ANNUAL REPORT 2015-16

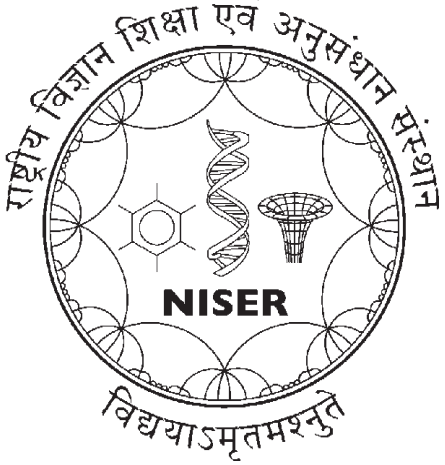
राष्ट्रीय विज्ञान शिक्षा एवं अनुसंधान संस्थान

NISER

विद्ययाऽमृतमश्नुते

NISER
BHUBANESWAR

Annual Report
2015-16



National Institute of Science Education and Research Bhubaneswar

(An Autonomous Institution Under Department of Atomic Energy, Govt. of India)

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Faculty-in-Charge Academic Affairs

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Dr. A. K. Naik
Registrar, NISER

From the Director's Desk

"There is no substitute under the heavens for productive labor. It is the process by which dreams become realities. It is the process by which idle visions become dynamic achievements."

-Gordon Hinckley

Another year has just passed by and a new one beckons. As we get wiser and older by a year and keeping in sight the dreams and promises of the years ahead, I take immense pleasure in presenting the annual report of National Institute of Science Education and Research (NISER) for the financial year 2015-16

2015-16 was a meaningful year in many ways. Among the major achievements during this year, the stand out one has been the movement to our permanent campus at Jatni and its subsequent dedication to the Nation by the Honourable Prime Minister ShriNarandraModi on 7th February 2016.It indeed was a great honour and pleasure in having the Prime Minister speak on the occasion as he spelt out his vision for Science education and urged our young scientists to focus on creating indigenous knowledge and socially meaningful technology for serving the nation.

I am extremely proud of the success stories scripted by our students that graduated in 2015.It feels great to note that our alumni have kept the NISER flag flying at some of the most sought after places all over the globe. Most of them are pursuing PhD programmes with fellowships from esteemed Universities and Institutes like University of Oxford, ETH Zürich, University of Illinois at Urbana-Champaign, University of Wisconsin-Madison, Texas A&M University, University of Michigan, RWTH Aachen University, University of British Columbia, Rice University, TIFR, IISc, IITs, etc. which reinforces the mandate that NISER is committed to create quality manpower for research in different areas of basic sciences.

The shifting to the permanent campus has brought along a new work environment and the entire NISER family is extremely upbeat about the days to come. Putting the constraints of the transit campus behind, all of us here are more enthusiastic about creating a better teaching-learning atmosphere than ever before. Facilities in the new campus include separate buildings for the schools of Physics, Chemistry, Mathematics, Biology and Humanities and Social Sciences. 130000 sqmtrs of residential space accommodating 11 hostels for boys and girls, faculty housing, staff quarters, auditorium, school, post office, hospital,

playground, a unique yoga centre on the hill top, etc. that have given the campus a holistic look. In addition to these, facilities for a green house, an animal house, rainwater harvesting, fire fighting, sewage water plants, etc. are also being put in place.

NISER has been extremely privileged to have the financial support from DAE to establish it in the forefront of research and development. Extramural funding bagged by our extremely talented faculty members isalso incredibly helping them in scores of research projects.A youthful profile of faculty members has created an enviable synergy that is contributing immensely to the Institution building. I take this opportunity to thank them for choosing to be here and applaud their relentless efforts in bagging academic fellowships and awards, publishing in high impact journals, being invited for talks, attending conferences, engaging in collaborative researchwith leading Universities across the globe, etc. Most notable among them this year was the prestigious Shanti SwarupBhatnagar Prize that was bestowed upon Prof. BedangadasMohanty of the School of Physical Sciences.

We at NISER firmly believe that innovative approaches and contribution to furthering the intellectual environment are the only keys to creating a niche in the global knowledge community. That in vision, we must relentlessly raise the bar and push ourselves to rise upto that. I am sure in the days to come, NISER's vision driven actions, quality of inputs and commitment from the entire NISER family will take it to greater heights of academic achievements. . NISER recognizes that modern scientific research is carried out in a domain transcending academic and intellectual boundaries. The students and research scholars are being nurtured in the ambiance of this scientific culture. We all have been tirelessly working towards this and will continue travelling the extra miles.

With the eternal words by Lao Tuz let me sum up our shared vision at NISER:

"Do the difficult things while they are easy and do the great things while they are small. A journey of a thousand miles must begin with a single step."

Last but not the least; I appreciate the efforts by the editorial team in bringing out this comprehensive Annual Report.

Prof. V Chandrasekhar
DIRECTOR

About NISER

National Institute of Science Education and Research (NISER) is envisioned to be a unique institution of its kind in India. NISER will strive to be recognized as a Centre of Excellence in science education and research in four basic sciences (Biology, Chemistry, Mathematics and Physics) and in related areas. The aim of this special institute is to nurture world class scientists for the country who will take up challenging research and teaching assignments in universities, R & D laboratories and various industries. The exemplary teaching and research attributes of its faculty will inspire strongly motivated bright young students to dedicate their lives for scientific research.

NISER has already shifted from its transit campus at Institute of Physics, Bhubaneswar to its permanent campus at Jatni, Khurda and the Institute has been dedicated to the nation by Honorable Prime Minister of India Shri Narendra Modi on February 07, 2016. The permanent campus has over 500 students spread over five batches of students admitted to the flagship MSc programme through NEST in Biology, Chemistry, Physics and Mathematics and Doctoral Programme in all Basic Sciences.

Academic Overview

The academic programme of NISER is designed to provide strong foundations to students through core courses, before they embark at the threshold of research in the field of their choice. Although there are four main school: Biology, Chemistry, Mathematics and Physics disciplines like Humanities and Social Sciences have already roped in and Computer Science, engineering sciences and earth and planetary sciences will also be included at appropriate stages.

Curriculum

The academic curriculum, including the structure of courses, laboratory hours, emphasis to study interdisciplinary subjects etc. are framed with a vision that NISER will provide strong foundations in subjects of specialization with a broad perspective in fundamental sciences.

School of Biological Sciences

The School of Biological Sciences aims to establish itself as a leading international centre for research and teaching with harmonious synthesis of classical and modern biology - always promoting scholarship, original thinking, innovative ideas and cutting edge research.

The school is on a mission

- To strive to become a centre of excellence in education and research in biological sciences providing training at undergraduate, graduate, doctoral and post-doctoral level.
- To provide effective interdisciplinary learning ambience through extensive subject coverage in all fields of modern biology and inter-phasing with other scientific disciplines.
- To equip its students to keep pace with recent developments in the field of scientific research.
- To undertake high quality research activities in defined areas of biosciences so as to make an impact at national and international level.
- To impart professional training for skilled human resource development across the state and country through short term training courses.
- To strive to develop state of the art infrastructure comparable to best anywhere in the world.

Facilities for Research and Teaching

- Confocal Microscope Facility
- DNA sequencing and Surface Plasmon Resonance Facility
- Micro-array facilities for Genomics

School of Chemical Sciences

Chemistry as a subject has considerable impact on our everyday lives and on other scientific disciplines. The aim of the School of Chemical Sciences at NISER is to impart high quality undergraduate and postgraduate level of knowledge to students coupled with cutting-edge research activity by the faculty and the students of the school. In addition to traditional organic, inorganic, physical and theoretical chemistry areas, the school embarks on teaching and research activity in the interface areas of Biology, Material Sciences and Medicine. The teaching philosophy at NISER is not only to impart high quality training to students to make them talented and motivated scientific personnel but also to inculcate human values and concern for societal needs and environment. The School of Chemistry offers one of the best integrated M.Sc. programme and the syllabus is designed not only to teach basic principles but also to have hands on practical experience by research projects as a part of the curriculum. The Ph.D. programme of School of Chemical Sciences has also been initiated since 2009. Currently, 65 integrated M.Sc. students and 6 Ph.D. students have been graduated so far from the School. The Integrated M.Sc. students are in BARC training school program, pursuing research in various institutes in India as well as abroad. The Ph. D. students are doing their postdoctoral research in abroad.

Research Facilities created in School.

- Completion of installation of 700 MHz Bruker high field NMR spectrometer fitted with cryogenically cooled probe, specially designed for bio-molecular research.
- DNA Oligo synthesizer
- GC Mass and ESI Mass Spectrometers
- Time-Resolved Fluorescence Spectrometers

Awards and Honours

Prof. T. K. Chandrashekar: SASTRA – CNR RAO Award for the Year 2016

School of Mathematical Science

The School of Mathematical Sciences (SMS) strives to become a citadel for mathematics and allied subjects in terms of teaching and research. The faculty of Mathematics has a strong penchant for acquiring and updating their knowledge and imparting it to the students. The undergraduate program in the school is carefully designed to train the students to acquire creative mind and analytical skills that are needed to pursue their career. SMS aspires to become the foremost center in the Ph.D. program in the forefront areas of Mathematics. In addition to formal courses and research, seminars are conducted regularly. In the seminars, outstanding mathematicians from throughout the world present their latest research findings in various fields of mathematics. SMS envisages to introduce strong curriculum in the fields of applied mathematics, financial mathematics and computer science so that students can take up prominent careers in financial/industrial establishments.

The Curriculum of the School

5-years Integrated M.Sc. Programme:

The curricula of SMS stresses interdependence and unified structure of science and at the same time emphasizes intensity of study in order to achieve a good understanding and skills in Mathematics. To fulfil this objective, a basic common core has been identified which constitutes the courses of the first two semesters. The courses on Mathematics in the 3rd semester onwards will focus on reading and understanding of mathematical proofs, emphasizing precise thinking and presentation of mathematical results both orally and in written form. The courses for the second and third year have been designed to provide an understanding of foundational level mathematics in the areas of logic, number theory, algebra, analysis, geometry, discrete mathematics and informatics. The students are encouraged to develop minor areas of interest in other streams of study by a system of open electives running up to the end of the sixth semester. The last four semesters have been reserved for advanced level courses and specialized courses. Provision has also been made for pursuing studies in special areas and writing an innovative project leading to a dissertation.

Ph.D. Progamme:

The aim and mission of the doctoral program in the School of Mathematical Sciences is to produce good and efficient scholars who will excel in acquiring and imparting good and deep knowledge in Mathematics. The program is carefully designed to understand mathematics both vertically and horizontally, that is, to obtain a fundamental understanding of basic fields of mathematics and a thorough state-of-the-art understanding of one major field of interest in which the student writes his thesis. Though the emphasis is placed on the abilities of the student recognizing significant research problems on their own and solving them, we create a sense of rapport between the students and the experts in the field, that is to say that an ambience is created for the students to have the excitement and stimulation on their own but at the same time with support and mentoring provided by the teachers.

The Ph.D. degree is generally a four year program culminating in an original piece of mathematical research for a thesis and eventual publications in good and scholarly journals. While the thesis is in a specific area, the coursework leading up to this is designed to provide breadth to prepare the students for successful careers in the academics. Besides, there are many opportunities for our students to enrich their

background in mathematics. Students are strongly encouraged to talk in the research seminars in the school, and to attend national/international conferences as well as regional meetings amply supported by NISER.

Facilities for Research and Teaching

- State-of-the-art Computing facility and a High Performance Computing Cluster for theoretical calculation.

Other Activity

- A Summer Outreach Program in Mathematics (SOPM) is organized by the school from 1st-12th June 2015."

School of Physical Sciences

The 5-year integrated Master of Science (M. Sc.) programme in Physics includes courses from core areas of physics such as Classical Mechanics, Quantum Mechanics, Electromagnetism, Statistical Mechanics and Mathematical Physics. In addition, elective courses based on upcoming areas in physical sciences are also offered for final and pre-final year students. Each semester of the programme includes one laboratory component where the students experimentally verify their theoretical understanding of concepts. For the pre-final year students, the laboratories offer state-of-the-art experimental facilities for addressing open-ended problems in physical sciences research. Final year of the programme includes one project course (depending on the expertise of the available faculty in the school) where the students learn about the various research methodologies and many aspects associated with carrying out active research in physics.

The Ph.D. students undergo one year of course work (spread over two semesters) which includes courses from the core-areas of physics such as Classical Mechanics, Quantum Mechanics, Electromagnetism, Statistical Mechanics, particle physics and condensed-matter physics.

The school offers the following broad areas in physics for carrying out research work leading to degree of Ph.D.

- High-energy physics (Theoretical) – String theory, Lattice Quantum Chromodynamics
- High-energy physics (Experimental) - Experiments at Large Hadron Collider (LHC), Switzerland
- Condensed-matter physics (Theoretical) – Electronic structure of matter, Colloids, Soft-condensed matter and statistical mechanics, density functional theory etc.
- Condensed-matter physics (Experimental) – Magnetism, superconductivity, low-temperature physics, semi-conductors and nano-fabrication, spectroscopy
- Ultra-cold atoms and Bose-Einstein condensation (Experimental)
- Photonics – Nonlinear optics, Laser Physics, Nano-photonics

Facilities for Research and Teaching

- Scanning Electron Microscope and Lithography
- Ultrafast Time-resolved Spectroscopy for quantum life measurements of molecular dynamics and Ultracold atoms and BEC facility using atom trapping by lasers
- Facility of Magnetic nanostructures and multilayers

School of Humanities and Social Sciences

Scientific temper can sustain and advance in a holistic environment. Creative thinking along with skill based expertise is essential for new age scientists. The School of Humanities and Social Sciences plays a crucial role in the NISER undergraduate programme. The purpose of Humanities and Social Sciences is to help students to identify a set of values which will help them exercise integrity, vision, community involvement, and knowledge of self. It also helps students equip themselves with strong communication skills, interpersonal and team building skills and apply the same in their respective profession. Students must understand the application of their discipline to contemporary issues, they must acquire strong communication and team-building skills, and they must understand the definitions of leadership, personal responsibility, and professionalism. The Humanities and Social Sciences curriculum provides students the opportunity to explore and master communication skills, critical thinking skills, innovative problem-solving skills, and other learning opportunities offered by the department. The school focuses on bridging the gap between society-science interfaces. The School of Humanities and Social Sciences (SHSS) is encompassing five specific areas of study. The school aims to become an innovative centre for research in the fields of English, Economics, Sociology, Philosophy and Psychology. With faculty drawn from diverse background and experience, it targets to be a thriving academic community, ensuring a fertile ground for true multi-disciplinary research, where academic programs are nationally recognized for high levels of quality and clear multi – disciplinary research.

The curricula of the school for the 5-year Integrated Program emphasize interdisciplinary and holistic approach to impart training and skills in humanities and social sciences. To achieve this objective, a set of core has been identified which constitutes the courses of the first two semesters, and one in each in third and forth semester. The curriculum generally begins with a two-course in communication skills, the purpose of which is to develop the required proficiency necessary to communicate, both orally and in writing, in their classes, in the workplace, and in community. Subsequent courses consist of introductory courses humanities and social science courses in sociology, psychology and economics that introduce students to the concepts of community, society, and self. In the third and fourth semester students are offered a variety of humanities and social science with an opportunity to select any two courses. Students are required to complete a minimum 16 credits. The electives are designed to provide advanced and applied knowledge in the areas of science communication, science, technology and society, organizational behaviour, urban planning, applied behavioural sciences, Indian society and social problems. This installs holistic vision and importance of responsible and sensitive global citizenship, through cultural self-reflection, ethical reasoning and historical understanding among the students.

The Ph.D programme aims to cultivate high quality research in various fields of English, Economics, Philosophy, Psychology and Sociology. Graduates of the programme are expected to design and execute original, high quality, interdisciplinary research that can be published in major scholarly journals and books of the profession. The Ph.D. degree is generally a four year program culminating in an original piece of humanities and social science research for a thesis and eventual publications in good and scholarly journals. The programme consists of both course Work and research work independently carried out by the student. While the thesis is in a specific area, the coursework leading up to this is designed to provide breadth to prepare the students for successful careers in the academics and industry. Students are expected to participate in the research seminars in the school, and to attend national/international conferences as well as regional meetings amply supported by NISER. Tata Institute of Social Sciences, Mumbai has recently conveyed approval to host NISER students for the Ph.D programme in Humanities and Social Sciences, which will host NISER students for Ph.D program in Humanities.

A report on Library

- Along with other department of NISER, Library is shifted from previous location in Institute of Physics (IOP) campus to the new location of institute in Jatni. Currently it is working in topmost floor of School of Chemical Sciences building and within a couple of months it will be shifted to the multistoried building mainly developed for it.

- The collection of library is described in following heading:

- Print books : 18000 (approx)
- Electronic books : 9000 (approx)
- Electronic Journals : 3500 (approx)
- Databases : 08
- CD/DVDs : 250 (approx)

- Books in different subjects such as biology, chemistry, humanities, mathematics, physics and interdisciplinary are acquired as per the requirement of institute. Research journals from reputed publishers of the world has been subscribed. Besides conventional journals multimedia publishers such as JoVE (Journal of Visual Experiments) has been acquired for NISER scientific community. As a member of DAE-Science Direct consortium, library community has access to all the journals published by Science Direct. Reputed databases such as Web of Science, SCOPUS, SCIFINDER has been subscribed by the library. VPN system is installed for remote access to the online resources.

- All the online resources are linked in library web site: http://www.niser.ac.in/library/

- Koha integrated library management software along with Radio Frequency Identification (RFID) system has been used for automation work, users can access online catalogue through intranet. Open source software is used to develop a repository for institute' scholarly literature.

- Library opens 365 days in a year. It has maintained an excellent environment for reading. Planning and monitoring work is managed through library advisory committee.

