath	-	-	1,529,258	1,529,258	76,700	1,452,558	-
81	DST- SJF- Dr. Sunish K Radhakrishnan	-	-	18,218,671	18,218,671	278,000	17,940,671	-
82	ISRO- Dr. Deepshikha Jaiswal Nagar	-	-	2,059,573	2,059,573	245,750	1,813,823	-
83	DBT- Tapas K Manna	-	-	3,298,348	3,298,348	583,364	2,714,984	-
84	DST- SERB- Ramanujan- Rajender Goreti	-	-	1,100,000	1,100,000	107,400	992,600	-
85	DST- SERB Dr. Tapas Kumar Manna	-	-	113,850	113,850	113,850	-	-
	INTEREST ON SB ACCOUNT	-	-	990,550	990,550	-	990,550	-
	INTEREST ON SB ACCOUNT	7,298,265	1	2,280,502	9,578,766	107,695	9,471,071	-
	Total	83,179,632	10,357,942	127,836,639	200,658,330	53,812,945	164,300,689	17,455,304

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

Schedules Forming Part of Balance Sheet as at 31<sup>st</sup> March 2017

SCHEDULE 3 (b)-SPONSORED FELLOWSHIPS AND SCHOLARSHIPS					Amount in Rupees		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Sl. No	Name of the Sponsor	Opening Balance as on 01.04.2016		Transactions during the year		Closing Balance as on 31.03.2017	
		Credit	Debit	Credit	Debit	Credit	Debit
1.	DST - INSPIRE	-	44,220,109	86,307,309	28,812,000	13,275,200	-
2.	CSIR (Ph D Research Scholars)	-	1,861,609	1,861,609	7,988,692	-	7,988,692
3.	KVPY (BSMS)	115,314	-	2,028,000	2,748,000	-	604,686
4.	UGC (Ph D Research Scholars)	-	4,674,044	5,423,044	-	749,000	-
5.	DBT (Ph D Research Scholars)	-	75,000	-	300,000	-	375,000
6.	ICMR (Ph D Research Scholars)	4,142	-	319,952	300,000	24,094	-
	<b>TOTAL</b>	<b>119,456</b>	<b>48,969,153</b>	<b>95,939,914</b>	<b>40,148,692</b>	<b>14,048,294</b>	<b>8,968,378</b>

## Schedules Forming Part of Balance Sheet as at 31<sup>st</sup> March 2017

SCHEDULE 3(C) - UNUTILIZED GRANTS FROM UGC, GOVERNMENT OF INDIA AND STATE GOVERNMENTS	Amount in Rupees	
	2016-17	2015-16
<b>A. Plan grants : Government of India (MHRD)</b>		
Balance B/F	1,577,911,215	1,213,276,615
Add: Receipts during the year	2,175,400,000	1,550,000,000
<b>TOTAL (a)</b>	<b>3,753,311,215</b>	<b>2,763,276,615</b>
Less Refunds		
Less: Utilized for Revenue Expenditure	606,615,816	423,282,678
Less: Utilized for Capital Expenditure	1,142,823,961	762,082,722
<b>TOTAL (b)</b>	<b>1,749,439,777</b>	<b>1,185,365,400</b>
<b>Unutilized carried forward (a-b)</b>	<b>2,003,871,438</b>	<b>1,577,911,215</b>
<b>B. UGC Grants: Plan</b>		
Balance B/F		
Add: Receipts during the year		
<b>TOTAL (c)</b>	<b>-</b>	<b>-</b>
Less Refunds		
Less: Utilized for Revenue Expenditure		
Less: Utilized for Capital Expenditure		
<b>TOTAL (d)</b>	<b>-</b>	<b>-</b>
<b>Unutilized carried forward (c-d)</b>		
<b>C. UGC Grants Non-Plan</b>		
Balance B/F		
Add: Receipts during the year		
<b>TOTAL (e)</b>	<b>-</b>	<b>-</b>
Less Refunds		
Less: Utilized for Revenue Expenditure		
Less: Utilized for Capital Expenditure		
<b>TOTAL (f)</b>	<b>-</b>	<b>-</b>
<b>Unutilized carried forward (e-f)</b>		
<b>D. Grants from State Govt.</b>		
Balance B/F		
Add: Receipts during the year		
<b>TOTAL (g)</b>	<b>-</b>	<b>-</b>
Less Refunds		
Less: Utilized for Revenue Expenditure		
Less: Utilized for Capital Expenditure		
<b>TOTAL (h)</b>	<b>-</b>	<b>-</b>
<b>Unutilized carried forward (g-h)</b>		
<b>Grand Total (A+B+C+D)</b>	<b>2,003,871,438</b>	<b>1,577,911,215</b>