Faculty

School of Biological Sciences

Sl. No.	Name & Designation	Field of Specialization
1.	Dr. Abdur Rahaman Reader-F	Biochemistry
2.	Dr. Asima Bhattacharyya Reader- F	Physiology / Host-Pathogen Interaction, Cancer Biology
3.	Dr. Chandan Goswami Reader- F	Cell Biology
4.	Dr. Harapriya Mohapatra Reader-F	Microbiology
5.	Dr. Kishore CS Panigrahi Reader-F	Plant Biology
6.	Dr. Debasmita Pankaj Alone Reader-F	Human Genetics
7.	Dr. Manjusha Dixit Reader -F	Human Genetics
8.	Dr. Palok Aich Associate Professor	Systems Biology
9.	Dr. Pankaj Vidyadhar Alone Reader-F	Molecular Biology
10.	Dr. Praful Singru Reader-F (Chairperson)	Neurobiology
11.	Dr. Subhasis Chattopadhyay Reader-F	Immunology
12.	Dr. V Badireenath Konkimalla Reader-F	Bioinformatics
13.	Dr. Rudresh Acharya Reader-F	Macromolecular X-ray Crystallography, Structural Bilogy, De Novo Protein Design
14.	Dr. Tirumala Kumar Chowdary Reader-F	Structural Virology
15.	Dr. Ramanujam Srinivasan Reader-F	Bacterial Pathogenesis, Cytoskeletal Dynamics and Functions
16.	Dr. Renjith Mathew Reader-F	Cell Biology, Development Biology

School of Chemical Sciences

Sl. No.	Name & Designation	Field of Specialization
1.	Prof. V. Chandrasekhar Director	Synthetic Inorganic Chemistry
2.	Prof. T.K. Chandrashekar Sr. Professor	Inorganic Chemistry Bio-Inorganic Chemistry-Expanded porphyrin Chemistry
3.	Prof. A. Srinivasan Professor	Inorganic Chemistry Bio-Inorganic Chemistry-Pyrrole Based Receptors
4.	Dr. Arindam Ghosh Reader-F	Physical Chemistry Methodology development in NMR
5.	Dr. B.L. Bhargava Reader-F	Physical Chemistry Computational studies of Materials
6.	Dr. C.S. Purohit Reader-F	Organic Chemistry Bio-organic and Organic Synthesis
7.	Dr. C. Gunanathan Reader-F	Organic Chemistry Organomettallic Chemistry and Catalysis
8.	Dr. J.N. Behera Reader-F	Inorganic Chemistry Law temperature multiferroics from single source precursors and Porous Magnetic Materials
9.	Dr. M. Sarkar Reader-F (Chairperson)	Physical Chemistry Fluorescence Spectroscopy
10.	Dr. N.K. Sharma Reader-F	Inorganic Chemistry Bio-Organic and Organic Synthesis
11.	Dr. Prasenjit Mal Reader-F	Inorganic Chemistry Supramolecular chemistry and Photochemistry
12.	Dr. S. Peruncheralathan Reader-F	Organic Chemistry Synthetic Organic chemistry and Asymmetric Catalysis
13.	Dr. Sanjib Kar Reader-F	Inorganic Chemistry Bio-inorganic chemistry: Metals in Medicine
14.	Dr. Sharanappa Nembenna Reader-F	Inorganic Chemistry Main Group Organometallic chemistry and Low oxidation state metal chemistry
15.	Dr. Subhadeep Ghosh Reader-F	Physical Chemistry Single Molecule Spectroscopy, Molecular Dynamics

16.	Dr. Sudip Barman Reader-F	Physical Chemistry Synthesis and Functionalization of Graphene
17.	Dr. U. Lourderaj Reader-F	Physical Chemistry Theoretical and Computational Chemistry
18.	Dr. V. Krishnan Reader-F	Inorganic Chemistry Catalysis and Materials Synthesis
19.	Dr. Himansu Sekhar Biswal Reader-F	Laser Spectroscopy and Instrumentation
20.	Dr. P.C. Ravikumar Reader-F	Inorganic Chemistry

School of Mathematical Sciences

Sl. No.	Name & Designation	Field of Specialization
1.	Prof. Madumbai Seshachalu Narasimhan Honorary Fellow	Moduli of Vector Bundles, Partial Differential Equations, Mathematical Physics, Representation Theory
2.	Prof. V. Muruganandam Professor	Harmonic Analysis
3.	Dr. Anil Kumar Karn Associate Professor (Chairperson)	Theory of operator spaces
4.	Dr. Biond Kumar Sahoo Reader-F	Representations of Geometries
5.	Dr. Brundaban Sahu Reader-F	Number Theory
6	Dr. Deepak Kumar Dalai Reader-F	Cryptography
7	Dr. Kamal Lochan Patra Reader-F	Algebraic Graph Theory
8	Dr. Nabin Kumar Jana Assistant Professor	Probability Theory
9	Dr. Sanjay Parui Reader-F	Harmonic Analysis
10	Prof. Vellat Krishna Kumar Visiting Professor	Differential Geometry
11	Dr. Shyamal Krisha De Assistant Professor	Topology
12	Dr. Tanusree Khandai Visiting Faculty	Representation Theory

13	Dr. Manas Ranjan Sahoo Assistant Professor	Differential Equations
14	Dr. Jaban Meher Assistant Professor	Number Theory
15	Dr. Amit Tripathi Assistant Professor	Algebraic Geometry
16	Dr. Ashwin S. Pande Visiting Faculty	T-duality symmetry of Type II String Theory.
17	Dr. Sarath Sasi Visiting Faculty	Differential Equations

School of Physical Sciences

Sl. No.	Name & Designation	Field of Specialization
1.	Sir Christopher Llewellyn Smith Distinguished Professor	High Energy Physics and Fusion
2.	Prof. Ashoke Sen Honorary Fellow	String Theory
3.	Prof. Jnanadeva Maharana Adjunct Professor	String Theory
4.	Prof. Subhendra D. Mahanti	Theoretical Condensed Matter Physics
5.	Prof. Nu Xu Adjunct Professor	Experimental High Energy Physics
6.	Prof. Rupak Mahapatra Visiting Professor	Dark Matter
7.	Dr. Bedangadas Mohanty Associate Professor (Chairperson)	Experimental High Energy Physics
8.	Dr. Subhasis Basak Reader-F	HEP Theory: Lattice QCD
9.	Dr. Sanjay Kumar Swain Associate Professor	Experimental HEP: LHP Physics
10.	Dr. A.V. Anil Kumar Reader-F	Statistical Mechanics and Modeling of Soft Matter
11.	Dr. Ashok Mohapatra Reader-F	Ultra cold Atoms and Bose-Einstein Condensation
12.	Dr. Chethan N. Gowdigere Reader-F	String Theory
13.	Dr. Colin Benjamin Reader-F	Theoretical CMP and Quantum Information

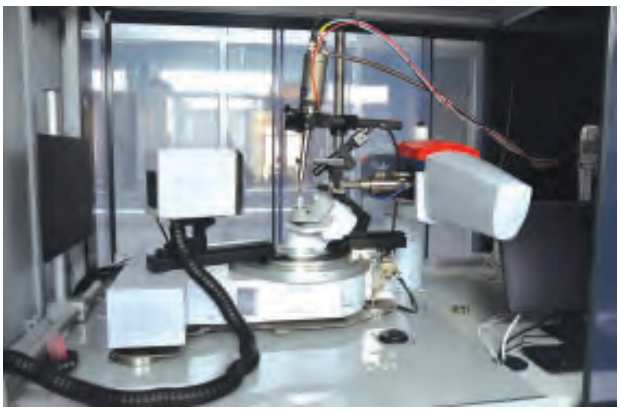
14.	Dr. Joydeep Bhattacharjee Reader-F	Computational Condensed Matter Physics
15.	Dr. Kartikeswar Senapati Reader-F	Experimental CMP
16.	Dr. Prasanjit Samal Reader-F	Theoretical CMP, Atomic and Molecular Physics
17.	Dr. Pratap Kumar Sahoo Reader-F	Nano fabrication and Ion/Photon matter interaction
18.	Dr. Prolay Kumar Mal Reader-F	Experimental High Energy Physics (Collider experiments)
19.	Dr. Ritwick Das Reader-F	Nonlinear optics, and Integrated Optics
20.	Dr. Subhankar Bedanta Reader-F	Experimental condensed matter physics (Nanomagnetism and multiferroics)
21.	Dr. Sumedha Reader-F	Special Mechanics and Interdisciplinary Applications
22.	Dr. Yogesh Kumar Srivastava Reader-F	String Theory
23.	Dr. V. Ravi Chandra Reader-F	Theoretical Condensed Matter Physics
24.	Dr. Nishikant Khandai Reader-F	Astrophysics and Cosmology
25.	Dr. Anamitra Mukherjee Reader-F	Condensed Matter Physics

School of Humanities and Social Sciences

Sl. No.	Name & Designation	Field of Specialization
1.	Dr. Pranay K. Swain Reader-F (Chairperson)	Public Policy and Governance, Science-Society Interface, Contemporary Social Issues
2.	Dr. Debashis Pattanaik Assistant Professor	Social Innovation, Social Network Analysis, Social Study of Sciences and Technology
3.	Dr. Rooplekha Khuntia Assistant Professor	Business Ethics, Ethical Cynicism, Organizational Behavior and Leadership
4.	Dr. Joe Varghese Yeldho Assistant Professor	Critical History and Narratives of Race
5.	Dr. Amarendra Das Assistant Professor	Natural Resource Management, Public Economics

Courses Offered

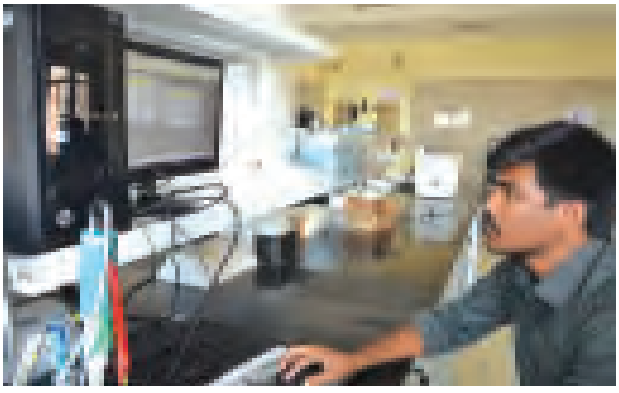
School of Biological Sciences



Biology I: Science of Life, Biology II: Cellular and Genetic basis of life, Biophysics and Biostat, Cell biology, Genetics, Ecology, Cell biology Laboratory, Genetics Laboratory, General course, Advance Molecular Biology, Advance Neurobiology, Cancer biology, Advanced Biochemistry, Biology Laboratory, Microbiology, Biochemistry, Biophysics and Biostat, Microbiology Laboratory, Biochemistry Laboratory , Physiology I (Animal Physiology) , Physiology II (Plant Physiology), Neurobiology, Physiology I (Animal Physiology) Lab, Physiology II (Plant Physiology) Lab, Principles of Drug design, Molecular genetics Infection and immunity, Cellular and Genetic Basis of Life, Cell Biology, Genetics, Ecology, Cell biology Laboratory, Genetics Laboratory, Molecular Biology, Immunology, Endocrinology, Plant Developmental Biology, Mol Biology Laboratory, Immunology Laboratory, Quantitative Biology, Biological techniques: Theory and practice.

School of Chemical Sciences

Theory: Chemistry I, Quantum Chemistry I, Physical Methods in Chemistry II, Nuclear Magnetic Resonance, Basic Inorganic Chemistry, Polymer



Chemistry, Advanced Organic Chemistry, Classics in Molecules, Physical Organic Chemistry, Organic Chemistry I, Organic Chemistry II, Organic Chemistry III, Supramolecular Chemistry, Organic Photochemistry, Advanced Bio-Organic Chemistry, Magnetism, Solid State Chemistry, Crystallography.

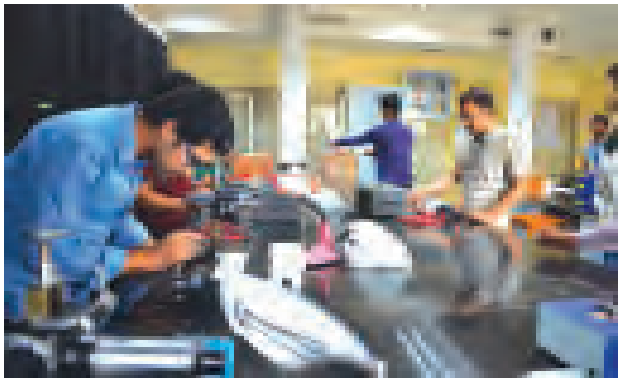
Laboratory: Chemistry Lab I, Chemistry Lab II, Chemistry Lab III, Physical Chemistry Lab -1, Biomolecular Lab, Electronics Lab, Inorganic Chemistry Lab

School of Mathematical Sciences

General Mathematics – I & II, Computation Laboratory – I & II, Analysis-I, Algebra-I (Group Theory), Discrete Mathematics, Analysis-II, Algebra-II (Linear Algebra), Probability Theory, Elementary Number Theory, Analysis-III, Algebra-III (Rings and Modules), Differential Equations, Topology, Analysis-IV (Calculus of Several Variables), Algebra-IV (Field Theory), Complex Analysis, Optimization Theory, Differential Geometry, Functional Analysis, Representation of Finite Groups, Measure Theory, Advanced PDE, Advanced Probability and Stochastic Process, Nonlinear Analysis, Commutative Algebra, Advanced Linear Algebra, Information and Coding Theory, Algebraic Topology, Operator Algebra, Harmonic Analysis.

School of Physical Sciences

Core: Mechanics and Thermodynamics, Electricity, Magnetism and Optics, Classical Mechanics, Mathematical Methods I, Electronics, Electromagnetism I, Mathematical Methods II, Quantum Mechanics I, Electromagnetism II, Statistical Mechanics, Quantum Mechanics II, Special relativity, Atoms, Molecules and Radiation, Introduction to Condensed Matter Physics, Nuclei and Particles



Electives: Classical Mechanics-II, Advanced Solid State Physics, Astronomy and Astrophysics, Computational Physics, Quantum Field Theory I, Quantum Optics, Particle Physics, Introduction to Phase-transition and Critical Phenomena, Plasma Physics and Magneto-hydrodynamics, Biophysics, Nonlinear optics and laser, Quantum Information, General Relativity and Cosmology, Soft Condensed matter, Applied Nuclear Physics, Many Body Physics, Quantum and Nano-Electronics, Nonlinear Physics, Chaos, Turbulence, Theory of Magnetism and Superconductivity, Density functional theory of atoms molecules and solids, Quantum Field Theory II.

School of Humanities and Social Sciences

Technical communication – I & II, Introduction to Psychology, Introduction to Sociology, Introduction to Economics, History of Science, Sociology of Science and Technology, Science Communication and Citizen, Organizational Behaviour, Applied Behavioural Science, Perspectives on Indian Society, Life and Community in the Urban World.

Academic Achievements and Research Overview

School of Biological Sciences

Systems Biology
(Palok Aich, Associate Professor)

Modern day world requires more work than play. While such demand puts us under various stressors (cause of stress) with the potential to perturb homeostasis, physiologically we try to restore normalcy by adjusting parameters of several physiological processes of a system. How we achieve the restoration, how are balancing acts performed among different physiological processes such as immunity, metabolism etc. are a few of the interests of my laboratory. My lab tries to develop methodologies to quantify psychological stress status of individuals, correlating stress with disease susceptibility (e.g. metabolic syndromes and infectious diseases) as well as how innate immunity can be primed to prevent against such diseases. For priming, we use mainly select probiotics and host defense peptides. We also try to enhance efficacy of these immune modulators by nanotechnology. In addition, we also attempt to understand how metagenome of gut microbiome regulates us. As we are more metagenomic than genomic, my main emphasis is to understand cross talk between host genome and metagenome of resident microbiomes under different conditions.

Our results are leading to an insight that correlation of genomic and metagenomic (especially for gut microbiota) properties of individuals could perhaps lead to a better understanding of physiology and perhaps better maintenance of health. We use a combination of experimental and theoretical methodologies to achieve our goals

Signaling systems in plants, Light perception, flowering time control, circadian rhythm and biological clock.
(Kishore CS Panigrahi, Reader-F)

As a living organism, plants are unique in many ways compared to animals. Like animals they also sense and perceive environmental stimuli and react to it. However, unlike animals they cannot run away from the unfavorable environmental conditions. They have also mechanisms that anticipate diurnal and seasonal changes that in turn are required for its reproductive fitness. Undoubtedly, they have evolved with amazingly intricate but well defined signaling networks tuned to suit its neighboring environment. We would like to explore these signaling networks in plants and would employ molecular, genetic, proteomic and cell-biological approaches. These researches would lead to identify possible regulators that would help the plant to withstand the effects of global warming and climate change. Furthermore, we will also explore some of the locally available medicinal plants and their extracts under the frame-work of chemical genetics. We wish to start with the following areas first and would expand our research interest with time and need.

1. Light signaling and flowering time control in plants

2. Plant response to stress. Proteomic and microarray profiling in different tissues and regions of a plant.

3. Screen for early or late photo-periodic flowering regulators influenced by the diurnal temperature differences.

Nuclear remodelling in Tetrahymena: Role of Dynamin related protein (Abdur Rahaman, Reader-F)

Nuclear remodelling is a universal process that occurs in all eukaryotes. It is relevant to human health, since a number of known human diseases are linked to nuclear remodelling. In spite of extensive research using higher eukaryotic systems, some basic questions related to nuclear remodeling remains unanswered. Specifically the mechanism of nuclear envelope expansion including the lipid addition to the nuclear envelope is not clearly understood. *Tetrahymena* undergoes closed mitosis and nuclear envelope expands ~10 folds during specific stages in cell conjugation. My group is interested on nuclear remodelling in *Tetrahymena*, specifically understanding the mechanism and cell cycle regulation of nuclear envelope expansion. Gene manipulation, generation of knockouts, maintenance of lethal alleles and i*n vivo* structurefunction analysis are easily achieved in *Tetrahymena*. This makes it a suitable model organism to study nuclear remodeling.

Cell biology of pain (Chandan Goswami, Reader-F)

TRP channels at the peripheral neurons act as "pain receptors" and are sensitive to stimuli like low pH, high temperature, noxious compounds, immune system and psychological state. In most cases, the pain is "acute" and thus decays fast if not vanishes in absence of these stimuli. However, in case of long-lasting chronic pain, there is no effective medical treatment. The factors involved in the development of chronic pain remain unclear. The chronic pain can be partially explained by the permanent changes in the neuronal signaling events and by alternate neuronal connections. Understanding of different molecules, cellular components like mitochondria and cytoskeleton as well as their complex regulation in the context of pain chronification is the main focus of this lab.

Molecular and Cellular Targets of Anesthesia and Anesthesia-induced Neurotoxicity; Role of small GTPases in Development and Disease (Debasmita Pankaj Alone, Reader-F)

Understanding molecular mechanisms that lead to a clinical state of "Anesthesia" has been a struggle for anesthesiologists, physiologists, biochemists and behavioral biologists for a very long time now. Upon exposure to anesthetic agents the subject feels no pain, loses short term memory and remains unconscious. The required high concentrations of these drugs both influences the fluidity of the lipids and acts on proteins such as ion channels and receptors e.g. GABA, Glutamate receptors, voltage gated and leak channels. My research aims to contribute by uncovering novel molecular targets of general anesthetics using molecular genetics in *Drosophila melanogaster*. Another major thrust would be to develop a fly model for understanding any neurotoxicity possibly associated with exposure to general anesthetics. This would also help establish the validity of conflicting opinions about influence of anesthetics on progression of neurodegenerative diseases i.e. actions of anesthesia are completely reversible *versus* increasing evidence that they might lead to irreversible changes by inducing apoptosis in the CNS. Possible outputs would involve developing new behavioral methodologies and employing various genetic, anatomical and behavioral assays to screen for neurotoxicity associated not only with general

anesthetics but also with various other drugs and chemicals.

Microbial genome dynamics and plasticity, antibiotic resistance genes and mobile genetic elements
(Harapriya Mohapatra, Reader-F)

My areas of research interests basically revolves around comparative genomic analysis of commensal and pathogenic bacteria. As antibiotic resistance has manifested itself as a serious public health problem all over the world. Complexity of the problem escalates manifold in developing countries due to numerous interlinked socio-economic factors. One of the projects aims at understanding the transmission dynamics of microbial resistome. Moreover, in nature seldom do bacteria exists in solitaire. It is increasingly evident that majority of pathogenic bacteria are derived from commensals that have acquired genes from foreign source. The second area of my research interest involves studying the evolution of pathogenic bacteria from their non-pathogenic counterpart.

Angiogenesis regulation, Genetics of Muscular Dystrophy, Genetics of coronary artery disease, gallstone disease and diabetes mellitus (Manjusha Dixit, Reader-F)

To delineate molecular mechanism contributing to the pathological changes in Facioscapulohumeral Muscular Dystrophy and to establish therapeutic regimes, role of Pitx1 in FSHD was determined. To test the hypothesis that up-regulation of Pitx1 contributes to the pathological changes in FSHD, *DUX* vectors and *Pitx1* promoter fragment were cotransfected in C2C12 cells. Luciferase assay identified that *PITX1* is direct transcriptional target of DUX4. Site directed mutagenesis of *Pitx1* promoter fragment reduced luciferase activity significantly when cotransfected with DUX vector. Electrophoretic mobility shift assay further confirmed interaction between DUX4 and *Pitx1*. Also conditional muscle specific *Pitx1* transgenic mouse line was developed, which can be animal model for FSHD.

Interdisciplinary approaches towards rational drug design and molecular medicine; Chemo/ Pharmacogenomic profiling of traditional medicine and natural products
(K. V. S. Badireenath, Reader-F)

Interdisciplinary approaches in the area of rational drug design and molecular medicine is the need of hour to drive high-throughput drug discovery. An increased understanding of molecular principles of protein-ligand interactions indeed enabled drug design and discovery in a big way by thoroughly indexing data from various computational and experimental methods. The quality of hit compounds from virtual screening can be adequately increased based on the understanding the structure activity relationship of any drug using different data-mining strategies. Ultimately, the goal of applying such methods would yield reliable hit compounds which can be further validated in lab conditions.

Molecular mechanisms of eukaryotic translation initiation
(Pankaj Vidyadhar Alone, Reader-F)

Protein biosynthesis is an important step in the life cycle of cells where genetic information is converted into functional protein information. Selection of an open reading frame is a key function of the translation initiation apparatus and a key regulatory step, which controls geneexpression. My research interests are to understand a) Mechanism of start codon recognition & translation fidelity. b) Translational control in molecular medicine and regulation of protein biosynthesis. c) Architecture of translation apparatus, molecular interactions and supra molecular assembly of translation initiation complex. I am using

a range of genetic, biochemical and biophysical techniques in the yeast model system.

Cellular mechanism of immune-regulation and its translational use in immuno-therapy (Subhasis Chattopadhyay, Reader-F)

Immune system is accountable for combating infectious diseases and cancer, in allergy, autoimmunity and immunopathology. The cellular, molecular and organismal levels to understand development, function, and regulation of the immune system from the most fundamental mechanisms to therapeutic applications are the major interests of Immunology Research. We would like to study immuno-regulatory T cells (Treg) and Toll like Receptor. (TLR) response in cancers, infectious diseases and inflammatory responses to regulate the immunogenic T cell response and designing the cellular inhibitors of Tregs so that immunosuppressive Tregs in tumor and infectious diseases can be regulated. Research in animal model and also with the human blood samples from normal donors and patients with due consents and National guide lines are the prime candidates for such experimental studies.Such understanding will help us towards designing vaccine strategies to control various diseases.

Structural Biology of membrane and water soluble proteins, de novo protein design, and structure based drug design (Rudresh Acharya, Reader-F)

Our research focuses on structural biology of membrane, and soluble proteins. We use X-ray crystallography as a tool to elucidate the structures of proteins. We are interested in elucidating structures viroporins. The channel structure provides insights into molecular mechanism for channel activity, and also aid in desiging antiviral drugs. Our interest is also to determine the structures of TM domain of bacterial histidine kinase sensors (HKs) to decipher the molecular mechanism for signal transduction across the membrane. This understanding is essential in general, and critical for pharmaceutically relevant therapeutic targets. Our research also focuses on understanding helix-helix interactions in membrane proteins with respect to dynamics, stability and structure-function correleations. The knowledge based parameters will be put into test by computational protein design of transmembrane proteins and characterization by various biophysical experiments. We are also open to widen our interests on the other systems.

Structural Virology (Tirumala Kumar Chowdary, Assistant Professor)

We are interested in biology of emerging infectious viruses, with emphasis on viral entry into host cell and virus-host protein interactions. We use molecular virology, structural biology, biophysical and biochemical techniques to study viral cell-entry machinery and its interactions with cellular receptor(s). Broad goal of our research is to develop knowledge for novel therapeutic strategies that prevent viral entry, and hence infection.

Neural circuits and neuroendocrine regulation (Praful S. Singru, Reader-F)

We have been interested in studying the complexity of neural circuitries, the multisynaptic pathways, and the neuroactive substances involved in the regulation of feeding, energy balance, reward and neuropsychiatric disorders. We are also exploring the neural pathways and interaction of neurotransmitters in the preoptic area and hypothalamus which links reproduction with energy status, and governs the neuroendocrine regulation of seasonal reproductive cycle and reproductive behavior.

Research Publications:

Publications

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4. Rath S, Das L, Kokate SB, Pratheek BM, Chattopadhyay S, Goswami C, Chattopadhyay R, Crowe SE, Bhattacharyya A. (2015) Regulation of Noxa-mediated apoptosis in Helicobacter pylori-infected gastric epithelial cells. FASEB J.3, 796-806

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6. Majhi RK, Sahoo SS, Yadav M, Pratheek BM, Chattopadhyay S, Goswami C. (2015) Functional expression of TRPV channels in T cells and their implications in immune regulation. FEBS J. 282, 2661-81

7. Mishra P, Panigrahi KC. (2015) GIGANTEA - an emerging story. Front Plant Sci. 6, 8

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11. Ghosh S. (2015) Sialic acids: biomarkers in endocrinal cancers. Glycoconj J. 32, 79-85

12. Ankit Tiwari A, Reddy GC, Dixit M, Sharma N. (2015) Methylene Salicylicacidyl Hexamer (MSH) has DNAse Activity. Applied Biochemistry and Biotechnology. 76, 1791-800

13. Majhi RK, Saha S, Kumar A,Ghosh A, Swain N, Goswami L, Mohapatra PP, Maity A, Sahoo V, Kumar A, Goswami C. (2015) Expression of temperature-sensitive ion channel TRPM8 in sperm cells correlates with vertebrate evolution. PeerJ. 3:e1310

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Risk factors associated with the development of non-alcoholic fatty liver disease in Indians: A case control study. Journal of Clinical and Experimental Hepatology 5, 295-302

15. Priyadarshini S and Aich P. (2015) Understanding effects of Psychological Stress on physiology and disease through human stressome - An integral algorithm. Current Bioinformatics 11(2), 277-290

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18. Sarid-Krebs L, Panigrahi KC, Fabio F, Yasuyuki T, Ryosuke H, Seonghoe J, Vicky T, Valverde F; Coupland G (2015) Phosphorylation of CONSTANS and its COP1-dependent degradation during photoperiodic flowering of Arabidopsis. Plant J. 84, 451-63

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21. Tripathy R, Mishra D, Konkimalla VB. (2015) A novel fuzzy C-means approach for uncovering cholesterol consensus motif from human G-protein coupled receptors (GPCR). Karbala International Journal of Modern Science. 1, 212-224

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Conferences/Seminars/Colloquium etc. organised by the School

- Second meeting of the India sub-continental Branch of the International Neuropeptide Society, Dec. 13-14, 2015.
- International workshop-cum-conference on applications of systems and mathematical biology in the areas of stress, microbiome and probiotics (ASMB-SGMP), March 6-13, 2016.
- 3rd Biennial PAi Conference & International Symposium on Stress, Microbiome & Probiotics, March 11-13, 2016.

Colloquia

- Prof. J. Gowrishankar, Director, CDFD,

Hyderabad. April 2015. Title: On the Method of Science, Darwinian Evolution, and the Central Dogma

Awards/recognition received during the year

- Dr. Praful Singru was selected as a Member, Executive Council; Society for Evolutionary and Integrative Biology (SEIB), India. 2014-15
- Dr. Debasmita Alone was elected as a member; Executive Council (2015-2017) of All India Society for Cell Biology, India
- Dr. Chandan Goswami has been selected as editorial member (2015) for PeerJ.
- Dr. Kishore C Panigrahi has been selected as editorial member for "Frontiers in Bioscience"

Research Facilities created in the School

- Animal house transit facility (for Mouse, rat and Zebra Finch)
- Animal cell culture facility
- Green house and Phytotron facility for plant development research
- Fly facility
- Microbial facility
- Imaging facility
- Proteomics and genomics and drug discovery facility
- Flow cytometry facility
- Crystalization and X-ray diffraction facility
- Low-temperature storage facility
- Computational facility

Any other information which think worthy to be published in Annual Report

- A NEW PASSAGE TO INDIA, Between Dr. K.C. Panigrahi, SBS NISER and Prof. Klaus Palme of Albert Ludwigs University, Frieburg. Funded by DAAD, GERMANY.
- Mr. Ashutosh Kumar received "Oral Presentation Award" in YUVA ISAR Conference held by Indian Society for Assisted Reproduction from 8th-9th August 2015
- Mr. Arijit Ghosh (MSc student in SBS) received "Second poster award" in "1st International Conference on Translational Research: From Basic Science to Clinical Application", at KIIT University, Bhubaneswar, India". 5-7th February, 2015

Placement of graduating students in the Department (Batch - 2010-15)

Sr.	Name	Designation	Current designation and affiliation
1.	Saurabh Ratiram Patil	PhD Scholar	NCBS, Bangalore
2.	Anurag Priyadarshi	PhD Scholar	IIT Guahati
3.	Aditya Prasad Naik	PhD Scholar	European Synchrotron Radiation facility, Grenoble, France
4.	Bharath Merugu Shiva	PhD Scholar	Shanghai-Jio Tong University, Shanghai, China
5.	Ruchishree Konhar	JRF	NEHU, Shilong
6.	Ansuman Sahoo	CSIR NET (LS)	NYU, Buffallo, USA
7	Krushna Chandra Murmu	NET-LS	JRF at ILS, Bhubaneswar
8	Aditya Anand		PhD in ILS Bhubaneswar

School of Chemical Sciences

Prof. V Chandrasekhar, Professor

Prior to joining NISER as Director in January 2014, Prof. Chandrasekhar worked at the Tata Institute of Fundamental Research, Centre for Interdisciplinary Sciences, Hyderabad as a Senior Professor and Dean (2012-14) and at IIT Kanpur at the head of the Department of Chemistry and Dean of Faculty Affairs. His current research interests are in the area of molecular materials, main-group- and organometallic chemistry. He is the recipient of several national and international awards including the Shanti Swarup Bhatnagar Award, the Friedrich-Wilhelm Bessel Award, and the national J. C. Bose Fellowship. He is a fellow of all the academies of sciences in India as well as the academy of sciences of the developing world, Trieste, Italy.

Prof. T. K. Chandrashekar, Sr. Professor

Our research activities are centered on synthesis and application of tetrapyrrole pigments and related macrocycles. Mainly focuses on; (1) To understand such macrocycles in the biological world; (2) Structure – Function correlations; (3) To find out their potential applications as Non-liner Optical materials, Photodynamic therapeutic drugs and receptor properties and (4) Use as versatile catalysts for many industrial inorganic reactions.

Prof. A. Srinivasan, Professor

Pyrrole Based Receptor Materials. Our research interests are: (1) synthesis of various metallocenyl incorporated calixpyrrole and calixphyrin – normal and expanded derivatives, structural analysis and receptor properties; (2) Calixbenzophyrins with Aggregation Induced Enhanced Emission Characteristics and applications as Hg(II) chemosensor; (3) Synthesis and structural analysis of normal, expanded and contracted porphyrinoids; (4) N-confused porphyrinoids – as Sensitizer for Photodynamic therapeutic applications and (5) Metal assisted macrocyclic synthesis.

Dr. Sanjib Kar, Reader F

Transition metal complexes are important in catalysis, materials synthesis, photochemistry, and biological systems. Display diverse chemical, optical and magnetic properties. In that context we are exploring the synthesis, structural characterization, spectroscopic properties (Raman, IR, NMR), electrochemistry, magnetic properties and chemical reactions of novel transition metal complexes.

To design and synthesis of newer classes of iron and manganese complexes incorporating selective combination of porphyrin and corrole ligand functionalities in order to achieve synthesis of the relevant iron and manganese complexes whose oxidation levels, electronic properties and mode of reactivity can be tuned by selective introduction of suitable donor or acceptor groups in the porphyrin/corrole frameworks. We will analyze *the use of high-valent iron and manganese complexes of corrole and porphyrin*in atom transfer and dioxygen evolving*catalysis*. Study of transition metal complexes of corrole and porphyrin will lead to discovery of excellent catalysts, in terms of stability and efficiency, for a variety of synthetic reactions. We will also investigate the efficacy of these complexes to intervene tumor growth. Preliminary study indicates that the proposed compounds indeed is able to induce apoptosis in vitro, an elaborate investigation is warranted to fully understand their mechanism of action and also the effectiveness in suppressing the tumor in vivo. Thus the present work will have a great translational importance in therapeutic intervention of tumor.

Water oxidation catalyzed at the oxygen-evolving center (OEC) in photosynthesis is one of the most

important and fundamental chemical processes in nature. A manganese cluster consisted by four manganese ions in higher plants plays an important role as a catalyst for water oxidation and oxygen evolution. It is our aim to establish artificial OEC models not only for understanding and simulating the photosynthetic OEC, but also to construct artificial photosynthesis, which is attracting a great deal of interest to convert solar energy into fuels.

The enzyme family cytochrome P-450 (cytochrome P-450s are oxidation enzymes, which bear a thiolate group as an axial ligand and catalyze the oxidation of organic substances by oxygen activation) catalyzes the incorporation of one oxygen atom from O_2 into a variety of organic substrates. We prepare chemical models (metal porphyrin) of cytochrome P-450 for catalytic oxygenation of olefins and hydrocarbons.

Dr. Arindam Ghosh, Reader-F

Our group works on method developments in the field of small molecules as well as large bio-molecules, digital signal processing techniques applicable to spectroscopy. Currently we are working on four different projects. The first aims at investigating, both theoretically and experimentally, the noise profiling of different rapid data acquisition techniques. The second project try to find solution against some of the fundamental challenges of NMR such as background noise, overlapping of signals, presence of undesired signals etc using digital signal processing techniques. The third project focuses on developing a MATLAB based programming package which will both simulate NMR spectra and help in product operator formalism at the same time. In addition we also work on NMR metabonomics and method developments associated with it.

Dr. B. L. Bhargava, Reader-F

Molecular simulations provide insights into the structure and dynamics of a system at atomic level helping to understand the system from a microscopic perspective. Using molecular simulations, it is possible to carry out controlled (virtual) experiments at extreme conditions without the safety issues involved in carrying out the actual experiments. We use ab initio methods, and empirical potential based molecular dynamics and Monte Carlo techniques to study condensed phases of materials. We explore the structural and dynamical properties of materials that are of potential use. For systems exhibiting aggregation behavior beyond the length scales accessible to the atomistic simulations, coarse grained MD simulations are used. Biological systems such as proteins and lipids are also be studied using molecular dynamics.

Dr. Chandra Shekhar Purohit, Reader-F

Peptide Nucleic Acid as a Tool for Sequence Specific DNA Cleavage. The manipulation of DNA serves as a tool for genetic engineering and DNA nanotechnology. It can even be possible to use these tools in cancer therapy for these following reasons. Cancer is caused by unregulated cell division in the tissue. One of the chemotherapy approaches for its cure is to damage the DNA, thereby stopping the cell to divide further which leads to apoptosis of the cell. *cis*-Platin is one of the chemical agent used to treat cancer. The function of *cis*-Platin is to cross linking two DNA strands, thereby stopping the cell division. Another way of stopping cell division is to damage the DNA which cannot be repaired by the cellular mechanism. Single nick on the DNA by cleaving phosphate bond is usually repaired by the enzymes. However, a second damage around the damaged site is hard to repair and leads to apoptosis. Because of possible chemotherapy agents and other uses in biotechnology, there has been a lot of interest in preparing molecules and metal complex that cleave DNA. The major disadvantage with these molecules is their non-sequence specific cleavage of DNA. Therefore, new chemical agents are required which can cleave DNA with sequence specificity. In principle, this is possible if these molecules will have

two components. One, which targets the DNA sequence specifically, and binds to it and a second component, cleaves the DNA at that position. This strategy will be used to synthesize few molecules and study their properties during the project execution.

Dr. C. Gunanathan, Reader-F

Chemistry of Pincer Complexes: Developing Sustainable Catalytic Processes. Sustainable development is accepted as an essential goal for achieving societal, economic and environmental objectives. Chemists have a prominent role to play for such a development by devising new environmentally benign methodologies. Discovery of new reactions to make advanced synthetic intermediates and target molecules in minimal steps also could save time, investment and minimize chemical waste.

Chemistry of Pincer Complexes is an important and rapidly growing discipline in Science. The focus of our research is centered on developing new pincer complexes and their applications as catalysts for synthesis, bond activations, and activation of small molecules. Hence, our group opens up a research discipline that focus on the fundamental studies of design and synthesis of new pincer complexes, and their organometallic chemistry with the perspective of developing efficient and green catalytic transformations through new discoveries. We also plan to foray into multi-component reactions and development of new lanthanide complexes for catalysis.

Dr. Jogendra Nath Behera, Reader-F

There is a considerable interest in multimetallic oxides incorporating heavy main group (lead and bismuth) and transition metals because of their attractive properties, such as ferro- and piezoelectricity, multiferroism, catalysis, and superconductivity. However, the preparation of lead-containing mixed oxides by traditional high-temperature solid state synthesis is often difficult to control because of the volatility of PbO. It is well-known that some heterometallic coordination complexes with suitable ligands can be used as single-source precursors (SSPs) to obtain crystalline oxide materials upon their decomposition at significantly lower temperatures compared with the solid state or multisource precursor approaches. The most common application of metal â-diketonates as precursors for the metals and metal oxides is based on their high volatility and clean, low-temperature decomposition pattern. To understand the importance of lead-containing transition hetero-bimetallic oxides, we are synthesizingc respective hetero-bimetallilc diketonates as single source precursors by both solution and solid-state methods.

While metal-organic frameworks have shown much promise and potential in interactions with small molecules (i.e; gas adsorption, etc), few studies report electronic or ionic conductivity in such porous compounds. To induce electronic conductivity, we will develop new frameworks with select metal cations and ligands to enhance electron transfer throughout the framework.

The most remarkable characteristic of MOFs relevant to catalysis, which makes them unique, is the lack of non-accessible bulk volume and thus, the mass transport in the pore is not hindered. Secondly, different strategies can be applied to introduce catalytically-active sites to facilitate the reaction inside MOFs. One approach is to utilize the metal-connecting points which coordination environments is saturated with coordinated water or other solvent molecules that can be easily removed without destroying the parent framework In another approach, the catalytic sites are incorporated directly into the bridging ligands used for the construction of MOFs. Importantly, the MOFs allow thedesired incorporation of catalytic sites in the controlled fashion, oriented towards the pore interiorand specifically organic-

grafting, therefore, can offer unique applications in heterogeneous catalysis.

Dr. Moloy Sarkar, Reader-F

We are mainly interested in the photophysical behavior of electron donor-acceptor (EDA) molecules in both conventional solvents and in room temperature ionic liquids. We are interested to study important photo-processes such as electron transfer, proton transfer reactions etc. of different EDA molecules by examining the spectral and temporal behavior of the systems using steady state and time-resolved absorption and fluorescence techniques.

Dr. Nagendra K. Sharma, Reader-F

Specialization in Bio-organic chemistryand dealing with following research area, Design, Chemical Synthesis and biological evaluation of Nucleic Acid & Peptide analogues, Synthesis of Inhibitors, to study the DNA/Protein and protein/protein Interaction *in vitro,* Mechanistic studies of Isoprenoids Enzymes and biosynthesis of natural products

Dr. Prasenjit Mal, Reader-F

Ion sensing, particularly as it could be applied to the emerging area of nano-technology and in parallel provide a platform to the drug-discovery, is a key area in which scientific and technological progress may be translated into economic growth. Prasenjit Mal has developed several new concepts in supramolecular chemistry while working in Prof. Michael Schmittel's laboratory at University of Siegen (Germany) as a Humboldt fellow, in Dr. Jonathan R. Nitschke's laboratory at University of Cambridge and also at NISER Bhubaneswar and so has proved his abilities in this related domain i.e., development of transition metal ion sensor (submitted). In next few years, he is going to work in an area where the major focus will be to develop ratiometric fluorescent probes for monitoring transition metal ion triggered cellular uptake of bioactive molecules. Cellular delivery of bioactive molecules by passive diffusion is usually restricted to small nonpolar molecules, while large or polar/ charged compounds are not membrane permeable unless actively transported to the interior of the cell by specific mechanisms (e.g. endocytosis). Beside the general challenge of effective cellular delivery, accumulation of a drug (or diagnostic agent) at its target site is a central aim of modern delivery techniques to make products more effective and selective and, as a result, safer. In general, fluorescence-based probes provide highly sensitive or accurate informationthat are suitable for the visualization of trace metal ions in biological environments. Specific requirements in terms of probe design will be taken into account for terpyridine/phenanthroline metal binding unit and proper functionalization of the probe for conjugation to other molecules. The terpyridine chelating unit is known to be an efficient binder for transition metal like Zn(II) or Fe(II), and also the phenanthroline unit can easily accommodate Cr(III) . The project includes organic synthesis, photophysical characterization and probe application to live cells using fluorescence microscopy. Thus, successful execution of the proposed idea would lead both to the introduction of new tools into the toolkit of chemical biology, in addition to preparation of new materials that might be of potential use for are of medicinal chemistry.

Dr. S. Peruncheralathan, Reader-F

Over the decades chemistry has changed the way from alchemy to nanoworld. However, one facet remains constant; that's the ability to create molecules in a stereo and regio controlled manner. In this regards, synthetic chemists play a vital role in assembling molecules by using different strategies. Among them, the use of catalysis to promote organic transformations is a key tool. Our research focuses on developing new catalytic approaches for synthesizing fine chemicals and enantiopure target molecules those are having unexplored physical and biological properties.