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM



INDIAN INSTITUTE OF SCIENCE EDUCATION  
AND RESEARCH THIRUVANANTHAPURAM

## Schedules Forming Part of Balancesheet as at 31<sup>st</sup> March 2017

SCHEDULE 4 - FIXED ASSETS (PLAN)												
Sl. No.	DESCRIPTION	GROSS BLOCK				DEPRECIATION	NET BLOCK					
		Opening Balance as on 01.04.2016	Additions	Deductions	Closing Balance		Rate of Depreciation	Opening Balance	Depreciation for the year	Deductions / Adjustment	Total Depreciation	31.03.2017
	TANGIBLE ASSETS											
1	LAND :											
	a) Freehold											
	Land obtained from Govt	1	-	-	1	0.00%	-	-	-	-	1	1
	Vithura	954,506	-	-	954,506	0.00%	-	-	-	-	954,506	954,506
2	Site Development	-	-	-	-	-	-	-	-	-	-	-
3	BUILDINGS :	129,758,143	73,572,821	-	203,330,964	2.00%	9,585,886	3,874,901	-	13,460,787	189,870,177	120,172,257
4	Roads & Bridges	-	-	-	-	2.00%	-	-	-	-	-	-
5	Tubes & Water Supply	-	-	-	-	2.00%	-	-	-	-	-	-
6	Sewage & Drainage	-	-	-	-	2.00%	-	-	-	-	-	-
7	Electrical Installation and equipment	17,331,527	2,097,459	-	19,428,986	5.00%	3,566,884	793,104	-	4,359,988	15,068,998	13,764,643
8	Plant and Machinery	37,142,796	9,696,271	-	46,839,067	5.00%	5,985,785	2,042,519	-	8,028,304	38,810,763	31,157,011
9	Scientific & Laboratory Equipment	720,055,458	433,695,227	92,689	1,153,657,996	8.00%	203,639,235	76,008,916	7,415	2,796,409,736	874,017,260	516,416,223
10	Office Equipment	-	-	-	-	7.50%	-	-	-	-	-	-
11	Audio Visual Equipment	-	-	-	-	7.50%	-	-	-	-	-	-
12	Computers & Peripherals	64,660,254	52,935,218	-	117,595,472	20.00%	29,194,328	17,680,808	-	46,875,136	70,720,336	35,465,926

13	Furniture, Fixtures and Fittings	61,353,923	22,245,093	-	83,599,016	7.50%	14,293,672	5,197,901	-	19,491,573	64,107,443	47,060,251
14	Vehicles	711,323	-	-	711,323	10.00%	397,013	31,431	-	428,444	282,879	314,310
15	Library Books & Scientific Journals	20,830,247	2,477,297	-	20,830,247	10.00%	8,439,914	148,676	-	9,926,677	13,380,867	12,390,333
16	Small Value Assets	-	-	-	-	-	-	-	-	-	-	-
	<b>TOTAL (A)</b>	<b>105,798,178</b>	<b>596,719,386</b>	<b>-</b>	<b>92,689</b>	<b>1,649,424,875</b>	<b>275,102,717</b>	<b>107,116,343</b>	<b>7,415</b>	<b>382,211,645</b>	<b>1,267,213,230</b>	<b>777,695,461</b>
17	CAPITAL WORK-IN-PROCESS - CONSTRUCTION											
		1,613,145,862	574,705,842	-	2,187,851,704	-	-	-	-	-	2,187,851,704	1,613,145,862
	CAPITAL WORK-IN-PROCESS- Lab Equipment											
		434,877,221	183,624,205	258,908,320	359,593,106	-	-	-	-	-	359,593,106	434,877,221
	<b>CAPITAL WORK IN PROGRESS (B)</b>										<b>2,547,444,810</b>	<b>2,048,023,083</b>
	<b>TOTAL A+B</b>										<b>3,814,658,040</b>	<b>2,825,718,544</b>
Sl. No.	INTANGIBLE ASSETS	GROSS BLOCK			DEPRECIATION	NET BLOCK					31.03.2017	31.03.2016
		Opening Balance as on 01.04.2016	Additions	Deductions		Closing Balance	Rate of Depreciation	Opening Balance	Amortization for the year	Deductions / Adjustment		
18	Computer Software	14,863,536	2,307,143	-	40.00%	17,170,679	40.00%	14,114,498	1,222,472	-	1,833,709	749,038
19	E-Journals	242,207,349	44,468,393	-	40.00%	286,675,742	40.00%	207,115,022	31,824,288	-	47,736,432	35,092,327
20	Patents	-	-	-	9 Years	-	9 Years	-	-	-	-	-
	<b>TOTAL - (C)</b>	<b>257,070,885</b>	<b>46,775,536</b>	<b>-</b>	<b>-</b>	<b>303,846,421</b>	<b>-</b>	<b>221,229,520</b>	<b>33,046,760</b>	<b>-</b>	<b>49,570,141</b>	<b>35,841,365</b>
	<b>GRAND TOTAL (A+B+C)</b>	<b>3,357,892,146</b>	<b>1,401,824,969</b>	<b>259,001,009</b>	<b>-</b>	<b>4,500,716,106</b>	<b>-</b>	<b>495,332,237</b>	<b>140,163,103</b>	<b>7,415</b>	<b>3,864,228,181</b>	<b>2,861,559,909</b>