We are interested in engaging our research activities in the following areas: Enantioselective Organocatalysis, Metal-Mediated Molecular Synthesis

Dr. Sharanappa Nembenna, Reader-F

Main Group Organometallic and Synthetic Inorganic Chemistry. Development of new ligand systems, Synthesis and characterization of main group metal complexes, Metal complexes with metal-metal bonds, Synthesis of low oxidation state metal complexes

Dr. Sudip Barman, Reader-F

Graphene is new allotrope of carbon, a 'thinnest material in the world'. It is two-dimensional sheet of sp^2 hybridized carbon. In spite of profound interest and continuing experimental success by experimental scientists, widespread implementation of graphene has yet to occur. Just like other newly discovered carbon allotrope (Carbon nano tube, Flulerene) material synthesis and processibility have been the rate-limiting steps in evaluation of graphene application. The outstanding electrical and mechanical and chemical properties of graphene make it attractive element for application in electronics. However, efforts to make patterned conducting graphene have been hampered by the lack of specialist methods for electrical modification of graphene for its application. One of the main interests of my work is to develop new synthetic route for large scale production of graphene. The functionalization of graphene will be done by using well-known chemical reactions.

Dr. V. Krishnan, Reader-F

The chemistry in my group will be interdisciplinary which includes inorganic, polymer and organic. My research focuses on the development of new synthetic routes for application in catalysis, and materials chemistry and fall into the following general areas viz., cooperative catalysts for CO_2 fixation, chiral counterions, hybrid inorganic-organic materials.

Dr. P.C. Ravikumar, Reader -F

He did his PhD from IISc Bangalore under the guidance of Prof. A. Srikrishna in the field of total synthesis of natural products. Subsequently after completing his PhD he moved to Duquesne University, Pittsburgh USA in the group of Prof. Fraser Fleming as a postdoctoral associate in 2007. He then moved to Yale University in the group of Prof. Seth Herzon in 2009. For a short period he worked as adjunct faculty in Duquesne University. In 2010 he returned back to India and joined as assistant professor at I.I.T. Mandi. In December 2015 he moved to NISER Bhubaneswar as Reader F, currently he is setting up his research lab in the school of chemical sciences and planning to work on the area of developing new CH activation methodologies and its application to synthesis of natural product targets.

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59. K. Dhanunjayarao, V. Mukundam, Krishnan Venkatasubbaiah* Ratiometric sensing of fluoride anion through selective cleavage of Si-O bond, Sens. Actuators, B.2016, 232, 175 – 180.

60. W. Sinha, M. G. Sommer, M. v. d. Meer, S. Plebst, B. Sarkar,* and SanjibKar* Structural, Electrochemical and Spectroelectrochemical Study on the Geometric and Electronic Structures of [(*corrolato*)AuIII]n (n = 0, +1, "1) ComplexesDalton Trans. 2016, 45,2914-2923

61. W. Sinha,L. Ravotto, P. Ceroni* and Sanjib Kar.*NIR-Emissive Iridium(III) Corrole Complexes as Efficient Singlet Oxygen Sensitizers. Dalton Trans,2015, 44, 17767-17773.

62. Sinha, W.; Sommer, M. G.; Deibel, N.; Ehret, F.; Bauer, M.; Sarkar, B.*;SanjibKar* Experimental and Theoretical Investigations for the Existence of Cu(II), Cu(III) and Cu(IV) in Copper-Corrolato Complexes. Angew. Chem. Int. Ed. 2015, 54,

13769–13774; Angew. Chem.2015, 127, 13973–13978 (HOT PAPER).

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64. Mal, S. K.; Mitra, M.; Purohit, C. S.; Ghosh, R., A trimetallic zinc (II) complex and its catecholase activity. Polyhedron 2015,101, 191-195;

65. Mal, S. K.; Mitra, M.; Yadav, H. R.; Purohit, C. S.; Choudhury, A. R.; Ghosh, R., Synthesis, crystal structure and catecholate activity of a vanadium(V) Schiff base complex. Polyhedron 2016,111, 118-122;

66. Nayak, S.; Mishra, S. K.; Bhakta, S.; Panda, P.; Baral, N.; Mohapatra, S.; Purohit, C. S.; Satha, P., Green Synthesis of Spirooxindole-pyrrolidine/ Piperidine Fused Nitrochromane: One Pot Three Component Stereo and Regioselective Cycloaddition. Lett. Org. Chem. 2016,13 (1), 11-21

67. Teja Illa, G.; Satha, P.; Purohit, C. S., Consecutive introduction of Ag(I) to an anionic homoleptic Co(III) complex: variable Ag(I) coordination mode. CrystEngComm 2016, 18 (29), 5512-5518.

68. M. Kr. Barman, A. K. Sinha and S. Nembenna* an efficient and recyclable thiourea-supported copper (I) chloride catalyst for azide–alkyne cycloaddition reactions Green Chem., 2016, 18, 2534-2541.

69. M. Kr. Barman and S. Nembenna* Mixed guanidinato-amido Ge (IV) and Sn (IV) complexes with Ge=E (E = S, Se) double bond and SnS4, Sn2Se2 rings RSC Adv. 2016, 6, 338-345.

70. A. Baishya. L. Kumar, M. Kr. Barman, T. Peddarao, and S. Nembenna* Air Stable N-Heterocyclic Carbene-Carbodiimide ("NHC-CDI") Adducts: Zwitterionic Type Bulky Amidinates ChemistrySelect 2016, 3, 498-503.

71. A. Baishya. T. Peddarao, M. Kr. Barman, and S. Nembenna* Catalyst free C–N bond formation by the reaction of amines with diimides: bulky guanidines New J. Chem. 2015, 39, 7503-7510.

72. M. Kr. Barman, A. Baishya and S. Nembenna* Synthesis Bulky guanidinate stabilized homoleptic magnesium, calcium and zinc complexes and their catalytic activity in the Tishchenko reaction J. Orgnomet. Chem. 2015, 785, 52-60.

73. Manas Kumar Kundu, Mriganka Sadhukhan and Sudip Barman Ordered assemblies of silver nanoparticles on carbon nitride sheets and their application in the non-enzymatic sensing of hydrogen peroxide and glucoseJ. Mater. Chem. B, 2015, 3, 1289-1300.

74. Tanmay Bhowmik, Manas Kumar Kundu and Sudip Barman, Ultra small gold nanoparticles–graphitic carbon nitride composite: an efficient catalyst for ultrafast reduction of 4-nitrophenol and removal of organic dyes from water , RSC Adv., 2015, 5, 38760-38773.

75. Manas Kumar Kundu, Tanmay Bhowmik and Sudip Barman, Gold aerogel supported on graphitic carbon nitride: an efficient electrocatalyst for oxygen reduction reaction and hydrogen evolution reaction, J. Mater. Chem. A, 2015, 3, 23120-23135.

76. Tanmay Bhowmik, Manas Kumar Kundu, and Sudip Barman, Palladium Nanoparticle–Graphitic Carbon Nitride Porous Synergistic Catalyst for Hydrogen Evolution/Oxidation Reactions over a Broad Range of pH and Correlation of Its Catalytic Activity with Measured Hydrogen Binding Energy, *ACS Catal.*, 2016, 6, 1929–1941.

77. Tanmay Bhowmik, Manas Kumar Kundu, and Sudip Barman, Highly active and durable Pd nanoparticles-porous graphitic carbon nitride composite for electrocatalytic oxygen reduction reaction, International Journal of Hydrogen Energy, 2016, 41, 14768–14777

Seminars/Conferences

1. Frontiers in Chemistry – 9.01.2016 to 10.01.2016 (Prof. T. K Chandrashekar)
2. The XI-JNOST Conference for Research Scholars (J-NOST 2015) was organized by School of Chemical Sciences, NISER Bhubaneswar during December 14-17, 2015 (Nearly 200 research scholars from India and Europe participated in the conference)
3. Single-Molecule Magnets: Experiences From Our Lab, Kaushal Kishore Memorial Lecture, Department of Inorganic and Physical Chemistry, IISc, Bangalore, August 21, 2015. (Prof.V Chandrasekhar)
4. Single Molecule and Single Ion Magnets, TIFR Center For Interdisciplinary Sciences Hyderabad Colloquium, November 2015 (Prof.V Chandrasekhar)
5. Lanthanide Complexes as Molecular Magnets, Plenary Lecture, Mdern Trends in Inorganic Chemistry, Jadavpur University, Kolkata, December 3, 2015. (Prof.V Chandrasekhar)
6. Molecular Magnets From Lanthanide Ion Complexes, Plenary Lecture, International Conferences on Nano, Energy and Emerging Sciences (ICNEES-15), Madurai Kamaraj University, Madurai, December 11, 2015. (Prof.V Chandrasekhar)
7. Lord of the Rings: The Rise of carbon. DST-INSPIRE Lecture, NIST, Berhampur, October 2015 (Prof.V Chandrasekhar)
8. Polynuclear 3d/4f and 4f Complexes. Synthesis, Structure and Single-Molecule Magnetism. Invited Lecture at the 5th Asian Coordination Chemistry Conference, University of Hong Kong, Hong Kong, July 12-16, 2015.(Prof.V Chandrasekhar)
9. "Hydrogen Bonding beyond Dipole-Dipole Interaction" December 24-25, 2015; "29th Annual Conference of Orissa Chemical society", IGIT, Sarang, Dhenkanal, Odisha. (Dr. Himansu S. Biswal)
10. "29th Annual Conference of Orissa Chemical society", IGIT, Sarang, Dhenkanal, Odisha. (Dr. Himansu S. Biswal)
11. Spectroscopy and Dynamics of Molecules and Clusters (SDMC- 2016), February 18-21, 2016; Bright land Resort, Mahabaleswar, India. (Dr. Himansu S. Biswal)
12. "Resource Generation Camp for International Chemistry Olympiad", 30th Sept to 3rd Oct 2015; Homi Bhabha Centre for Science Education (HBCSE, TIFR), Mumbai. (Dr. Himansu S. Biswal)
13. "Moderation Workshop for National Talent Search Examination (NTSE) 2015", 28-30 October, 2015; NCERT, New Delhi. (Dr. Himansu S. Biswal)
14. Coordinator for "Nurturance Programme for NTS Awardees -2016", 04-08 January, 2016; Regional Institute of Education (RIE, NCERT), Bhubaneswar. (Dr. Himansu S. Biswal)
15 "Rashtriya Avishkar Abhiyan (RAA) by MHRD, Govt. of India", 08-09 March, 2016; Regional Institute of Education (RIE, NCERT), Bhubaneswar. (Dr. Himansu S. Biswal)

School of Mathematical Sciences

Varadharajan Muruganandam, Professor

Fourier Algebra and Fourier-Stieltjes Algebra: I am generally interested in the study of a Fourier algebra and Fourier-Stieltjes algebra of a locally compact group G. They are commutative Banach algebras and can be identified with the predual of the Von-Neumann algebra of the group and the dual of C*-algebra of G respectively. If the group G is amenable, then the space of multipliers of A (G) can be identified with B(G). In 1989, there appeared a path-breaking paper due to Cowling and Haagerup (M. Cowling and U. Haagerup, Completely bounded multipliers of the Fourier algebra of a simple Lie group of real rank one, Invent. Math. 96 (1989), 507-549) which connects operator algebras and multipliers of A (G); and creates certain exotic invariants called Haagerup constants. I gave a simpler proof of their work. Encouraged by this paper, Eymard suggested me to look into the Fourier algebras of hypergroups.

Besides, there is a general problem in this field which reads as follows: For every $\lambda \geq 1$, does there exist a von-Neumann algebra Γ such that $\lambda(\Gamma) = \lambda$? I am fascinated by this problem. I am exploring the possibility of having the von-Neumann algebras associated to hypergroups. As there is much to be done in the context of Fourier algebras of hypergroups, I initiated the study of Fourier algebras of hypergroups with particular reference to Fourier-Jacobi algebras which turn out to be Fourier algebras of Gelfand-pairs associated to simple Lie groups of rank one for some discrete parameters.

There is a long way to go and my current concern is to study the amenability of hypergroups on one hand and Fourier algebras of hypergroups that arise from H-type groups on the other hand.

Courses Taught

Complex Analysis, Representation Theory of Compact Groups, Analysis-III, General Mathematics-II

Supervision of PDF, Ph.D./M.Sc./Summer students

- Post-Doctoral Fellow: Safdar Quddus
- M.Sc. Thesis of Vishal, NISER, Bhubaneswar
- M.Sc. Project of Prajakta Bedekar, NISER, Bhubaneswar
- M.Sc. Thesis of Gaurav Kumar (continuing), NISER, Bhubaneswar
- M.Sc. Thesis of Prajakta Bedekar (continuing), NISER, Bhubaneswar

Conference/workshop attended

- Prof. V. Muruganandam visited I.I.T. Guwahati During this visit he has delivered a lecture on Harish-Chandra - A mathematical Profile on June 27, 2015.

Participation in School/Institute Administration

- Dean (Academic Affairs), Member-Academic Council, Member-PGCI, Member-UGCI, Member-PGCS, Member-UGCS.

Anil Kumar Karn, Associate Professor

Order structure of C*-algebra: I am interested in the study of the order structure of a C*-algebra. Let us recall that the self-adjoint part of a C*-algebra may be characterized by as an abstract-M space. (An abstract-M space is a Banach lattice with some additional properties.) Further, we note that the self-adjoint part of a non-commutative C*-algebra (for example: B(H), $\dim(H) \geq 2$) is not a Banach lattice. However, a `non-commutative' lattice-type structure can be `seen' in the self-adjoint part of a non-commutative C*-algebra. This structure is a lattice if

and only if the C^*-algebra is commutative. I am very close to find an abstract characterization of this structure. As soon as this gap is filled, a non-commutative Banach latice theory may be proposed. This programme may lead to an abstract order theoretic characterization of a non-commutative C*-algebra. Not to mention seperately that this programme uses heavily the theory of matrix ordered spaces.

Publications

- Orthogonality in C*-algebras, Positivity, 20(03) (2013), 607-620.

Courses Taught

- Analysis-II (Ph.D.), Functional Analysis

Supervision of PDF, Ph.D. / M.Sc./ Summer students

- Post-Doctoral Fellow: AntaraBhar
- Ph.D. thesis of Anindya Ghatak (continuing), NISER, Bhubaneswar
- M.Sc. Project of G. Priyanga, NISER, Bhubaneswar

Seminar/Talks delivered

- Operator summability in Banach spaces, 30th Annual conference of The Ramanujan Mathematical Society, (May 15-17, 2015) at IISER, Mohali.
- Orthogonality in ordered normed linear spaces, International Conference ``Positivity VIII", (July 20-24, 2015) at Chengdu, Sichuan Province, China.

Conference/Workshop attended

- 30th Annual conference of The Ramanujan Mathematical Society, (May 15-17, 2015) at IISER, Mohali.
- International Conference ``Positivity VIII", (July 20-24, 2015) at Chengdu, Sichuan Province, China.

Participation in School/Institute Administration

- Chairperson (SMS), Member-Academic Council, Member-PGCS, Member-UGCS

Deepak Kumar Dalai, Reader-F

Algebraic Attacks and Algebraic Immunity of Stream ciphers: Cryptology is the science of secure communications where Mathematical techniques are used to hide the information for secure communication. Stream Cipher is one of the class of techniques. Algebraic attack is one of the cryptanalysis of all techniques which is very effective in the case of stream cipher. Algebraic Immunity (AI) is a cryptographic term which measures the strength of a cipher (technique) against algebraic attack. In this research topic, we study the AI of different stream ciphers and find different ways to implement algebraic attacks on stream ciphers.

Courses Taught

Math Lab-II, Elementary Number Theory, Computation Laboratory-I, Discrete Mathematics, Cryptology

Sanjay Parui, Reader-F

My research interest includes Harmonic Analysis on Euclidean spaces and Heisenberg group. I am now working on problems related to Dunkl transform on Euclidean spaces. Dunkl transform is a generalization of Fourier transform. We don't have explicit formula for Dunkl kernel and very little is known for translation operator. I am planning to develop Littlewood Paley g function theory for Dunkl Hermite operator which may lead to multiplier theory for Dunkl Hermite operator. I am interested in establishing L^p, L^q mapping property for wave operators related to Dunkl and Dunkl Hermite Operator.

Amit Tripathi, Assistant Professor

My research interest lies in the subject of complex algebraic geometry. More specifically, I study vector bundles over hypersurfaces in complex projective space. I study them from the point of view of finding cohomological obstructions to splitting a bundle into direct sum of line bundles as well as conditions for extending it over the ambient projective space. In algebraic geometry, the study of vector bundles over projective space and its subvarieties is a theme which can be classified into following (by no means exhaustive) list of major open ended problems:

1) Moduli space problem:Giving a "geometrical" structure to the set of vector bundles with certain fixed invariants?
2) Splitting problem: Finding to what extend vector bundles on projective space or its subvarieties behave like line bundles?
3) Extendibility:Finding under what conditions does a bundle on a subvariety of $\p^n$ comes from restriction of bundle on $\p^n$ itself.
4) Construction of new bundles:How to construct nontrivial vector bundles of specific rank (> 1) on projective space?
5) Relation between bundles and subvarieties: What does the existence of a nontrivial vector bundle reveals about the geometry of that variety?

Each of the above question has been studied extensively over last few decades and though progress has been made, vector bundles (even of rank 2!) are very much mysterious objects over varieties as simple as P^n. So far I have been interested in the problems (2) and (3) above.

Shyamal Krishna De, Assistant Professor

My research interests involve two areas, namely multiple hypothesis testing for sequentially collected data and multistage or purely sequential methods of estimation. For testing simple versus simple and some special types of composite hypotheses, I have been developing stopping and decision rules such that desired error rates such as Generalized Familywise Error Rates (GFWER) and tail probabilities of False Discovery Proportion (FDP) and False Non-discovery Proportions (FNP) are controlled at pre-specified levels keeping the expected sample size as low as possible. I am interested in developing sequential procedures for testing multiple composite hypotheses that can control both False Discovery Rate (FDR) and False Non-discovery Rate (FNR) at some prescribed levels. In another direction of sequential multiple testing, I plan to develop methodologies for discriminating between two or more distributions controlling the probabilities of misclassification at some desired level.

In the area of sequential estimation, my interest is to develop the theory and methodology for fixed width, fixed accuracy, fixed proportional closeness, and bounded length interval estimation of certain parameters of interest such that attained coverage probabilities are nearly the same as the prescribed level. In a non-parametric setting, I am also interested to develop sequential and multistage procedures for minimum risk point estimation and bounded-length interval estimation of Gini index which is considered to be the most widely used measure of economic inequality.

Publications in journals/conference proceedings during 2015-16 FY

- Bhargab Chattopadhyay and Shyamal K. De (2016), Estimation of Gini Index with Pre-Specified Error Bound, Econometrics, Volume 4, Issue 3, No.30.
- Sharon Ramsay and Shyamal K. De (2016), The Definition of Life: The Impact of Physician's Reporting Practices on Neonatal Mortality Rate in

New York City, Journal of Neonatal and Clinical Pediatrics, Volume 3, Issue 1, Pages 1--5.

- Shyamal K. De and Nitis Mukhopadhyay (2015), Fixed Accuracy Interval Estimation of the Common Variance in a Equi-Correlated Normal Distribution}, Sequential analysis, Volume 34, Issue 3, Pages 1-23.

Courses Taught during 2015-16 FY

- Math 206, Probability Theory (for 2nd and 3rd year integrated M.Sc. students) in even semester 2016.
- Math 305, Statistics (for 3rd year integrated M.Sc. students) in odd semester 2015.

Conference talks/Invited talks/seminars etc. given in NISER and outside NISER during 2015-16 FY

- Contributed talk: Sequential Multiple Testing Controlling Tail Probabilities of Both False Discovery and Non-discovery Proportions and Other Error rates, Ninth International Triennial Calcutta Symposium on Probability & Statistics, Kolkata, India, 2015.
- Contributed talk: Stepwise Methods of Multiple Testing Controlling Generalized Type I and Type II Error Rates in Sequential Trials, 9th International Conference on Multiple Comparison Procedures, Westin Hyderabad, Hyderabad, India, 2015.
- Invited talk: Stepwise Methods of Multiple Testing Controlling FDP and FNP in Sequential Trials, International Workshop in Sequential Methodologies, Columbia University, New York, USA, 2015.

Academic visits during 2015-16 FY

- Department of Mathematical Sciences, Binghamton University, New York, USA, 2015.
- Department of Mathematical Sciences, the University of Texas at Dallas, Richardson, Texas, USA, 2015.
- Department of Mathematics and Statistics, American University, Washington DC, USA, 2015.
- Department of Mathematics and Statistics, Indian Institute of Technology Kanpur, Uttar Pradesh, India, 2015.

Collaboration outside NISERduring 2015-16 FY

- Department of Mathematical Sciences, Binghamton University, New York, USA
- Department of Mathematics, The University of Texas at Dallas, Texas, USA
- Department of Statistics, University of Connecticut, Connecticut, USA
- Department of Mathematics and Statistics, American University, Washington DC, USA
- Department of Mathematics and Statistics, Indian Institute of Technology Kanpur, Uttar Pradesh, India

Participation in different Committees in NISER during 2015-16 FY

- Convener, Committee for screening Candidates for the Assistant Prof Post in SMS
- Convener, Committee for screening Candidates for the Reader-F Post in SMS
- Member, PGCS
- Member, Building Maintenance Committee, SMS
- Member, Committee for making 13th 5 year plan (Niti Aayog) for SMS

Workshop/Conference attended during 2015-16 FY

- Ninth International Triennial Calcutta Symposium on Probability & Statistics, University of Calcutta, Kolkata, India, 2015.
- 9th International Conference on Multiple Comparison Procedures, Westin Hyderabad, Hyderabad, India, 2015.
- International Workshop in Sequential Methodologies, Columbia University, New York, USA, 2015.

Dr. Manas Ranjan Sahoo, Assistant Professor

Systems of conservation laws which are not strictly hyperbolic appear in many physical applications. Generally solution space for such systems are not the usual space of the function of bounded variations. Here solution may be general distributions. Since the product of distributions appears, it is difficult to define a proper notion of solution for this case. Such kind of difficulty arises in the models like large scale structure formation of the universe, zero pressure gas dynamic system, etc. The aim is to define a proper notion of solution and get well-poesedness results of such systems. On the other hand it is important to understand the structure and the large time behavior of the solution.

Publications

- Generalized solution to a system of conservation laws which is not strictly hyperbolic. J. Math. Anal. Appl. 432 (2015), no. 1, 214–232.
- Singh, Harendra; Sahoo, Manas Ranjan; Singh, Om Prakash Weak asymptotic solution for a non-strictly hyperbolic system of conservation laws. Electron. J. Differential Equations 2015, No. 01, 12 pp.
- Sahoo, Manas Ranjan; Singh, Harendra Weak asymptotic solution for a non-strictly hyperbolic system of conservation laws-II. Electron. J. Differential Equations, to appear.

Courses taught

Metric spaces (M 204)

Supervision of PDF, Ph.D./M.Sc./Summer students

- M.Sc. Thesis of Vishal Tripathy

Dr Vellat Krishna Kumar, Visiting Professor

- Retired from the University of Calicut in 2008 as Professor of Mathematics.
- M Sc & Ph D in Mathematics from IIT, Madras in 1969 & 1973 respectively.
- Post Doctoral at University of Dundee, Scotland, UK, (1973 - 75) and at Technical University, Darmstadt, Germany, (1980-81).
- 20 publications in reputed National and International journals.
- Taught M 101, M 310 and a part of M 309 during 2015-2016. Supervised M Sc. Dissertation by Mr S Bibek Sankar.
- Delivered Invited Lectures at the University of Calicut in June 2015 and March 2016.
- Received INSA Teacher Award 2015.

Kamal Lochan Patra, Reader-F

Laplacian Spectrum of Graphs: The Laplacian is an important matrix associated with a graph, and the Laplacian spectrum is the spectrum of this matrix. The Laplacian eigenvalues have found numerous applications in various fields. Specially, the second smallest and the largest eigenvalues are used in theoretical chemistry, combinatorial optimization and communication networks. I work on the relationship between the structural properties of a graph and its Laplacian spectrum.

Courses Taught

Elementary Number Theory, Representations of Finite Groups, Optimization Theory

Publications

Minimum size blocking sets of certain line sets related to a conic in PG (2, q), Discrete Mathematics, 339 (2016), 1716-1721.

Supervision of PDF, Ph.D./M.Sc./Summer students

Post-Doctoral Fellow: SumitMohanty

M.Sc. Thesis of AadilAman, NISER, Bhubaneswar

M.Sc. Project of Dheer Noal Sunil Desai, NISER, Bhubaneswar

Seminar/Talks delivered

Minimizing Laplacian spectral radius of unicyclic graphs with fixed girth, 8th Slovenian Conference on Graph Theory, Kranjska Gora, June 21-27, 2015.

Algebraic Connectivity of Graphs, 4th Indo-Taiwan Conference on Discrete Mathematics, IIT Madras, 10-13 July 2015.

Conference/Workshop attended

- 8th Slovenian Conference on Graph Theory, Kranjska Gora, June 21-27, 2015.
- 4th Indo-Taiwan Conference on Discrete Mathematics, IIT Madras, 10-13 July 2015.
- Participation in School/Institute Administration
- Member-UGCI, Convenor-UGCS, Hostel Warden

Sarath Sasi, Visting faculty

Research Interest

My primary area of research is nonlinear boundary value problems. Currently my work is focused on two topics in quasilinear elliptic partial differential equations:

- The structure of the second eigenfunctions of the p-Laplacian on a ball,
- Quasilinear elliptic problems in the exterior domain.

Recently we have been looking at an optimization problem on the placement of an obstacle in a ball so as to maximize the first eigenvalue of the p-Lapace operator.

I am also interested in spatial ecology. I have worked on some reaction-diffusion models that have been used to analyze the existence of alternate stable states in ecosystems.

Publications

1. Anoop T. V, Pavel Drabek, Sarath Sasi, "On the structure of the second eigenfunctions of the p-Laplacian on a ball", to appear in Proc. Amer. Math. Soc., no 6, 2016, 2503-2512.
2. Anoop T. V, Pavel Drabek, Lakshmi Sankar, Sarath Sasi, "Antimaximum principle in exterior domains", Nonlinear Analysis TM&A, Vol 130, January 2016, Pages 241–254.

Courses Taught

- Topology, Calculus of several varaibles, Functional Analysis (currently teaching)
- Supervision of Msc./PhD/Summer students:
- MSc thesis of Aman Chandna, NISER Bhubaneswar,
- Summer project with Satyam Chandra Mishra, SPS, NISER Bhubaneswar,
- I have also been working with Mohan Kumar Mallick, a PhD student at IIT Madras.
- Research visits: Visited IIT Madras in October 2015.

Seminars/Talks delivered

Presented a colloquium talk at IIT Madras on “Modeling alternate stable states in ecological systems” in October 2015.

Conference/Workshop attended

I taught topology at TPM 2016 for two weeks.

Dr. Nabin Kumar Jana, Assistant Professor

Dean/Chairperson/Convener/Warden:
Convener, PGCS

Research Area: Probability Theory

Education:

- Doctor of Philosophy: From Indian Statistical Institute, Kolkata, India in 2008
- Master of Science: From Department of Pure Mathematics, University of Calcutta, Kolkata, India in 2000

- Bachelor of Science: From Ramakrishna Mission Vidyamandira, Howrah, India in 1998 with Mathematics as Honours subject

Research Interest

Disordered systems pops up quite often in physics (spin glass), biology (artificial neural network), social sciences (matching) and many other places. To analyze, usually these systems are identified with the stochastic models. My main research interest is on the application of probabilistic tools to analyze these stochastic models.

Awards

Post-doc fellowship from Hausdorff Center for Mathematics, Bonn, Germany from November, 2008 to October, 2009.

Publications

Generalized Random Energy Model, (2006) J. Stat. Phys.(123) DOI: 10.1007/s10955-006-9043-9 (with B. V. Rao)

Generalized Random Energy Model II, (2007) J. Stat. Phys.(127) DOI: 10.1007/s10955-007-9288-y (with B. V. Rao)

Preprints

Infinite range Blume-Capel model with random crystal fields, (2016), submitted (with Sumedha)

Teaching

2016-17:
Odd: M455: Introduction to Stochastic Processes

2015-16:
Even: M102: General Mathematics II
Odd: M201: Real Analysis

2014-15:
Summer: M101: General Mathematics I
Even: M472: Advanced Probability
Odd: M201: Analysis I

2013-14:
Summer: M101: General Mathematics I
Even: M206: Probability Theory
Odd: M455: Advanced Probability and Stochastic Processes

2012-13:
Summer: M102: General Mathematics II
Even: M206: Probability Theory & M305: Statistics
Odd: M101: General Mathematics I

2011-12:
Even: M206: Probability Theory
Odd: M455: Advanced Probability and Stochastic Processes

Academic Visits

2015-16:
Conference in Analysis and Probability, ISI, Delhi, 27 - 29 November 2015
Indo-UK Workshop on Stochastic Partial Differential Equations and Applications, IISc, Bangalore, 9 – 19 December 2015
Lectures on Probability and Stochastic Processes X, IISc, Bangalore, December 13 - 16, 2015

Dr. Sanjay Parui, Reader-F

Research Area: Harmonic Analysis

Education:

Msc. 1999, University of Calcutta

PhD 2005, Indian Statistical Institute (Bangalore Center)

Research Interest

I work on Harmonic Analysis on Euclidean Spaces and Heisenberg Groups.

At present my research interest is Spherical harmonics, Hermite and Laguere expansion and Dunkl Transform.

Awards

- CSIR NET
- NBHM Post Doctoral Fellow

Publications

- Variations on a theorem of Cowling-Price with applications to nilpotent Lie groups, with S. Thangavelu, J. Austral. Math. Soc. 82, (2007), 11-27.
- Beurling's theorem and Lp - Lq Morgan's theorem for step two nilpotent Lie groups, with Rudra P. Sarkar, Publication, Research Institute for Mathematical Sciences, 44 (2008), 1027-1056.
- On theorems of Beurling and Hardy for certain step two nilpotent Lie groups, with S. Thangavelu, Integral Transforms and Special Functions ,Vol 20, No 2 (2009
- Analyticity of the Schrödinger propagator on the Heisenberg group, with P. K. Ratnakumar, and S.Thangavelu Monatsh. Math. 168 (2012), no. 2,
- Generalized Hermite expansions of functions arising from Hardy conditions. Adv. Pure Appl. Math. 4 (2013), no. 1, 67–91.

Preprints

- Revisitng Beurling's theorem for Dunkl Transform with S. Pusti.

Teaching

- 2014-2015, Odd Semester: Harmonic Analysis (M555) Credit 4.

Responsibility

- Member of UGCS
- Member of PGCS
- Project/Thesis Guidance: Yet to get a student.

Binod Kumar Sahoo, Reader-F

I work on the problem of existence of representations of incidence geometries possibly in nonabelian groups. This helps us to look for the possibility of constructing new geometries and giving new constructions to know geometries. I also work on the study of minimum size blocking sets in projective spaces with respect to varying sets of lines.

Publications

- K.L. Patra, B.K. Sahoo and B. Sahu, Minimum size blocking sets of certain line sets related to a conic in PG(2,q), Discrete Mathematics 339 (2016), 1716 - 1721.
- B.K. Sahoo and N.S.N. Sastry, Binary codes of the symplectic generalized quadrangle of even order, Designs Codes and Cryptography 79 (2016), 163 - 170.

Courses Taught

- Field Theory
- Rings and Modules
- Algebra-ii(Ph.D.)

Projects Supervised

- M.Sc. Project of Mr. Ayush Kumar Tiwari, SMS, NISER, Bhubaneswar (2015-2016)
- Summer (2015) Project of Ms. Ritika Nair, Department of Mathematics, St. Stephen's College, University of Delhi (under SRF Programme)
- Summer (2015) Project of Mr. Yash Travadi, Department of Mathematics and Statistics, IIT Kanpur.

Academic Presentations

- Standard number systems and beyond, Lecture for school children at Capital High School, Bhubaneswar (February 16, 2016), supported by Odisha Bigyan Academy.
- Binary codes of the symplectic generalized quadrangles of even order, 8th Slovenian conference on Graph Theory (June 21--27, 2015), at Kranjska Gora, Slovenia.

- Delivered four lectures during Interactive Mathematics Training Camp (May 13-22, 2015), at Institute of Mathematics and Applications, Bhubaneswar.

Academic Visits

- 8th Slovenian conference on Graph Theory (June 21-27, 2015), at Kranjska Gora, Slovenia.
- Interactive Mathematics Training Camp (May 13-22, 2015), at Institute of Mathematics and Applications, Bhubaneswar.

Brundaban Sahu, Reader-F

Supercongruences - The numbers which occur in Apéry's proof of the irrationality of $\zeta(2)$ and $\zeta(3)$ have many interesting congruence properties. Work started with F. Beukers and D. Zagier, then extended by G. Almkvist, W. Zudilin and S. Cooper recently has complemented the Apéry numbers with set of sequences known as Apéry-like numbers which share many of the remarkable properties of the Apéry numbers. We study supercongruences properties of Apéry-like numbers.

Differential Operators - There are many interesting connections between differential operates and modular forms. Using Rankin-Cohen type differential operators on Jacobi forms/Siegel modular forms, we study certain arithmetic of Fourier coefficients.

Convolution sums and applications - We compute convolution sums of divisor function using the theory of modular forms and quasi modular forms and apply those to find number of representations of an integer by certain quadratic forms.

Courses Taught

Algebra-IV (Field Theory), Algebra-III (Rings and Modules), Modular forms of one variable

Tanusree Khandai, Visiting Professor

I am interested in the representation theory of infinite dimensional Lie algebras. Specifically, I work on the integral representations of the toroidal Lie algebras which are generalizations of the affine Kac-Moody Lie algebras.

In the past I have looked into finite dimensional as well as the graded integrable representations of multiloop Lie algebras. Since toroidal Lie algebras are universal central extensions of multiloop Lie algebras, representations of the graded multiloop Lie algebras can also be thought of as level zero representations of the toroidal Lie algebras. In the case when the centre acts non-trivially, S. Eswara Rao classified the irreducible integrable representations of the toroidal Lie algebra which have finite dimensional weight spaces. It has however been observed that the category of such representations is not completely reducible. Hence it is interesting to look at the homological properties of this category.

Courses Taught

Algebra-II (Linear Algebra)

Vellat Krishna Kumar, Visiting Professor

Courses Taught

Advanced PDE, Differential Geometry, General Mathematics-I, Nonlinear Analysis

Supervision of PDF, Ph.D./M.Sc./Summer students

- M.Sc. Project of S. Bibek Sankar, NISER, Bhubaneswar

Ashwin S. Pande, Visiting Professor

I am trying to find some more examples on the application of Topological Stacks to Topological T-duality. I am also trying to complete a work on the crossed product by R of a certain class of C*-algebras proposed by Dadarlat and Pennig.

Courses Taught

Differential Equations, Computation Laboratory-II, Analysis-IV, Math Lab-3

Supervision of PDF, Ph.D./M.Sc./Summer students

- M.Sc. Project of Abinash Meher on "Symmetry", NISER, Bhubaneswar
- M.Sc. Project of Abinash Meher on "The Schottky Group", NISER, Bhubaneswar
- M.Sc. Project of Akshay Singh Yadav on "The Phase Plane and phenomena", NISER, Bhubaneswar

B. Subhash, Visiting Faculty

Vector Field Problem: The problem of finding the number of linearly independent vector fields on a sphere was a long standing one which was solved by Adams, using algebraic topological methods. This raised a lot of questions, like what is the maximum number of linearly independent vector fields on a manifold? When can an n-dimensional manifold have n linearly independent vector fields (parallelizable), etc. These sort of questions are collectively known under the name of vector field problems. This problem has been addressed for various manifolds like Projective spaces, Grassmann manifolds, Stiefel manifolds and entire or partial results have been obtained. The tools of algebraic topology and k-theory have been effectively used to answer some of them. I am looking at the vector field problem for a class of manifolds that are quotients of the complex projective Stiefel manifold; I am interested in finding and understanding the co-homology algebra and the k-groups of these homogeneous spaces in order to solve the vector field problem for these classes of manifolds.

Courses Taught

Analysis-II, Topology, Algebraic Topology

Supervision of PDF, Ph.D./M.Sc./Summer students

- M.Sc. Project of T. Assaimani, NISER, Bhubaneswar

Post-Doctoral Fellows

Antara Bhar (Mentor: Anil K. Karn)

Safdar Quddus (Mentor: V. Muruganandam)

Doctoral Students

Abhash Kumar Jha (Advisor: Brundaban Sahu)

Anindya Ghatak (Advisor: Anil K. Karn)

Anoop. V. P. (Advisor: Sanjay Parui)

Bikramaditya Sahu (Advisor: Binod Kumar Sahoo)

Moni Kumari (Advisor: Brundaban Sahu)

School of Physical Sciences

Dr. Bedangadas Mohanty, Associate Professor

The research group is focused in establishing the phase diagram of strong interactions using a system formed by colliding heavy-nucleus at high energies. The phase diagram of strong interactions have a very rich phase structure, which includes: a hot and dense de-confined phase of quarks and gluon, and a low temperature phase of hadrons. In addition it offers the possibility to study transitions of different orders and possible existence of a critical point. Further a de-confined phase of quarks and gluons, the fundamental constituents of visible matter in Universe, allows for the interesting possibility to study its properties like viscosity, conductivity etc. The high-energy nuclear physics group at NISER is pursuing these physics areas through experimental programs at the Relativistic Heavy Ion Collider (RHIC) Facility at Brookhaven National Laboratory, USA and Large Hadron Collider (LHC) Facility at CERN, Switzerland.

The group leads the Beam Energy Scan Program at RHIC to establish the QCD phase diagram and earlier held the Deputy Spokesperson position in the STAR experiment at RHIC, currently the member of council of STAR experiment and Collaboration board of ALICE experiment at LHC. In the LHC experiment the group focuses on resonance particle production, which helps to understand the re-scattering effects in the system formed in high energy heavy-ion collisions. The group has now also taken up the challenging task of looking for Dark Matter candidates. It has successfully defened the proposal to join Super CDMS experiment to be carried out in SNOLAB, Canada. In future it intends to participate in high-energy programs at FAIR facility at GSI, electron Ion collider facility at BNL, USA and INO program in India.

The significant results that have come out from the research of the group are the following: At RHIC - Demonstration of existence of partonic collectivity at very high-energy heavy-ion collisions using the multi-strange hadrons – Paper published in Physical Review Letters. One PhD student has graduated during this period – whose work on nuclei production in heavy-ion collision has been submitted for publication in Physical Review.

At LHC – Evidence of re-scattering effects in low impact parameter heavy-ion collisions which reduces as the impact parameter increases. – the work is published in Physical Review, first paper from photon multiplicity detector (Indian effort) published in Eur Physics J. C. and low momentum D-meson production in high emergy heavy-ion and proton-proton collisions a work accepted for publication in Physical Review C.

Dr. Sanjay Swain, Associate Professor

The group led by Sanjay Swain, work in CMS experiment at LHC, CERN. The main focus of the group is to perform data analysis using pp collision data. The main areas of interest are

(I) B-physics: Here the group is involved in rare B-decays such as Bs->mumu, B->K*+mumu and B->K+mumu. These are very rare decay modes and are good tool to look for physics beyond standard model. Currently also the group started working in lifetime analysis of Bs ->mumu decay. This has never been done at all so far. This measurement will be the first and can give us hint for NP phenomena.

(ii) Also the group is involved in SUSY analysis, particularly, the susy top-squark production using all hadronic decay mode. This decay is considered to be the most sensitive decay to look

for susy top. Although they have not found any SUSY particle at LHC yet, but this measurement can push the limit to exclude the mass of SUSY as they get more and more data.

(iii) Apart from this, the group has taken many important roles in B-physics ad SUSY groups, such a student from NISER-CMS group are leading the triggering validation, data validation, implementing new trigger path which can be used to start new analysis in favorable condition."

Dr. Subhankar Bedanta, Reader-F

The area of focus for the group led by Dr. Bedanta is nanomagnetism and multiferroics. The details of their research activities are mentioned below.