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Schedules Forming Part of Balancesheet as at 31<sup>st</sup> March 2017

SCHEDULE 4 A - FIXED ASSETS (PLAN+NON PLAN)												
Sl. No.	DESCRIPTION	GROSS BLOCK				DEPRECIATION	NET BLOCK					
		Opening Balance as on 01.04.2016	Additions	Deductions	Closing Balance		Rate of Depreciation	Opening Balance	Depreciation for the year	Deductions / Adjustment	Total Depreciation	31.03.2017
	TANGIBLE ASSETS											
1	LAND :											
	a) Freehold											
	Land obtained from Govt	1	-	-	1	0.00%	-	-	-	-	1	1
	Vithura	954,506	-	-	954,506	0.00%	-	-	-	-	954,506	954,506
2	Site Development	-	-	-	-	-	-	-	-	-	-	-
3	BUILDINGS :	129,758,143	73,572,821	-	203,330,964	2.00%	9,585,886	3,874,901	-	13,460,787	189,870,177	120,172,257
4	Roads & Bridges	-	-	-	-	2.00%	-	-	-	-	-	-
5	Tubes & Water Supply	-	-	-	-	2.00%	-	-	-	-	-	-
6	Sewage & Drainage	-	-	-	-	2.00%	-	-	-	-	-	-
7	Electrical Installation and equipment	17,331,527	2,097,459	-	19,428,986	5.00%	3,566,884	793,104	-	4,359,988	15,068,998	13,764,643
8	Plant and Machinery	37,142,796	9,696,271	-	46,839,067	5.00%	5,985,785	2,042,519	-	8,028,304	38,810,763	31,157,011
9	Scientific & Laboratory Equipment	720,055,458	433,695,227	92,689	1,153,657,996	8.00%	203,639,235	76,008,916	7,415	2,796,409,736	874,017,260	516,416,223
10	Office Equipment	-	-	-	-	7.50%	-	-	-	-	-	-
11	Audio Visual Equipment	-	-	-	-	7.50%	-	-	-	-	-	-
12	Computers & Peripherals	64,660,254	52,935,218	-	117,595,472	20.00%	29,194,328	17,680,808	-	46,875,136	70,720,336	35,465,926

13	Furniture, Fixtures and Fittings	61,353,923	22,245,093	-	83,599,016	7.50%	14,293,672	5,197,901	-	19,491,573	64,107,443	47,060,251
14	Vehicles	711,323	-	-	711,323	10.00%	397,013	31,431	-	428,444	282,879	314,310
15	Library Books & Scientific Journals	20,830,247	2,477,297	-	20,830,247	10.00%	8,439,914	148,676	-	9,926,677	13,380,867	12,390,333
16	Small Value Assets	-	-	-	-	-	-	-	-	-	-	-
	TOTAL (A)	105,798,178	596,719,386	-	92,689	1,649,424,875	275,102,717	107,116,343	7,415	382,211,645	1,267,213,230	777,695,461
17	CAPITAL WORK-IN-PROCESS - CONSTRUCTION	1,613,145,862	574,705,842	-	2,187,851,704	-	-	-	-	-	2,187,851,704	1,613,145,862
	CAPITAL WORK-IN-PROCESS- Lab Equipment	434,877,221	183,624,205	258,908,320	359,593,106	-	-	-	-	-	359,593,106	434,877,221
	CAPITAL WORK IN PROGRESS (B)											
	TOTAL A+B											
											2,547,444,810	2,048,023,083
											3,814,658,040	2,825,718,544
		GROSS BLOCK				DEPRECIATION	NET BLOCK					
SL. No.	INTANGIBLE ASSETS	Opening Balance as on 01.04.2016	Additions	Deductions	Closing Balance	Rate of Depreciation	Opening Balance	Amortization for the year	Deductions / Adjustment	Total Amortization/ Adjustments	31.03.2017	31.03.2016
18	Computer Software	14,863,536	2,307,143	-	17,170,679	40.00%	14,114,498	1,222,472	-	15,336,970	1,833,709	749,038
19	E- Journals	242,207,349	44,468,393	-	286,675,742	40.00%	207,115,022	31,824,288	-	238,939,310	47,736,432	35,092,327
20	Patents	-	-	-	-	9 Years	-	-	-	-	-	-
	TOTAL - (C)	257,070,885	46,775,536	-	303,846,421	-	221,229,520	33,046,760	-	254,276,280	49,570,141	35,841,365
	GRAND TOTAL (A+B+C)	3,357,892,146	1,401,824,969	259,001,009	4,500,716,106	-	495,332,237	140,163,103	7,415	636,487,925	3,864,228,181	2,861,559,909



# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Schedules Forming Part of Balance Sheet as at 31<sup>st</sup> March 2017

SCHEDULE 7- CURRENT ASSETS	Amount in Rupees		
	Sub Sch. No.	2016-17	2015-16
<b>1. Stock</b>			
a) Stores and Spares			
b) Loose Tools			
c) Publications			
d) Laboratory Chemicals, consumables and glass wares			
e) Building materials			
f) Electrical materials			
g) Stationery			
h) Water supply material			
<b>2. Sundry Debtors :</b>			
a) Debts Outstanding for a period exceeding six months			
b) Others			
<b>3. Cash balances in hand (including cheques/drafts and imprest)</b>	<b>4</b>	<b>-</b>	<b>-</b>
<b>4. Bank Balances:</b>			
Institute balance			
a) With Scheduled Banks :			
- On Current Accounts	5	26,551,643	381,050
- On Term Deposit Accounts (includes margin money)	5	394,201,879	676,917,528
- On Savings Accounts	5	41,735,486	353,610,353
b) With non-Scheduled Banks :			
- On Current Accounts			
- On Term Deposit Accounts			
- On Savings Accounts			
<b>Project Balance</b>			
a) With Scheduled Banks:			
- On Current Accounts			
- On Term Deposit Accounts (includes margin money)		-	4,146,218
- On Savings Accounts		152,758,704	61,088,962
b) With non-Scheduled Banks:			
- On Current Accounts			
- On Term Deposit Accounts			
- On Savings Accounts			
<b>5. Post Office- Savings Accounts</b>			
<b>TOTAL</b>		<b>615,247,712</b>	<b>1,096,144,111</b>

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Schedules Forming Part of Balance Sheet as at 31<sup>st</sup> March 2017

SCHEDULE 8- LOANS, ADVANCES & DEPOSITS	Amount in Rupees		
	Sub Sch. No.	2016-17	2015-16
1. Advances to employees : (Non interest bearing)			
a) Salary			
b) Festival			
c) Medical Advance			
d) Other (to be specified)			
2. Long Term Advances to employees: ( Interest bearing)			
a) Vehicle Loan			
b) Home Loan			
c) Others (to be specified)			
3. Advances and other amounts recoverable in cash or in kind or for value to be received			
a) On Capital Account			
b) To suppliers			
c) Others	7	2,433,616,047	1,301,542,957
4. Prepaid Expenses			
a) Insurance			
b) Other Expenses	6	22,476,735	12,792,918
5. Deposits			
a) Telephone			
b) Lease Rent			
c) Electricity			
d) AICTE, if applicable			
e) Others (to be specified)			
6. Income Accrued:			
a) On Investments from Earmarked/Endowment Funds			
b) On Investments-Others			
c) On Loans and Advances			
d) Others (includes income due unrealized-Rs.....)	8	26,090,322	16,672,399
7. Other Current Assets Recievables			
a) Debit balances in sponsered projects			
b) Debit balances in fellowship & scholarships			
c) Grants recoverable			
d) Other recievables			
8. Claims Receivable	9	99,313,168	98,694,777
<b>TOTAL</b>		<b>2,581,496,272</b>	<b>1,429,703,051</b>

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Schedules Forming Part of Income and Expenditure Account for the Period/Year Ended 31<sup>st</sup> March 2017

SCHEDULE 9- ACADEMIC RECEIPTS	Amount in Rupees	
	2016-17	2015-16
<b>FEE FROM STUDENTS</b>		
<b>Academic</b>		
a) Tuition fee	9,987,718	9,811,950
b) Admission fee	-	-
c) Enrolment fee	-	-
d) Library fee	421,200	355,200
e) Laboratory fee	-	-
f) Art & Craft fee	-	-
g) Registration fee	291,200	242,000
h) Syllabus fee	-	-
i) Other Receipts	839,200	738,050
<b>TOTAL (A)</b>	<b>11,539,318</b>	<b>11,147,200</b>
<b>Examinations</b>		
a) Admission test fee	-	-
b) Annual examination fee	543,005	452,400
c) Mark sheet, Certificate fee	-	-
d) Entrance Examination fee	-	-
<b>TOTAL (B)</b>	<b>543,005</b>	<b>452,400</b>
<b>Other Fee</b>		
a) Identity Card fee	-	-
b) Fine/ Miscellaneous fee	-	-
c) Medical fee	76,200	64,100
d) Transportation fee	-	-
e) Hostel Fee	29,000	19,000
<b>TOTAL (C )</b>	<b>105,200</b>	<b>83,100</b>
<b>Sale of publications</b>		
a) Sale of admission forms		
b) Sale of syllabus and question paper		
c) Sale of prospectus including admission forms		
<b>TOTAL (D)</b>	<b>-</b>	<b>-</b>
<b>Other Academic Receipts</b>		
a) Registration fee for workshops programmes		
b) Registration fees (Academic Staff College)		
<b>GRAND TOTAL (A+B+C+D)</b>	<b>12,187,523</b>	<b>11,682,700</b>

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Schedules Forming Part of Income and Expenditure Account for the Period/Year Ended 31<sup>st</sup> March 2017

SCHEDULE 10- GRANTS/ SUBSIDIES	Amount in Rupees	
	2016-17	2015-16
(Irrevocable Grants & Subsidies Received)		
Balance B/F	1,527,199,909	1,187,121,138
ADD: Receipts During the Year		
Capital Grant	2,175,400,000	1,550,000,000
General	1,464,672,500	
SC	283,485,000	
ST	141,742,500	
Revenue Grant		
General	221,262,500	
SC	42,825,000	
ST	21,412,500	
DST - INSPIRE (Ph D / BSMS)	86,307,309	1,685,200
CSIR (Ph D Research Scholars)	1,861,609	13,100,213
KVPY (BSMS)	2,028,000	1,863,000
UGC (Ph D Research Scholar)	5,423,044	-
DBT	-	-
ICMR	319,952	79,142
DST - INSPIRE	-	-
	<b>3,798,539,823</b>	<b>2,753,848,693</b>
Less : Capital Expenses Incurred during the year	1,142,823,961	762,082,722
Less : Closing Unspent balance of grant	2,008,951,355	1,527,199,909
	<b>646,764,507</b>	<b>464,566,062</b>
<b>TOTAL</b>	<b>646,764,507</b>	<b>464,566,062</b>

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Schedules Forming Part of Income and Expenditure Account for the Period/Year Ended 31<sup>st</sup> March 2017

SCHEDULE 12- INTEREST EARNED	Amount in Rupees	
	2016-17	2015-16
<b>Particulars</b>		
1) On Savings Accounts with scheduled banks	9,353,408	6,765,462
2) On Loans		
a. Employees/ Staff	-	-
b. Others	-	-
3) On debtors and others receivables	-	-
<b>TOTAL</b>	<b>9,353,408</b>	<b>6,765,462</b>

# INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

## Schedules Forming Part of Income and Expenditure Account for the Period/ Year Ended 31<sup>st</sup> March 2017

SCHEDULE 13- OTHER INCOME	Amount in Rupees	
	2016-17	2015-16
<b>A. Income from Land &amp; Building</b>		
a) Hostel room rent	2,669,257	2,152,500
b) License fee	415,826	502,700
c) Hire charges of Auditorium/ Play ground/ Convention Centre, Etc	-	-
d) Electricity Charges recovered	848,000	717,500
e) Water Charges recovered	-	-
<b>TOTAL</b>	<b>3,933,083</b>	<b>3,372,700</b>
<b>B. Sale of Institutes Publications</b>		
<b>TOTAL</b>	<b>-</b>	<b>-</b>
<b>C. Income from Holding Events</b>		
a) Gross receipts from annual function/ sports carnival Less: Direct expenditure incurred on the annual function/ sports carnival		
b) Gross receipts from fetes Less: Direct expenditure incurred on fetes		
c) Gross receipts on educational tours Less: Direct expenditure incurred on tours		
d) Others ( to be specify and separately disclosed)		
<b>TOTAL</b>	<b>-</b>	<b>-</b>
<b>D. Interest On Term Deposits :</b>		
a) With Scheduled Banks	39,821,774	47,287,237
b) With Non-Scheduled Banks	-	-
c) With Institutions	-	-
d) Others	-	-
<b>TOTAL</b>	<b>39,821,774</b>	<b>47,287,237</b>
<b>E. Interest On Savings Accounts:</b>		
a) With Scheduled Banks		
b) With Non-Scheduled Banks		
c) With Institutions		
d) Others		
<b>TOTAL</b>	<b>-</b>	<b>-</b>
<b>F. On Loans:</b>		
a) Employees/Staff	-	-
b) Others	10,176,045	9,686,622
<b>TOTAL</b>	<b>10,176,045</b>	<b>9,686,622</b>
<b>G. Interest on Debtors and Other Receivables</b>		
<b>TOTAL</b>	<b>-</b>	<b>-</b>
<b>H. Others</b>		
a) Income from consultancy	-	-
b) RTI Fees	995	1,573
c) Income from royalty	-	-
d) Sale of application form	80,400	141,929
e) Misc. receipts (Sale of tender form, waste paper, etc.)	5,483,393	5,905,400
f) Profit on sale/ disposal of Assets	-	-
1. Owned asset	-	-
2. Assets aquired out of grants, or received free of cost	-	-
g) Other Incomes	-	-
<b>TOTAL</b>	<b>5,564,788</b>	<b>6,048,902</b>
<b>GRAND TOTAL (A+B+C+D+E+F+G+H)</b>	<b>59,495,690</b>	<b>66,395,461</b>

## INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

### Schedules Forming Part of Income and Expenditure Account for the Period/ Year Ended 31<sup>st</sup> March 2017

SCHEDULE 15- STAFF PAYMENT & BENEFITS	Amount in Rupees	
	2016-17	2015-16
a) Salaries and Wages	190,979,396	153,815,280
b) Allowances and Bonus	3,908,731	2,184,746
c) Contribution to Provident Fund	-	-
d) Contribution to Other Fund (Leave Salary & NPS Employer Share)	32,045,866	8,783,505
e) Staff Welfare Expenses	-	-
f) Retirement and Terminal Benefits	-	-
g) LTC facility	2,437,243	1,292,048
h) Medical facility	1,571,093	1,289,605
i) Children Education Allowance	1,063,278	939,163
j) Honorarium	-	-
k) Others (Leave Salary )	3,138,627	210,062
<b>TOTAL</b>	<b>235,144,234</b>	<b>168,514,409</b>

## INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

### Schedules Forming Part of Income and Expenditure Account for the Period/ Year Ended 31<sup>st</sup> March 2017

SCHEDULE 16- ACADEMIC EXPENSES	Amount in Rupees	
	2016-17	2015-16
a) Laboratory Expenses	134,980,581	73,660,991
b) Field Work/ Participation	807,101	506,962
c) Expenses on Seminar/ Workshop	-	-
d) Payment to visiting faculty	-	-
e) Examination	-	-
f) Student welfare expense	-	-
g) Admission expenses	138,651	212,620
h) Convocation expense	957,957	935,104
i) Publication	-	-
j) Stipend/ means-cum-merit scholarship	92,607,195	82,612,409
k) Subscription Expense	-	-
l) Others (Specify)	-	-
<b>TOTAL</b>	<b>229,491,485</b>	<b>157,928,086</b>



## INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

### Schedules Forming Part of Income and Expenditure Account for the Period/Year Ended 31<sup>st</sup> March 2017

SCHEDULE 17- ADMINISTRATIVE AND GENERAL EXPENSES	Amount in Rupees	
	2016-17	2015-16
<b>A. Infrastructure</b>		
a) Electricity and power	33,023,899	16,521,354
b) Water charges	2,053,989	2,031,248
c) Insurance	-	-
d) Rent, Rates and Taxes	51,733,901	49,562,414
<b>B. Communication</b>		
e) Postage & Telegram	1,175,937	777,778
f) Telephone and Internet Charges	8,011,695	1,250,324
<b>C. Others</b>		
g) Printing and Stationary	9,336,371	4,749,532
h) Travelling and Conveyance Expenses	5,542,013	4,041,666
i) Expenses on Seminar/Workshops	6,993,957	10,180,626
j) Hospitality	-	-
k) Auditors Remuneration	138,510	262,859
l) Professional Charges	-	-
m) Advertisement and Publicity	2,935,689	2,668,991
n) Magazine & Journals	-	-
o) Others (specify)		
Sports / Cultural Festival / Celebration expense	1,161,035	1,384,633
Consumables	2,575,041	839,041
Contingencies	8,768,980	2,538,162
Cable TV Charges	224,162	120,774
Newspaper & Periodicals	145,087	143,106
Office contingencies	5,042,818	2,685,095
Software License fees	950,471	5,029,539
Photography Charges	27,500	21,860
Publication Charges	5,830	-
Guest house and other expenses	249,443	678,482
Gardening & Landscaping Chages	1,377,405	483,790
Other Adminstrative / Miscellaneous Expenses	2,126,481	932,247
Legal and consultancy charges	470,330	1,049,207
Anvesha Programme Expenses	161,257	232,038
Permananent Campus Inaguration expenses	102,230	4,866,600
Loss on sale of Fixed Assets	-	993,860
Medical Centre - Consumables & Medicines	343,798	139,323
<b>TOTAL</b>	<b>144,677,828</b>	<b>114,184,548</b>

## INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

### Schedules Forming Part of Income and Expenditure Account for the Period/Year Ended 31<sup>st</sup> March 2017

SCHEDULE 18- TRANSPORTATION EXPENSES	Amount in Rupees	
	2016-17	2015-16
1. Vehicles (owned by educational institution)		
a) Running expense	114,862	203,500
b) Repairs & Maintenance	34,425	16,269
c) Insurance Expenses	10,207	13,585
2. Vehicles taken on rent		
a) Rent/ Lease expenses	22,329,046	16,103,927
3. Vehicle (Taxi) Hiring expenses	-	-
<b>TOTAL</b>	<b>22,488,540</b>	<b>16,337,281</b>

## INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

### Schedules Forming Part of Income and Expenditure Account for the Period/Year Ended 31<sup>st</sup> March 2017

SCHEDULE 19- REPAIRS & MAINTANENCE	Amount in Rupees	
	2016-17	2015-16
a) Building	-	-
b) Furniture & Fixtures	-	-
c) Plant & Machinery	14,796,364	7,480,113
d) Office Equipments	-	-
e) Computers	-	-
f) Laboratory & Scientific equipment	-	-
g) Audio Visual equipment	-	-
h) Cleaning Material & Services	-	-
i) Book binding charges	-	-
j) Gardening	-	-
k) Estate Maintenance	-	-
f) Others (Specify)	-	-
<b>TOTAL</b>	<b>14,796,364</b>	<b>7,480,113</b>

## INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH THIRUVANANTHAPURAM

### Schedules Forming Part of Income and Expenditure Account for the Period/Year Ended 31<sup>st</sup> March 2017

SCHEDULE 20- FINANCE COSTS	Amount in Rupees	
	2016-17	2015-16
a) Bank Charges	166,057	121,624
b) Others (specify)	-	-
<b>TOTAL</b>	<b>166,057</b>	<b>121,624</b>

## SCHEDULE 23- SIGNIFICANT ACCOUNTING POLICIES

### 1. Basis for preparation of Accounts:

The Annual Accounts of the institute are prepared on the basis of revised format and guidelines issued by the Ministry of Human Resource Development, Government of India and approved by the C&AG of India for all Central Educational Institutes w.e.f. FY 2014-15 (Communicated vide Lr.No.29-4/2012-IFD dated 17.04.2015 of MHRD, GOI).

### 2. Accounting Convention:

The financial statements are prepared on the basis of Historical Cost Convention unless otherwise stated and generally on the accrual method of accounting.

### 3. Revenue Recognition:

Admission fees, Tuition Fees and other fees received from students are accounted on accrual basis.

Interest on Fixed Deposits has been credited in the accounts on accrual basis.

No interest bearing advances for House Building, Purchase of Vehicles etc., has been sanctioned to staff to the said period.

### 4. Fixed Assets and Depreciation

The fixed assets are valued at cost of acquisition and inclusive of inward freight, duties, taxes, incidental and direct expenses related to acquisition.

No fixed asset has been received directly by way of non-monetary grant during the year under consideration.

The land at Jersey Farm, Vithura Nedumangad Taluk, Thiruvananthapuram District has been given by the Government of Kerala at no cost, hence the same has been shown at nominal value of Rs.1/- in Annual Account.

No gifted/donated assets and Books have been received during the year under consideration.

Fixed Assets are valued at cost less accumulated depreciation. No change has been made in the method and depreciation on fixed assets has been provided on Written Down Value Method at the following rates:

#### Tangible Assets:

1.	Land	0%
2.	Site Development	0%
3.	Buildings	2%
4.	Roads and Bridges	2%
5.	Tube wells and water supply	2%
6.	Sewerage and Drainage	2%

7.	Electrical installation and equipment	5%
8.	Plant and Machinery	5%
9.	Scientific and Laboratory Equipment	8%
10.	Office Equipment	7.5%
11.	Audio Visual Equipment	7.5%
12.	Computer and Peripherals	20%
13.	Furniture, Fixtures and Fittings	7.5%
14.	Vehicles	10%
15.	Library Books and Scientific Journals	10%

#### **Intangible Assets (Amortization)**

1.	E-Journals	40%
2.	Computer Software	40%
3.	Patents and Copyrights	9 Years

Depreciation is provided for the whole year on additions during the year for acquisition period of six months and above and for half year on additions for acquisition period of less than six months.

Where an asset is fully depreciated, it will be shown at a residual value of Rs.1/- in the Balance Sheet and will not be further depreciated.

Assets created out of Earmarked Funds and Funds of Sponsored Projects where the ownership of such assets vests in the Institution will be setup by credit in Capital Fund and merged with the Fixed Assets of the institution. Depreciation will be charged at the rates applicable to the respective assets. However no such assets are there at present.

Patents, copyrights and E Journals are grouped under intangible assets.

Electronic Journals (E-Journals) are separated from Library Books in view of the limited benefit that could be derived from the on-line access provided. E-Journals are not in a tangible form, but temporarily capitalized in view of the magnitude of expenditure and the benefit derived in terms of perpetual knowledge acquired by the Academic and Research Staff. Depreciation is provided in respect of E-Journals at a higher rate of 40% as against depreciation of 10% provided in respect of Library Books.

Software and Computer Peripherals are being shown under the Fixed Assets.

#### **Stocks:**

Expenditure on purchase of Chemicals, Lab ware, Office Consumables, Publications and other consumable items are accounted as revenue expenditure. Such items issued to Labs are treated as consumed and hence closing stock is taken as NIL.