- They prepared thin films of Co/Al2O3 on Si substrate by varying the substrate rotation using sputtering method. The magnetization reversal in a single Co layer has been studied by performing longitudinal magneto-optic Kerr (LMOKE) microscopy at room temperature. LMOKE measurements reveal that the magnetic domains and the reversal process strongly depends on the substrate rotation, however the anisotropy is moderately modified.
- Further magnetic/non-magnetic multilayers have been prepared by sputtering in order to study the inter-layer coupling effects on the magnetization reversal processes. In a bilayer of Co/Al2O3/Co deposited on Si-substrate they have observed layer-by layer magnetization reversal evidenced by the stepped hysteresis and different domain images corresponding to two cobalt layers in the LMOKE microscopy. The layer-by-layer magnetization reversal is observed to be different for thicker Al2O3 spacer layer. In future we plan to study Co/Au/Co multilayers to study the effect of RKKY interactions in addition to the dipolar and Neel coupling.
- The group has started working in fabrication and characterization of magnetic antidot lattices (MALs) of Cobalt films. They prepared MALs of Cobalt by photolithography followed by sputtering deposition. The domain structure and domain wall dynamics in such MAL revealed that domain engineering is possible in MALs. Further the relaxation dynamics in such MALs has been studied as a function of the angle between the easy axis and the magnetic field. In future the group is going to fabricate nanodimensional MALs.
- The group has studied the angle dependent magnetization reversal in superferromagnetic thin films. It has been found that by applying the magnetic field at various angles to the easy axis the size, shape and relaxation dynamics of SFM domains can be very well controlled. In future the group plan to prepare magnetic nanoparticles of Co and CoFe by both chemical and sputtering deposition. Then by putting them on substrates and varying the concentration of nanoparticles, the effect of inter-particle interaction effects can be studied. In particular focus will be given to understand the mechanism of "superferromagnetism".
- The group also focuses on the magnetization reversal process in epitaxial thin films of Fe on MgO (001) substrates. In this system both cubic and uniaxial anisotropy co-exist which led the reversal process to happen via either two 90° or two 180° domain wall motions. In future the group plans to work on preparation of Fe/C60 multilayers to study the effect of C60 on the magnetism of Fe and vice-versa.
- The group has also started preparing heterostructures of La0.7Sr0.3MnO3 (2-5nm)/BiFeO3 (20-50nm)/SrTiO3 (substrate) with (001) orientation bilayers where they intend to observe the exchange bias in multiferroics. BiFeO3 (BFO) is a room temperature multiferroic material and has a very strong magnetoelectric coupling. La0.7Sr0.3MnO3 (LSMO) is a room temperature ferromagnet with a TC~ 350 K. In

this heterostructure the electrical control of magnetic exchange bias effect will be studied.

Dr. Subhasis Basak, Reader-F

Presently the group in working on Charmonium spectroscopy with overlap fermions and 2+1+1 highly improved staggered quark (HISQ gauge) configurations.

Dr. Chetan Gowdigere, Reader-F

Working in those topics of string theory that address black holes and also the topics of gauge-gravity duality. The next to most recent research is on settling the question of horizon smoothness in the most generic multi-black hole space-time. The most research is on studying various aspects of three dimensional Cherns-Simons-matter superconformal theories primarily monopole operators in these theories.

Dr. Yogesh Srivastava, Reader-F

Dr. Srivastava interested in gravitational aspects of string theory, particularly issues related to singularity resolution in Black holes and cosmology.

With Master's student, Abhishek Mathur, he has worked on calculating geometries corresponding to Penrose limit of various non-relativistic geometries which have been extensively studied in recent String theory literature. Paper was published in Classical and Quantum gravity Journal last year. He has worked on constructing non-extremal microstates for two charge black holes in string theory with Amitabh Virmani and Pratik Roy. Paper has been accepted for publication in JHEP recently. He has worked on cosmologies in Anti-desitter space with Sudipta Mukherji, Soumyabrata Chatterjee and Sudipto Paul Chowdhury. Paper has been submitted for publication. Currently he is working on solution generating technique for generating a wide class of microstate geometries for 3-charge black holes.

Dr. Joydeep Bhattacharjee, Reader-F

The group led by Dr. Bhattacharjee focuses on studies related electronic and optical properties of different class of solids and nano-structures. The activities of his group are described below.

- The structural effects on electron-electron and electron-hole coulomb, exchange and correlation interactions become increasingly important with decreasing system size. At nanoscale they are extremely crucial in determining the optical properties, towards which, we perform extensive ab-initio many-body perturbation theory based calculations for accurate estimation of the ground and excited states. Based on the new understanding obtained from such calculations we are exploring the possibility of structurally functionalized type-II heterojunctions ideal for photovoltaic applications.
- Another area of focus of this group is the studies related to grapheme and carbon nanotubes. Since their discovery, graphene and carbon nanotubes have been long proposed as ideal building blocks for robust nano-electronic circuitry mainly due to their tunable electron transport property and structural robustness. Inspired by recent advancements in their controllable synthesis, we aim to design novel carbon based simple nanostructures which can be used as active elements like inductor, capacitor, diodes and transistors for electronic circuitry and spintronic applications at nanoscale. Research in this direction involves extensive calculation of mesoscopic electron transport using Greens functions and other techniques.

Dr. Prasanjit Samal, Reader-F

Research Areas: Atomic and Molecular Physics, Computational Materials Science, Condensed Matter Physics, Quantum Theory of Solid State and Research Interests: Methodological developments of excited-state Density-functional theory (DFT), both

static and time-dependent., Nanostructures and Molecular Electronics.

(1) Development and implementation of density functionals for atoms, molecules and solids. The group is working on new density functionals that provide more accurate estimates of molecular properties (structures, energies, chemical shifts etc.) and electronic as well as optical properties of nanoparticles and clusters. Firstly, their aim is to reconstructing the exact exchange-correlation potential or kernel from accurate wave-function based results for model systems. Secondly, they are further improving tuned range separated hybrid density functionals encompassing proposed excited-state methods. All the above mentioned developments are aimed at calculating more accurately the charge transfer and double excitations which are now issues in TDDFT.

(2) Investigating nanostructures by DFT & first principles molecular dynamics (MD) method.

They are interested in studying the effect of dimensionality on the electronic, structural and optical properties of hydrogenated silicon nanoclusters. Hydrogenated silicon nanostructures have drawn increasing attention in the past one decade because of the visible luminescence was discovered in porous silicon, and more recently, optical gain was observed in silicon nanocrystals. Optical properties are thus of special interest because of the potential application for making optoelectronic devices. Low dimensionality of silicon nanostructures enlarges the smaller indirect band gap of bulk silicon into larger direct gaps, facilitating reasonably high visible photoluminescence (PL) from the nanostructures compared with the poor photoluminescence from bulk silicon. And now the most important thing which is noticed is the effect of quantum confinement in nanoclusters. As the size of bulk silicon decreases beyond the limit of its free-exciton Bohr radius (43 Å) the quantum confinement effect significantly alters the optical behavior of the system, resulting in possible excitations in the visible range. A unified DFT and MD approach will be very useful to study nanoscale phenomena.

(3) TDDFT research work and excited state dynamics Their first attempt in this regard is to use novel (orbital-based) density functionals in practical TDDFT calculations for real molecules. Secondly, to work on time-dependent DFT in real time, for strong laser-molecule interactions. The ultimate goal of this TDDFT research plan will be the extension of the first principle molecular dynamics studies to include excited states with the help of time-dependent DFT. We are working on methods that hold the promise to be able to treat linear and nonlinear response and excitation properties of very large and complex systems in which many-body effects are dominating.

Dr. A. V. Anil Kumar, Reader-F

The group led by Dr. Kumar aims to understand the complexity in understanding the interaction between charged colloidal particles in solutions in order to unravel some basic physics. Their research activity is described below.

The interactions between charged colloidal particles in solution can be complex and varied. One particularly interesting case is when the particles attract one another at small separations, but repel at larger separations. These competing interactions lead to very rich phase behavior in these systems like formation of cluster fluids. Our investigations on a highly size-asymmetric binary colloidal mixtures shows that counter ion distributions around the colloidal particles are nonlinear and this leads to highly non-additive interactions between the two

components. In such an asymmetric mixture, even though likely charged, larger colloidal particles form a cluster fluid which is in very good agreement with experimental findings. Similar effects may be observed in the case highly charge-asymmetric mixtures also. We are investigating the effect of this charge/size polydispersity in colloidal mixtures on phase behavior and dynamical properties using classical molecular simulation methods such as Monte Carlo and molecular dynamics. (This work is being carried out in collaboration with Prof. J. Horbach at German Aerospace Center (DLR), Köln, Germany)

Dr. Sumedha, Reader-F

Dr. Sumedha's group are interested in understanding and developing mathematical and numerical approaches to study disordered systems. The recent work involves:

1. Effect of quenched disorder on first order transitions. Typically correlation length is finite near the first order transitions and they are more stable than the continuous transitions. It is found though that in two dimensions, even an infinitesimal amount of quenched disorder either destroys transition, or converts it into a continuous transition. What happens in higher dimensions is still not clear. They have looked at three models with random field disorder: Random field Ising Model, p-spin interaction model and random crystal field Blume Capel model. They found that typically there is a threshold of disorder, beyond which the transition is always continuous.
2. Phase transitions in random k-Satisfiability problems. In computer science, it is now believed that computational complexity is connected to phase transitions. K-satisfiability is one of the most fundamental complex optimization problems. The problem is known to undergo phase transitions as a function of the ratio of constraints and variables. While polynomial time algorithms are known to solve the problem for k = 2, for k ≥ 3 the problem is known to be NP-complete. They define the model on a tree and find that the solvability threshold for k = 2 matches the exact value of the threshold on regular random graphs. For higher k, the values are very close to those predicted using other techniques. Their method can be extended to many other optimisation problems.
3. Stochastic modelling of cellular processes. They are interested in understanding the role of stochasticity in biological processes. They are working on stochastic modelling of dynamics of FtSz monomers, which result in the formation of Z-ring, which plays a crucial role during cell division in bacteria.

Dr. Colin Benjamin, Reader -F

Dr. Benjamin's research topic are Theoretical Nanoscale science, Quantum information theory and Game theory. Focus of the group led by him is on basically three things:

1. Quantum Hall and quantum spin Hall related effects in 2D materials:
2. Andreev and Josephson related effects at interfaces with superconductors:

3. Quantum Games and Quantum information:

Dr. Pratap Kumar Sahoo, Reader-F

The group led by Dr. Sahoo carries out experimental investigation of nano-materials and ion matter interaction. The main two research areas are mentioned below.

- Tunnel devices are very important for technological application. The basic phenomena can be understood in terms of the physics behind the

electron and phonon-tunnel device, which depends on the device geometry. The group is involved to fabricate novel structure with low cost techniques for tunnel devices. Recently they have synthesized crystalline-amorphous-crystalline (c-a-c) stature which can be used as phonon-tunnel junction devices. Similar structures like c-a-c with p-n-p electronics devices also of great interest which can be fabricated using low energy ion beam facility.

- Also optical excitation by coupling a foreign atom by ion implantation to propagate surface plasmons and its anisotropic optical response due to the strong transverse and longitudinal plasmons coupling is a hot recent research area. Ion beams are also indispensable tools to dope materials with optically active ions. Ion irradiation can also lead to nanoscale changes in the structure and shape of materials such as colloids, Si nanostructures and lithographic masks. The thermal spike that is generated along the ion track leads to anisotropic deformation, with the material expanding perpendicular to the ion beam. Continuum modeling is used to determine the fundamental mechanisms behind these ion-solid interactions. The first attempt in this regard is to fabricate the nanostructures using various lithographic techniques, thin film deposition and energetic low and swift heavy ion beam implantation and study the strong interaction of light with nano structured materials which lead to the design of plasmonic devices with optimized properties.

Dr. Kartikeswar Senapati, Reader-F

The group led by Dr. Senapati is exploring unconventional superconductivity in hybrid superconductor-ferromagnet systems. In particular, the group is involved in various experiments to generate and tune spin-triplet supercurrent in artificial structures. The large range of this type of super-current is immediately attractive for the field of low temperature spintronics. We are attempting several methods for addressing the issue such as embedding an exchange spring in a Josephson junction and forcing a spin-singlet supercurrent through natural domain walls existing in well known ferromagnets. These experiments are being carried out in collaboration with UGC-DAE CSR, Indore and University of Cambridge UK.

Dr. Ashok Mohapatra, reader-F

Currently, the group is working on 2 major projects.

1) Study of coherent Rydberg excitation in a thermal and ultra-cold atomic vapor.

   The long term objective is to realize strong photon-photon interactions using the non-linearity mediated Rydberg blockade interaction. Rydberg blockade is a phenomenon where more than one atom within the blockade volume can't be excited to the Rydberg state using a monochromatic laser beam due to strong Rydberg-Rydberg interaction. Recently the group has established a technique for all optical detection of Rydberg population which is particularly useful for thermal vapor experiments. Using the same technique the blockade interaction has been studied in thermal vapor. Currently, the group is involved in further investigation of Rydberg-Rydberg interactions in thermal vapor. The group is also involved in setting up a ultra-cold atom set up study the same.

2) Study of optical optical non-linearity facilitated by light induced Zeeman coherence of thermal atomic vapor Light-induced Zeeman coherence of degenerate sub-levels of two-level atomic system can facilitate efficient degenerate four wave mixing (FWM) and cross phase modulation (XPM) which leads to the polarization rotation of an arbitrary elliptically polarised light propagating through the atomic vapor. Recently, the group was involved in

theoretical and experimental study of the same system. It has been realized that the system can be used to control the diffraction of a weak probe light in the presence of a strong light field with orthogonal polarization. Also the system can be used to generate various quantum states of light like polarization squeezed light, correlated photon sources and Schrodinger cat states. The study of the system along these directions is now included as the major activity of the group.

Dr. Ritwick Das, Reader-F

The research group led by Dr. Das focuses on nonlinear photonics, plasmonics and waveguide optics. The main areas of research are described below.

- Optical Parametric Oscillators or OPOs provide an alternative and practical route to reach those spectral regions that are inaccessible to conventional laser technology, by exploiting nonlinear optical properties of non-centro-symmetric crystals. An interesting configuration of OPOs is singly-resonant OPOs or SROs where only one of the generated waves oscillates between a pair of mirrors forming a very stable source of generating coherent radiation. The frequency tunability is achieved by either changing the properties of the crystal such as temperature or angular orientation with respect to the pump beam, or by inserting a frequency selective element in the cavity such as an etalon which manipulates the longitudinal resonance condition. In the present research work, the main idea is to generate high-power, continuous-wave, coherent radiation in the mid-infrared that is tunable from 2-6 μm. This wavelength region is extremely crucial for carrying out absorption spectroscopy of trace-gas molecules such as methane, formaldehyde, nitrogen, carbon-dioxide and many more.
- The research work essentially comprises study of modal interaction between bandgap-guided modes in a dielectric medium and surface plasmon modes. The dispersive properties of the waveguides, anti-crossing behavior and propagation loss features are being investigated in detail. Another interesting feature that involves the existence and excitation of 'Tamm-plasmon' states is also being investigated. The major goal of this research activity is to provide alternative as well as efficient route for signal processing in the miniaturized photonic integrated circuits and realization of efficient biochemical sensors.

Prolay Kumar Mal, Reader-F
(Ramanujan Fellow 2013-18)

The Standard Model (SM) of Particle Physics is the theoretical framework explaining the dynamics of the subatomic particles viz., quarks, leptons and gauge bosons, and their interactions. The discovery of the SM Higgs boson by the LHC experiments (ATLAS and CMS) has finally culminated the long-standing puzzle of electroweak symmetry breaking (at least within the context of the SM). However, in spite of its great accuracy in explaining the wide range of experimental data over the past few decades, it has several shortcomings and it is believed to be a low-energy limit of a more fundamental theory. For example, it cannot provide appropriate explanation for the dark matter candidate and mass hierarchy problem.

Dr. Mal's primary research focuses on the understanding of the basic mechanism responsible for the electroweak symmetry-breaking and to probe new physics beyond the standard Model (BSM) of Particle physics. He works with the CMS detectors at the Large Hadron Collider (LHC) involving the top quark and Higgs boson. In particular, during the current LHC Run II at $\sqrt{s}$=13-14 TeV, he looks for the

signatures of dark matter and flavor-changing neutral current (FCNC) decays of the top quark.

In addition, he is leading the NISER-CMS group in terms of CMS detector upgrade program scheduled in next few years. During this period the LHC is scheduled to undergo several luminosity upgrade programs where the number of interactions per proton-proton branch crossing would heavily be increased. In such an environment, any physics analyses would require event filtering based on the tracking detector. Dr. Mal is actively involved in the CMS upgrade program for developing suitable track triggering mechanism, as well as in building the tracking detector for High-Luminosity LHC (HL-LHC). Furthermore, he pursues the performance studies for the present CMS tracker using the Monte Carlo simulations apart from his participation in CMS detector operations.

Dr. V Ravi Chandra, Reader-F

Dr. Chandra's research deals with the study of unusual phases and transitions in magnetic systems with competing interactions.

In the year 2015-2016 this group focused on enhancing existing capabilities in the technique of exact diagonalisation, a widely used method to studyfrustrated magnets. As a result the group currently has programs, both shared and distributed memory versions, which can evaluate (using only S_z conservation and spin inversion symmetries) the low energy spectrum of spin-1/2 Heisenberg exchange models in symmetry sectors whose Hilbert space dimension can reach billions of states. The programs have been cross-checked against existing results for Heisenberg models with 36 spin-1/2 sites. The programs have been written to evaluate spin-spin, dimer-dimer and chirality correlation functions and in addition have the capability to evaluate entanglement spectra of any arbitrarily defined cluster for 36 spin-1/2 sites. The group is currently working to develop an additional branch of the program to evaluate dynamical and thermal properties which would enable the group to produce high quality numerical results using this technique for a wide class of models. Using the existing programs for ground state properties the Heisenberg model on the pyrochlore lattice and the entanglement content of the J_1 J_2 model on the Kagome lattice are being analyzed.

Another direction of research currently being pursued is studying the critical properties of dipolar magnets. Dipolar magnets in frustrated geometries in the recent past have been studied using mean field theories, Monte Carlo simulations, Luttinger Tisza techniques etc. For some standard two dimensional dipolar magnets that are being studied in the laboratory (square, honeycomb, triangular, Kagome lattices). They are currently investigating their critical properties using renormalization group techniques like the epsilon expansion. Our objective is to report on the critical behaviour of these models from the RG perspective, something which has received comparatively less attention.

Dr. Nishikant Khandai, Reader-F

Nishikanta Khandai's group (including 1 PhD Student) is interested in the areas of cosmology, large scale structure and galaxy formation. Cosmology is an observationally driven field. Over the last decade independent observations have confirmed that the Universe is currently in a phase of accelerated expansion. They attribute this to a mysterious form of energy which permeates all of space also known as dark energy. In its simplest form dark energy can be parametrized by a cosmological constant, a constant energy density filling space homogeneously. We can measure the contribution of dark energy to the total energy density of the Universe because we can measure the expansion history of the Universe

accurately. Other than that it is a complete mystery. However it is an important mystery, since it constitutes nearly ~ 74% of the energy density of the Universe. The second mystery is an unknown form of matter, dark matter, which makes up ~ 22% and the rest is in baryonic or normal matter. Unlike ordinary baryonic matter, dark matter cannot be seen directly, it is weakly interacting or cold, but its presence and properties are inferred from its gravitational effects on visible matter, radiation and the large scale structure of the Universe. Independent observations have formed a consistent picture, the so-called standard model of cosmology, namely the Lambda-Cold Dark Matter (LCDM) model, a flat universe dominated by dark energy, supplemented by dark matter and atoms with density fluctuations seeded by a Gaussian, adiabatic and in a nearly scale invariant process. With time these perturbations grow due to gravitational instability and form deep potential wells in which gas can cool and form hierarchically the first stars, proto-galaxies, galaxies and clusters of galaxies that we see today. Galaxy formation is indeed a complex and extremely non-linear process and in order to understand and interpret observations we need to resort to numerical simulations. For our research we use numerical simulations as a tool to understand the rich process of galaxy formation and large scale structure in a Universe driven by dark matter and dark energy. Our current thrust is on understanding the distribution of neutral hydrogen in the post-reionisation Universe.

Dr. Anamitra Mukherjee, Reader-F

Dr. Mukherjee's research is in the area of strongly correlated electron systems and materials theory. Strong interaction between electrons, a common origin of strong correlations, is at the heart of many quantum phenomena such as high Tc superconductivity and colossal magneto-resistance. Microscopic understanding of such many body quantum states is one of the grand challenges of theoretical condensed matter physics.

The particular focus areas of research currently undertaken are (i) theoretical modeling of magnetism and superconductivity in recently discovered Iron superconductors, (ii) Developing methods to study quantum criticality arising out of the interplay of interaction and disorder in models and materials, and (iii) studying few body bound state formation in Rydberg dressed atoms.

In the past year the group has been actively developing, benchmarking and applying a new technique called Monte Carlo-Mean Field (MC-MF) method to solve multi orbital Hubbard models at finite temperatures. This is needed to model the many body phenomena described above. The results from these calculations have elucidated that electronic fluctuations are the dominant reason for nematic order in a large class of the Iron based superconductors. In addition, the group predicted a novel dimensional reduction in these materials where one direction becomes conducting and the other insulating. Current research includes extending the method to handle more orbitals and incorporating superconducting instability in the theory so that a single theoretical framework can be established to understand these superconductors.

The group as also found novel bound states in few body Rydberg atoms in one dimension using a continued fraction formalism to calculate few body Green's function. These predicted bound states should be directly seen in cold atom experiments employing Rydberg atoms. Effort is going on to extend our formalism to study few to many body transitions in cold atom systems. Finally, the group has extensively studied the Anderson-Hubbard model, where preliminary results indicate rich quantum critical behavior originating from disorder-induced metallization of Mott insulators.

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2. 2.Effect of substrate rotation on domain structure and magnetic relaxation in Magnetic Antidot Lattice (MAL) arrays Sougata Mallick, Srijani Mallik and Subhankar Bedanta J. Appl. Phys 118, 083904 (2015)
3. Superferromagnetism in dipolarly coupled L10 FePt nanodots with perpendicular magnetization S. Bedanta, T. Seki, H Iwama, T Shima, K Takanashi Applied Physics Letters 107, 152410 (2015)
4. Penrose limits and non-relativistic geometries, Abhishek Mathur, Yogesh K. Srivastava., Class.Quant.Grav. 32 (2015) no.23, 235024.
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141. Search for pair-produced vectorlike B quarks in proton-proton collisions at $\sqrt{s}$=8TeV, By CMS Collaboration (Vardan Khachatryan et al.).Phys.Rev. D93 (2016) no.11, 112009.

142. Limits on the Higgs boson lifetime and width from its decay to four charged leptons, By CMS Collaboration (Vardan Khachatryan et al.).Phys.Rev. D92 (2015) no.7, 072010.

143. Pseudorapidity distribution of charged hadrons in proton-proton collisions at $\sqrt{s}$ = 13 TeV, By CMS Collaboration (Vardan Khachatryan et al.). Phys.Lett. B751 (2015) 143-163.

148. Measurement of the ${{\mathrm {W}}^{+}}\mathrm{W}^{-} $ cross section in pp collisions at $\sqrt{s}=$ 8 TeV and limits on anomalous gauge couplings, By CMS Collaboration (Vardan Khachatryan et al.). Eur.Phys.J. C76 (2016) no.7, 401.

145. Inclusive and differential measurements of the $t\overline {t}$ charge asymmetry in pp collisions at $\sqrt{s}=$ 8 TeV, By CMS Collaboration (Vardan Khachatryan et al.).Phys.Lett. B757 (2016) 154-179.

146. Search for a Higgs boson decaying into $\gamma^* \gamma \to \ell \ell \gamma$ with low dilepton mass in pp collisions at $\sqrt s = $ 8 TeV, By CMS Collaboration (Vardan Khachatryan et al.).Phys.Lett. B753 (2016) 341-362.

147. Search for supersymmetry with photons in pp collisions at $\sqrt{s}$=8TeV, By CMS Collaboration (Vardan Khachatryan et al.).Phys.Rev. D92 (2015) no.7, 072006.

148. Search for exotic decays of a Higgs boson into undetectable particles and one or more photons, By CMS Collaboration (Vardan Khachatryan et al.). Phys.Lett. B753 (2016) 363-388.

149. Search for neutral MSSM Higgs bosons decaying into a pair of bottom quarks, By CMS Collaboration (Vardan Khachatryan et al.). JHEP 1511 (2015) 071.

150. Search for resonant $t \bar t$ production in proton-proton collisions at $\sqrt s=$ 8TeV, By CMS Collaboration (Vardan Khachatryan et al.). Phys.Rev. D93 (2016) no.1, 012001.

151. Search for diphoton resonances in the mass range from 150 to 850 GeV in pp collisions at $\sqrt{s}=$ 8 TeV, By CMS Collaboration (Vardan Khachatryan et al.).Phys.Lett. B750 (2015) 494-519.

152. Search for a massive resonance decaying into a Higgs boson and a W or Z boson in hadronic final states in proton-proton collisions at $ \sqrt{s}=8 $ TeV, By CMS Collaboration (Vardan Khachatryan et al.). JHEP 1602 (2016) 145.

153. Search for the standard model Higgs boson produced through vector boson fusion and decaying to $b \overline{b}$, By CMS Collaboration (Vardan Khachatryan et al.).Phys.Rev. D92 (2015) no.3, 032008.

154. A search for pair production of new light bosons decaying into muons, By CMS Collaboration (V. Khachatryan et al.).Phys.Lett. B752 (2016) 146-168.

155. Search for neutral color-octet weak-triplet scalar particles in proton-proton collisions at $

\sqrt{s}=8 $ TeV, By CMS Collaboration (Vardan Khachatryan et al.). JHEP 1509 (2015) 201.

156. Comparison of the Z/γ* + jets to γ + jets cross sections in pp collisions at $ \sqrt{s}=8 $ TeV, By CMS Collaboration (Vardan Khachatryan et al.).JHEP 1510 (2015) 128, Erratum: JHEP 1604 (2016) 010.

157. Search for a pseudoscalar boson decaying into a Z boson and the 125 GeV Higgs boson in $ℓ^+ℓ^−b\overline{b}$ final states, By CMS Collaboration (Vardan Khachatryan et al.).Phys.Lett. B748 (2015) 221-243.

158. Search for a Higgs Boson in the Mass Range from 145 to 1000 GeV Decaying to a Pair of W or Z Bosons, By CMS Collaboration (Vardan Khachatryan et al.). JHEP 1510 (2015) 144.

159. Measurement of inclusive jet production and nuclear modifications in pPb collisions at $\sqrt{s_{_\mathrm {NN}}}=$ 5.02 TeV, By CMS Collaboration (Vardan Khachatryan et al.). Eur.Phys.J. C76 (2016) no.7, 372.

160. Measurements of t t-bar spin correlations and top quark polarization using dilepton final states in pp collisions at sqrt(s) = 8 TeV, By CMS Collaboration (V. Khachatryan et al.).Phys.Rev. D93 (2016) no.5, 052007.

161. Correlations between jets and charged particles in PbPb and pp collisions at $ \sqrt{s_{\mathrm{NN}}}=2.76 $ TeV, By CMS Collaboration (Vardan Khachatryan et al.).JHEP 1602 (2016) 156.

162. Measurement of top-antitop production cross-section in the all-jets final state in proton-proton collisions at $\sqrt{s}$ = 8 TeV, CMS Collaboration, Eur. Phys. J. C 76, 128 (2016)

163. Classical dipoles on the kagome lattice, M. Maksymenko, V. Ravi Chandra and R. Moessner, Phys. Rev. B 91, 184407 (2015).

Conference / Workshop proceedings:

1. Density-to-Potential Mapping for Excited-States: Uniqueness, Existence, and Construction – Prasanjit Samal and Subrata Jana

2. P.K. Sahoo, International conference on "Polymers on Micro-and Nanoscale" ICNP-2015, Mahatma Gandhi University, Kottayam, Kerala, 10-12 April 2015.

3. Strong Red luminescent Twin ZnO nanorods for nano-thermometry applications; Avanindra Singh, Kartik Senapati, Karuna Kar Nanda and Pratap Kumar Sahoo, MRS Advances, 1, 869-874 (2016).

4. Invited Speaker at National Workshop on Cosmology with the HI 21cm line Raman Research Institute, June 23-26 2015

5. Azimuthal anisotropy of φ-meson in U+U and Au+Au collisions at RHIC" Strangeness in Quark Matter (SQM) and Dense Matter School, 29 June – 11 July, 2015 Joint Institute of Nulcear Research, Dubna, Russsia. Vipul Bairathi, Proceedings J. Phys. Conf. Ser. 668, 1, 012039 (2016).

6. Bulk properties of the system formed in Au+Au collisions at = 14.5 GeV

   Using the STAR detector at RHIC", Quark Matter, Kobe, Japan, 27 September -3 October, 2015. Vipul Bairathi, Proceedings Nucl. Phys. A, D 15-00434R1, (2016).

7. Selection of body-tip configuration in U+U collisions at $\sqrt{s_{NN}}$ = 193 GeV using spectator neutrons" DAE Symposium on Nuclear Physics (DAE-NP), 7-11 December, 2015, Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, AP, INDIA. Vipul Bairathi, Rihan Haque, Bedangadas Mohanty, Proceedings DAE Symp. Nucl. Phys. 60, 726, (2015).

8. Identified Particle Production in Au+Au Collisions at $\sqrt{s_{NN}}$ =14.5 GeV in STAR" DAE Symposium on Nuclear Physics (DAE-NP), 7-11 December, 2015 Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, AP, INDIA. Debadeepti Mishra,

Proceedings of the DAE Symp., Nucl. Phys. 60, 764 (2015).

9. Measurement of D-meson production in p-Pb collisions with the ALICE detector", DAE Symposium on Nuclear Physics (DAE-NP), 7-11 December, 2015 Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, AP, INDIA. Chitrasen Jena, Proceedings DAE Symp. Nucl. Phys. 60, 724, (2015)
10. Production of hadronic resonances in p-Pb collisions in ALICE at LHC" DAE Symposium on Nuclear Physics (DAE-NP), 7-11 December, 2015 Sri Sathya Sai Institute of Higher Learning, Prasanthi Nilayam, AP, INDIA. Ajay Kumar Dash, Proceedings of the DAE Symp., Nucl. Phys. 60, 810 (2015).

Conferences / Workshop / Meeting organized:

STAR Regional Meeting held at NISER from February 12 – 13, 2016.The purpose of this meeting was to discuss recent heavy-ion collision results from the STAR experiment at RHIC, stimulate collaborative work on specific physics topics, develop new analysis plans, paper plans, ideas and plan for future directions among our colleagues working in relativistic heavy-ion collisions in STAR. The meeting emphasized on discussing spectra and fluctuation measurements at low energies, summary of the BES-I results, and preparation for BES-II.

Projects from non-DAE schemes:

1) Title: Engineering magnetic domains in Co antidot arrays

- PI: Dr. Subhankar Bedanta,
- Funding agency: DST-SERB
- Amount sanctioned:Rs. 49.92 lakhs

2) Title: Electric field induced spin wave spectra in multiferroicantidot lattice arrays

- PI: Dr. Subhankar Bedanta,
- Funding agency: DST
- Amount sanctioned:Rs. 17.24 lakhs

3) Title: Beam Energy Scan Program with Relativistic Heavy Ion Collisions and Development of a Gas based detector facility at NISER

- PI: Dr. Bedangadas Mohanty
- Funding agency: DST-SERB
- Amount sanctioned: Rs. 39 lakhs

4) Title: Topology, spintronics and quantum computation with Dirac materials

- PI: Dr. Colin Benjamin
- Funding agency: DST Nanomission
- Amount sanctioned: Rs. 27 Lakhs

Talks (Invited and contributory)

1. **Vipul Bairathi,** Azimuthal anisotropy of φ-meson in U+U and Au+Au collisions at RHIC, Strangeness in Quark Matter (SQM) and Dense Matter School, 29 June-11 July, 2015 Joint Institute of Nulcear Research, Dubna, Russia.
2. **Vipul Bairathi,** Bulk properties of the system formed in Au+Au collisions at $\sqrt{s_{NN}}$ = 14.5 GeV using the STAR detector at RHIC, Quark Matter, Kobe, Japan, 27 September - 3 October, 2015.
3. **Vipul Bairathi,** Selection of body-tip configuration in U+U collisions at $\sqrt{s_{NN}}$ = 193 GeV using spectator neutrons, DAE Symposium on Nuclear Physics (DAE-NP), 7-11 December, 2015.
4. **Vipul Bairathi,** Inclusive charged hadron elliptic flow (v2) in Au+Au collisions at $\sqrt{s_{NN}}$ = 14.5 GeV, 6th Asian Triangle Heavy-Ion Conference (ATHIC), February 15-19, 2016 Delhi University, New Delhi, INDIA.
5. **Debadeepti Mishra,** Identified Particle Production in Au+Au Collisions at $\sqrt{s_{NN}}$ = 14.5 GeV in STAR, 6th Asian Triangle Heavy-Ion Conference (ATHIC), February 15-19, 2016, Delhi University, New Delhi, INDIA.

6. **Kishora Nayak,** Multiplicity dependence of identified hadron production in pp collisions at √ s = 7 TeV in the ALICE at LHC, 6th Asian Triangle Heavy-Ion Conference (ATHIC), February 15-19, 201, Delhi University, New Delhi, INDIA.
7. **Kishora Nayak,** First look of K* resonance in pp collisions at ALICE in LHC, Sezione INFN di Catania, ITALY
8. **Chitrasen Jena,** D-meson production in p-Pb collisions at √ (s_NN) =$ 5.02 TeV with the ALICE detector, 6th Asian Triangle Heavy-Ion Conference (ATHIC), February 15-19, 2016 , Delhi University, New Delhi, INDIA.
9. **Chitrasen Jena,** Measurement of D-meson production in p-Pb collisions with the ALICE detector, DAE Symposium on Nuclear Physics (DAE-NP), 7-11 December, 2015.
10. **Ajay Kumar Dash,** Transverse mass scaling of identified hadrons in pp collisions at RHIC and LHC, 6th Asian Triangle Heavy-Ion Conference (ATHIC), February 15-19, 2016, Delhi University, New Delhi, INDIA
11. **Ranbir Singh,** Hadronic resonance production in Pb-Pb collisions with ALICE detector at the LHC, 6th Asian Triangle Heavy-Ion Conference (ATHIC), February 15-19, 2016, Delhi University, New Delhi, INDIA
12. **Ranbir Singh,** Transverse momentum distributions of identified hadrons within multiple freeze-out scenario, Workshop on High Energy Physics Phenomenology, December 4 – 13, 2015, Indian Institute of Technology, Kanpur, INDIA
13. **Bedangadas Mohanty,** Physics of Relativistic Heavy-Ion Collisions, 6th Asian Triangular Heavy Ion Conference, New Delhi, February 15-19, 2016
14. **Bedangadas Mohanty,** Freeze-out Dynamics at RHIC Beam Energy Scan Program, Strongly Interacting Hot and Dense Matter: Theory and Experiment, GSI, Darmstadt, Germany, November 2-6, 2015
15. **Bedangadas Mohanty,** Search for Critical Point in QCD phase Diagram, 13th international eXtreme QCD (XQCD), Central China Normal University (CCNU), Wuhan, China, September 21-23, 2015
16. **Bedangadas Mohanty**, Freeze-out dynamics in high energy heavy-ion collisions, Discussion Meeting on High Moment of Net-charge, Net-Kaon and Net-protons in High-Energy Nuclear Collisions, Lawrence Berkeley National Laboratory, Berkeley USA, June 22-24, 2015.
17. **Bedangadas Mohanty**, Colloquium on New Form of Matter: De-confined state of Quarks and Gluons at Saha Institute of Nuclear Physics, Kolkata, India, February 24, 2016.
18. **Bedangadas Mohanty**, Invited Talk on New Form of Matter: De-confined state of Quarks and Gluons, DPS day IISER, Kolkata, India, March 05, 2016.
19. **Bedangadas Mohanty**, Narayan Mishra memorial lecture, Department of Physics, Ravenshaw University, Cuttack, November 21, 2015.
20. **Subhankar Bedanta**, Invited talk in ICMAGMA-2015 (international conference on magnetism and magnetic materials) held at VIT, Vellore, India in December 2015.
21. **Subhankar Bedanta**, Physics seminar at the physics department of physics, Indian Institute of Technology (IIT, Delhi) in January 2016.
22. **Subhankar Bedanta**, Invited talk at the Institute of Physics Polish Academy of Sciences, Warsaw, Poland in February 2016.
23. **Subhankar Bedanta**, Invited Physics colloquium at physics department of University of Bialystok, Bialystok, Poland in March 2016.

24. **Prasanjit Samal,** Uniqueness, Existence, and Construction of the Density-to-Potential Mapping for Excited-States, DFT-2015 International Conference, Hungary.

25. **Prasanjit Samal,**, Predicting Pressure Absorbing Materials Through First Principles Molecular Dynamics Simulations – CTS, I.I.T. Kharagpur

26. **Chethan G Gowdegere,** Aseries of 12 lectures on the general relativity and gravitation course at the SERC Preparatory School in THEP held at IISER Bhopal between June 29 and July 15th, 2015.

27. **Pratap K Sahoo**, Single Step Nano-pattern synthesis of compound semiconductor using Low Energy Ion Beams, Kurukshtra University, Kurukshetra low energy ion beam Seminar, 5th March 2016.

28. **Pratap K Sahoo**, Sputtering induced nano-dot synthesis from Au/Si thin filmsby keVion beams, ICNIB-2015, BRA University, Agra, November 23-25, 2015.

29. **Pratap K Sahoo**, A novel way of synthesizing TiO2-NiO core-shell nanoparticles for solid state dye-sensitized solar cell application, ICNP-2015, Mahatma Gandhi University, Kottayam, Kerala, 10-12 April 2015

30. **Pratap K Sahoo**, Radiative emission from ion-beam-synthesized nano-materials, Low energy ion beam workshop at IUAC New Delhi, November 3-4, 2016.

31. **Pratap K Sahoo**, Basic Principles and Applications of Electron Microscopy in Materials Science, NIT Raipur, National Seminar on Spectroscopic Techniques, 12th Feb. 2016.

32. **Pratap K Sahoo**, Synthesis of Twin ZnO Nanorods for electron–exciton coupling related applications and Stable bimetallic phase synthesis of quantum dots using solid state chemical and dynamic methods, Ravenshaw University, Materials Chemistry National Workshop, 22nd Jan. 2016.

33. **Pratap K Sahoo**, Materials Research Society (MRS), November 29- December 4, 2015, at Boston, USA. (contributed talk and poster)

34. **N.Khandai**, Invited Speaker at IIT Kharagpur Astrophysics Seminar, 29 January 2016

35. **Colin Benjamin** :- Invited talk on "Do quantum strategies always win?" at meeting on Quantum Information Processing and Applications (QIPA2015) 10 December, 2015 at Harish-Chandra Research Institute (HRI), Allahabad, India.

36. **Colin Benjamin**, Invited lecture on "Quantum games" at International School And Conference On Quantum Information 2016 Institute of Physics, Bhubaneswar, February 12, 2016.

37. **Colin Benjamin**, Invited talk on "Revisiting the ElitzurVaidman bomb paradox" at International School And Conference On Quantum Information 2016 Institute of Physics, Bhubaneswar, February 18, 2016.

38. **Sumedha**, Invited talk in seminar series in complex systems at IOP, Bhubaneswar on 'Effect of random field disorder on first order transitions', March 2016.

39. **Sumedha,** Joint Computer Science and Theoretical Physics Seminar at TIFR Mumbai on 'Phase transitions in k-satisfiability problems', October 2015.

40. **Sumedha**, Physics Seminar at NISER on 'Phase transitions in k-satisfiability problems', January 2016.

41. **Anamitra Mukherjee**, "Aspects of magnetism in Iron superconductors", in 'Workshop on Frontiers in condensed matter physics', Institute of Physics, Bhubaneswar, Feb. 2016.