#### **Retirement Benefits:**

All employees of the Institute are covered under the New Pension Scheme. As such no provision has been made for pension, however suitable provision on the basis of actuarial valuation has been made

for the Earned Leave Encashment.

No long term or Short Term Investments are made by the institute in Government Securities, Bonds, Debentures and Shares.

### **Corpus / Earmarked / Designated Endowment Funds:**

The funds of the institute are classified into following categories:

**1. Corpus / Capital Fund:** It refers to fund contributed by Government for establishment and activities of the institute. Corpus fund is the main fund of the institute and it denotes a permanent fund kept for the existence of the institute. The additions to this fund are Grants from Government to the extent utilised for Capital Expenditure. Assets purchased out of earmarked funds and sponsored project funds and excess of income over expenditure transferred from Income and Expenditure account.

### **Government Grants:**

Plan grants received from Government are accounted on accrual basis.

To the extent utilised towards capital expenditure, Government Grants are transferred to the Capital Fund.

Unutilised Government Grants are shown as Liability in Balance Sheet.

### **Sponsored Projects:**

The amount received under Sponsored Projects has been separately shown in Schedule 3.

The fellowships and scholarships funded by the UGC, CSIR, DST INSPIRE etc., are also shown separately in Schedule 3B

The Fellowships and Scholarships provided by the institute itself are accounted as Academic expenses.

### **Income Tax:**

The income of the institute is exempt from Income Tax under Section 10(23c) of the Income Tax Act 1961. Therefore, no provision for tax is made in the accounts.

## SCHEDULE 24 - CONTINGENT LIABILITIES AND NOTES ON ACCOUNTS

The financial statement of the institute is prepared in three parts:

- i) Receipt and Payment Account
- ii) Income and Expenditure Account
- iii) The Balance Sheet.

The Receipts and Payments Account consists of the figures of actual receipts and payments of the institute during the financial year 2016-17 as per Cash Book. The total receipts from the different sources as shown in Receipt and Payment Account comes to Rs. 543.58 crore which inter alia includes grant of Rs.217.54 crore received from Ministry of Human Resource Development and the total receipts towards Fees, interests and other resources of Rs. 216.42 crore.

The Income and Expenditure Account is prepared on accrual basis. The total income during the financial year was Rs. 727,801,128/-.

In Balance Sheet the acquired fixed assets, current assets are taken as assets while the Corpus Fund, Designated Fund, Endowment Funds, balance of Sponsored Projects and Grants received from Government and Current Liabilities etc are shown in respective Schedules under Sources of Funds / Liabilities.

Figures in Final Accounts have been rounded off to the nearest rupee.

Schedule 1 to 22 are annexed and they form an integral part of Annual Accounts.

The details of balances in Saving Bank, Current Accounts and in Fixed Deposit Accounts are given in Schedule 7 of the Balance Sheet.

The unutilized grant shown under Schedule 3(C) Plan Grants from MHRD is Rs.200.38 crore out of which advance payment including Rs.212.15 crore payment made to CPWD as Deposit work for Phase I construction of IISER Permanent Campus vide Balance Sheet Sub Schedule 7.

### **Sponsored Project Accounts:**

The institute has received grants from DST, DBT, CSIR, UGC etc., in Research and Development (R&D) Projects. A separate bank account is maintained for Sponsored R & D Projects. The transactions in Sponsored Projects and Project wise closing balances are being shown in Schedule 3(A) of the Balance Sheet. From the current financial year 2016-17, as per the funding agencies guidelines project wise bank account (s) are being maintained with IDBI bank.

The treatment of Project Grant and its utilisation is on Cash basis.

### **Capital Works-in-Progress:**

The construction work of institute's permanent campus situated at Jersey Farm, Vithura is under progress and expenditure related to the same is shown under Schedule 4 (Fixed Assets) of the Balance Sheet. The expenditure on capital work-in-progress as at 31.03.2017 was of Rs.2,547,444,810/- out of which construction is Rs.2,187,851,704/- and uninstalled equipment procured during the period is Rs.359,593,106/-.



The NPS subscription recovered from employees and employer's contribution are remitted to NPS Trust Account regularly. The NPS Accounts are maintained by NSDL. Hence relevant schedule prescribed in the format are not applicable to the institute accounts.

GPF is not applicable to the institute employees. Hence GPF accounts schedule has not been prepared.

### **Other Additions**

As per the institute's policy, the overhead generated from the Externally Funded Projects have been segregated into four parts vis-à-vis, (i) 45% - income from overheads to institute, (ii) 5% - Staff Welfare Fund, (iii) 25% - School Department Fund and (iv) 25% - Project Investigator Fund. The said figures (ii) to (iv) have been depicted as other additions in Schedule 1 of Annual Accounts.