42. **Prolay K Mal**, Search for the Higgs boson in associated production excluding ttH (Run 1 & Run 2 perspective) -- ATLAS & CMS combined presentation at the 25th Workshop on Weak Interactions & Neutrinos, Heidelberg, Germany, June 8-13, 2015

43. **Prolay K Mal**, Top-antitop cross-section measurement with CMS detector – Physics seminar at IIT Bombay, November 20, 2015

44. **Prolay K Mal**, Recent Top Physics Results from the CMS@LHC – Physics seminar at IUAC, New Delhi, December 14, 2015

Recognitions:

1. Shanti Swarup Bhatnagar Prize for Physical Sciences, 2015 – **Bedangadas Mohanty**
2. **Dr. Colin Benjamin** awarded DAAD, Germany Research stay at RWTH Aachen University, Germany to work on Mesoscopic physics from May 23July 22, 2016.

Doctoral degree awarded to Ph.D. Students:

1. Rihan Haque:
   Supervisor - Prof. Bedangadas Mohanty

Outreach program:

1. **S. Bedanta** delivered a lecture to school students in Salipur, Cuttack, Odisha in July 2015.
2. **Ritwick Das** delivered lectures on "Lasers & Nonlinear Optics" at Paradip College, Paradip (Odisha) and Gopabandhu Science College, Athgarh (Odisha) as a part of Optical Society of India's (OSI) Foundation Lecture Series (2014-15).
3. **Colin Benjamin**:- Led Informal discussions with students and faculty interested in quantum games at the International School And Conference On Quantum Information – 2016, Institute of Physics, Bhubaneswar
4. **Bedangadas Mohanty**, Origin of Mass, DST INSPIRE Internship Programme, KIIT, Bhubaneswar, March 22, 2016
5. **Bedangadas Mohanty**, Recent Discoveries in High Energy Physics, Foundation Day celebrations of Bigyan Prachar Samiti,Cuttack, December 20, 2015.
6. **Bedangadas Mohanty**, Nurturance Programme For NTS Awardees -2016, Regional College of Education, Bhubaneswar, January 05, 2016
7. **Bedangadas Mohanty**, Recent Discoveries in Physics - understanding of the Universe, National Science Day Celebrations at KIIT, Odisha, February 27, 2016
8. **Bedangadas Mohanty**, Origin of Mass, DST, INSPIRE Camp at NIST, Berhampur, Odisha, January 31st 2016
9. **Bedangadas Mohanty**, Basic Science and Make in India, Foundation Day of Arya School of Management & Information Technology, Bhubaneswar, March 11, 2016.
10. **Bedangadas Mohanty**, Origin of Mass, DST INSPIRE Internship Programme, KIIT, Bhubaneswar, August 22, 2015

Major research facilities in School of Physical Sciences:

1. Cryogenic Free Physical Property Measurement System:

This is an equipment for measurements of electronic transport and magnetization properties of various materials at high fields and low temperatures. The system is capable of cooling small specimens down to 2 Kelvins without needing any liquid Helium supply using a closed cycle Helium gas compressor with pulse-tube cold head. The superconducting solenoid can

provide a field up to 9 Tesla parallel and perpendicular to the specimen. This instrument will support various low temperature research activities in the institute such as (i) proximity effect between superconducting and magnetic layers, (ii) transport in Josephson devices, (iii) multi-ferroic materials research (iv) transport in semiconducting and superconducting nanowires, (v) nano-magnetism in patterned magnetic arrays, etc.

2. **Low-temperature magnetoresistance set-up:**

   A low-temperature cryostat has been procured and is going to be installed in the Laboratory of Nanomagnetism and Magnetic Materials (LNMM) in School of Physical Sciences, NISER in 2015-2016. With this set-up magnetoresistance can be measured down to 1.7 K and in a magnetic field of about 7 Tesla. This cryostat has two optical windows with which in future the set-up can be modified to a low-temperature magneto-optic Kerr effect measurement set-up.

3. **Major facilities:**

- Low temperature high field transport property measurement system
- UHV multi-target sputter miller system
- Facility to study the study strong optical non-linearity for quantum state of light

School of Humanities and Social Sciences

Dr. Pranay Swain, Reader-F (Chairperson)

Public Policy and Governance: public policy research aims at facilitating a better understanding of issues related to governance and public affairs and bridging the gap by offering to can analyse the actual implementation of policies by drawing upon comparative and international perspectives in public policy.

Voluntary Sector and Development: with the third sector assuming increasingly significant and creating a huge niche in social development the aim is to enhance our knowledge of the sector through independent and critical research. We also aim to better understand the value of the sector and how this can be maximized in terms of developmental interventions in an array of sectors.

Science Society Interface: Historically science has been steadily contributing in terms of shaping human thinking. As Herbert Spencer puts it Society has evolved through the three stages of evolution, namely theological, metaphysical and positive. Rational thinking and problem solving are two of the major hallmarks of science. However, there is need to continuously study the interactions between science and society that are designed to maintain the balance between scientific quality, political legitimacy and societal relevance

Contemporary Social Issues: In order to achieve effective solutions to societal problems that involve science and technology, there is a need to understand the changing priorities and the patterns in social life. With technology driven life-style gripping the young generation, the resultant social issues must be addressed with fair amount of details. Our aim is to deep dive into the social transformation due to digital life style and offer valuable insights.

Dr. Debashis Pattanaik, Assistant Professor

Social networks for co-creation of knowledge: My

research work is related to the understanding of knowledge diffusion and role of social networks. Social networks provide rich and systematic means of assessing informal networks In addition to mapping information flow; it also helps us in relational characteristics of knowledge, access, and engagement. My research focuses on analysis of the dimensions of relationships that precede or lead to effective knowledge sharing, and an understanding and tools and techniques that improves a network's ability to create and share knowledge.

Dr. Rooplekha Khuntia, Assistant Professor

Business Ethics and Organizational Behaviour: Human behaviour is a result of their individual characteristics as well as the context in which they are placed. My research is about people working in organizations and understanding their behaviour from a person-situation interaction perspective. Exploring people's behaviour within a broader context of work culture, leadership characteristics as well human values and personal belief systems as applied to ethical decision making is the core of my research. Also included in my research is work stress and work life balance - the challenges of a dynamic evolving world like.

Dr Joe Varghese Yeldho, Assistant Professor

Dr Yeldho's research areas focus on Critical History and Narratives of Race, Event Studies, Pedagogy and the Public Sphere, Architecture and Performance, Topology and Affordances

Dr Amarendra Das, Assistant Professor

I obtained my MA in Economics degree from Utkal University in 2004 and obtained MPhil in Applied Economics in 2006, and PhD Degree in Economics from the Centre for Development Studies, Thiruvananthapuram, which is affiliated to the Jawaharlal Nehru University, New Delhi in April 2012. I started my professional career from the Department of Analytical and Applied Economics, Utkal University, Bhubaneswar on March 06, 2010. In July 2013 I went on deputation from Utkal University to work in the Fourteenth Finance Commission of India as a Deputy Director up to October 2014. Again I worked in Utkal University from November 2014 to November 2015. I joined the School of Humanities and Social Sciences on December 01, 2015. At Utkal University I have taught Micro Economics, Public Economics, Environmental Economics, International Trade and Finance and Development Economics to MA students. I have taught computer application in Economics to PhD scholars and Contemporary Issues in Indian Economy to MPhil students at Utkal University. My teaching and research interest lies in Public Economics and Environmental Economics. At NISER I am teaching Introduction to Economics and Environmental Economics and Environmental Impact Assessment to the Integrated MSc students and Environmental Economics and Ecological Economics and Research Methodology to PhD Students.

Publication

1. Das Amarendra and Satyananda Acharya (2016) 'Mining and Odisha's Economy' in The Economy of Odisha: A Profile, eds, Pulin B. Nayak, Santosh C. Panda, and Prasanta K. Pattanaik, Oxford University Press, New Delhi
2. Swain, P.K. & Ray, S. P. (2015). State Intervention in Epidemic Prevention: the Case of Bird-flu Out-break in India, International Journal of Management and Social Sciences Research, Vol IV, No. 12 (ISSN: 2319 – 4421)
3. Swain, P.K . (2015). Water Contamination and Health Concerns: Exploring Appropriate

Technology to trim down the Predicaments in Odisha, Proceedings of Odisha Environment Congress-2015, pp. 216-223

4. Yeldho, Joe Varghese and Jaya Shrivastava. "A Cognitive Approach to Trauma Narrative in Toni Morrison's A Mercy." Language and Semiotic Studies. 2.1 (2016): 133-145.
5. Yeldho, Joe Varghese. "The Ecology of Time in Alice Walker's The Color Purple." Alice Walker's The Color Purple: Critical Perspectives. Ed. Devaleena Das. Delhi: Pencraft Publishers, 2016. 133-154.

Seminars /Conferences

- Pranay Kumar Swain, Financial Inclusion and Indian Securities Market: reaching out to the rural (and possibly reluctant) investors, at SEBI, Mumbai on 16 February 2016.
- Pranay Kumar Swain, Water Contamination and Health Concerns: Exploring Appropriate Technology to trim down the Predicaments in Odisha, Odisha Environment Congress, Bhubaneswar 22-24 December 2015
- Amarendra Das, Localising Global Values and Action: what the SDGs mean for local government in South Asia', at Indian Institute of Management Calcutta, Kolkata, India during 28-29 January 2016
- Amarendra Das, 'Does Sanitation affect Health Outcomes? Evidence from India' 52nd Annual Conference of The Indian Econometric Society at IIM Kozhikode, Kerala, during 4-6 January 2016.
- Joe Varghese Yeldho, "Rachel Carson and Jane Jacobs: The Pedagogy of Decay." Presented at 18th Forum on Contemporary Theory (FCT) International Conference on The Wider Significance of Nature (December, 2015), Ravenshaw University, Cuttack.

Colloquium

Prof. Mithila Bihari Sharan, The Psychology of Super-conscious Mind, 21 August 2015

Outreach Programme

- Pranay Kumar Swain, Social Productivity in Science: why do I need to do Science, at IHSE, SoA University, Bhubaneswar, July 2015

Research and Development Projects: Extraural Funding

New Project Sanctioned During 1st April 2015 to 31st March 2016											
	Funding Agency									Total	Fund Sanctioned (Rs.)
School	DAE	DST	DBT	SERB	CSIR	ICMR	IFCPAR	MES	MOD		
SPS		1		1						2	5524000
SMS		2								2	2600000
SBS				5						5	25469074
									GRAND TOTAL	9	33593074

Project Sanctioned during 1st April 2015 to 31st March 2016

Project Sanctioned During 1st April 2015 to 31st March 2016					
SL No.	Title of the Project	Source of Funding	Name of the Principal Investigator	School	Amount Sanctioned
1	Electric field induced spin wave spectra in multi ferroic antidote lattice arrays.	DST	Dr. Subhankar Bedanta	SPS	1724000
2	Ramanujan fellowship	SERB	Dr. Nishikanta Khandai	SPS	3800000
3	Ramanujan fellowship	SERB	Dr. Sanjita Banerjee	SBS	8900000
4	Molecular mechanistic study of interaction between FRGI and IQGAP2 with special focus on angiogenesis and tumorigenesis.	SERB	Dr. Manjusha Dixit	SBS	5674874
5	Regulation of cytoskeletal components by TRPV receptors and vice versa relevant in cancer and neuropathic pain	SERB	Dr. Chandan Goswami	SBS	3399000
6	Role of the putative domains of GIGANTEA and their functions thaliana.	SERB	Dr. K.C. Panigrahi	SBS	4205200
7	Dissecting Phytochrome regulated yield components in Rice introgression lines and EMS mutants tolerant to low Red/Far-red light quality	SERB	Dr. Madhusmita Panigrahi	SBS	3290000
8	DST INSPIRE FACULTY AWARD	DST	Dr. Manas Sahoo	SMS	700000
9	DST INSPIRE FACULTY AWARD	DST	Dr. Lakshmi Sankar Kalappattil	SMS	1900000
				TOTAL	33593074

Fourth Graduation Ceremony

The 4th graduation ceremony of NISER was held on 6th June 2015. Honorable Chief Guest Dr. R.K.Sinha , Chairman AEC , Padmabhusan Prof S.K.Joshi, Chariman Board of Governors and Guest of Honour Mr Gokul Chandra Pati, Chief Secretary Govt of Odisha graced the occasion and awarded the degrees to the graduated students.

Three PhD scholars and 59 MSc Integrated programme students graduated in the 4thconvocation ceremony. Mr.Amudhan K.U of the School of Mathematical Sciences was awarded a gold medal for outstanding overall performance of the year. He was also awarded a silver medal for best academic performance in Mathematics. Similarly, Mr.Jyotisman Ch. Sahoo from the School of Physical Sciences, Ms. Adyasha Panigrahi from the School of ChemicalSciences and Mr.Anurag Priyadarshi from the School of Biological Sciences received the silver medals for the best academic performance in their respective schools. Offers for doctoral programmes poured in from reputed universities from all over the world.

Infrastructure

Existing Infrastructure in Transit campus:

- It has an infrastructure worth Rs 15 cores including an academic-cum-administrative building of 5000 sq. meters within Institute of Physics campus.
- A hostel for girls of 1781 Sqr. meter inside Institute of physics campus.
- Initial expenditue of Rs 56 crores for the laboratories of different schools in the transit campus which include

Permanent Campus at Jatni

The academic complex at permanent campus comprises of a total built up area of 72,700 square metres spread in 11 buildings. The residential township has a built up area of 102,000 square metres comprising nine buildings for hostels, adequate number of faculty and staff quarters and one Directors' Bungalow. The sports complex is going to have a student activity centre, aquatic sports complex and playground.

NISER permanent campus project at Jatni comprises a total of 127 buildings. The building comprises of various types like Academic buildings, Amenities buildings, Service buildings, Residential buildings, Hostels etc.

Academic building consists of Schools of Chemical Science, Biological Science, Library, Physical Science, Mathematical Science, Humanities and Social Science, Green House, Animal House, Auditorium, Workshop and Meditation centre.

Amenities building consist of Health centre, bank and Post office, Primary school, Community Centre and shopping complex, Student activity centre and

Aquatic complex.

Service building consists of AC plant room, Main receiving station (MRS), Local control substations (LCS), Gas bank, water works and gate house.

Residential Buildings consist of Flats of A, B, C, D and individual duplex houses like E type, Dean Bungalow and Director Bungalow.

Hostels consist of Double Occupancy and single occupancy.

The campus has been shifted to its permanent campus on 1st June 2015 after which the works department is very much actively participating the needs of its end users i.e. staff, faculty members and residents.

As the peak demand water supply from Naraj Barrage is likely to take 2-3 years, temporary arrangement to the tune of 5 MLD (Million Litre per day) is being made by Government of Odisha by constructing the bore well at Bhimpur near Jatni. The interim water supply with the electrification of the pump panel room was successfully done in the month of March 2015.

Rain water harvesting structures like ground water recharging pits and ponds have been come up in the Jatni campus of NISER.

The water to the campus is to be filled in the water tank placed at the hill top from where the water is filled to the respective water tanks at the multi storied buildings through gravity which is economical as far as the expenditure with regards to keeping a pump and its operation and consumption of diesel etc.

The sewage treatment plant is in place. The treated water from the plant can be used for arboriculture and other useful purposes etc.

PM Dedicates NISER to the Nation

NISER has just completed one year of functioning from its permanent campus at Jatni. On 7th February 2016, the Honourable Prime Minister, Shri Narendra Modi dedicated NISER to the nation.

The honourable Governor of Odisha Dr S C Jameer, the Honourable Chief Minister of Odisha Shri Naveen Pattnaik, the Union Minister of Tribal Affairs Shri Jual Oram, the Union Minister of State (I/C) of Petorleum and Natural Gas Shri Dharmendra Pradhan, the Union Minister of State (I/C) of Department of Atomic Energy Dr Jeetendra Singh, MP of Bhubaneswar Dr Prasanna Kumar Patsani and the Chairman of Atomic Energy Commision and Secretary Department of Atomic Energy Dr Sekhar Basu graced the occasion.

Speaking on the occasion, the Prime Minister said innovation is the need of the hour for every society and every era. In this context, he mentioned India's space programme, which had begun from scratch, and which has now caught the attention of the whole world. He called upon young scientists to be similarly inspired to achieve and to serve the people through their work. The Prime Minister hoped that an environment of innovation would be fostered among scientific institutions. In the context of NISER, situated in Odisha, he mentioned the possibilities for innovation in areas such as coal gasification and clean energy, the blue economy, and housing for all by 2022.

The Prime Minister urged NISER to work towards a green campus, and a zero-emission, zero-discharge campus.

(http://pib.nic.in/newsite/PrintRelease.aspx?relid=136173)

Outreach Programmes

1. **S. Bedanta** delivered a lecture to school students in Salipur, Cuttack, Odisha in July 2015.
2. **Ritwick Das** delivered lectures on "Lasers & Nonlinear Optics" at Paradip College, Paradip (Odisha) and Gopabandhu Science College, Athgarh (Odisha) as a part of Optical Society of India's (OSI) Foundation Lecture Series (2014-15).
3. **Colin Benjamin**:- Led Informal discussions with students and faculty interested in quantum games at the INTERNATIONAL SCHOOL AND CONFERENCE ON QUANTUM INFORMATION – 2016, Institute of Physics, Bhubaneswar
4. **Bedangadas Mohanty**, Origin of Mass, DST INSPIRE Internship Programme, KIIT, Bhubaneswar, March 22, 2016
5. **Bedangadas Mohanty**, Recent Discoveries in High Energy Physics, Foundation Day celebrations of Bigyan Prachar Samiti,Cuttack, December 20, 2015.
6. **Bedangadas Mohanty**, Nurturance Programme For NTS Awardees -2016, Regional College of Education, Bhubaneswar, January 05, 2016
7. **Bedangadas Mohanty**, Recent Discoveries in Physics - understanding of the Universe, National Science Day Celebrations at KIIT, Odisha, February 27, 2016
8. **Bedangadas Mohanty**, Origin of Mass, DST, INSPIRE Camp at NIST, Berhampur, Odisha, January 31st 2016
9. **Bedangadas Mohanty**, Basic Science and Make in India, Foundation Day of Arya School of Management & Information Technology, Bhubaneswar, March 11, 2016.
10. **Bedangadas Mohanty**, Origin of Mass, DST INSPIRE Internship Programme, KIIT, Bhubaneswar, August 22, 2015.
11. **Pranay Kumar Swain**, Social Productivity in Science: why do I need to do Science, at IHSE, SoA University, Bhubaneswar, July 2015.
12. A Summer Outreach Program in Mathematics (SOPM) is organized by the school from 1st-12th June 2015.

Miscellaneous

Public Awareness on Plantation and go-green

Plantation drives have been a regular feature at NISER permanent campus being constructed at Jatni. Every year while celebrating the significant days such as: Republic Day, Independence Day and NISER Foundation Day, the staff, students and faculty members of NISER participate in the go-green drive sending out a message to the stakeholders and public at large to care for and preserve our immediate environment. Over a thousand of saplings have so far been planted. In addition to this, as a plantation drive and under the leadership of Registrar, NISER with help of Forest department already around 10,000 plants have been planted inside the campus which are being maintained by the forest department. Apart from this with the induction of malls and award of contract various plantation have been taken up at large with a target to make the campus as the most greenest campus in India and in world later. This was the pledge taken after the NISER was officially dedicated to Nation by Honorable Prime Minister, Shri Narendra Modi on 7th February 2016.

Vigilance Awareness Week

The vigilance awareness week was observed during 26 October 2015- 31 October 2015. This year the theme of Vigilance Awareness Week was "Preventive Vigilance as tool of Good Governance". All the employees of NISER took the oath of official secrecy and pledged for maintenance of honesty and transparency while delivering their work. Essay and debate competitions were held on the above mentioned topic which saw participation of members of NISER family in a large number.

Sadbhavana Diwas

The Sadbhavana Diwas was observed 20th August 2015. All the officers and employees took the Sadbhavana Pledge for maintaining communal harmony.

Official Language Implementation:

The implementation of official language in the institute is gaining momentum day-by-day. This year we have shifted to our permanent campus at Jatni and various new sections have become functional. Accordingly, the Official Language Implementation Committee (OLIC) of NISER was reconstituted to include the representative from each section. During the year various activities to encourage use of Hindi in official works at NISER were conducted. Few of them are mentioned below:

1. Conduction of classes for "Praveen" course for 20 staff members of NISER under Central Hindi Teaching Scheme of Government of India.

2. Organization of joint Hindi seminar on "Role of Science & Technical Institutions in Start-up India programme.

3. Hindi fortnight was observed during September 16th to 30th, 2015. A series of activities were conducted which includes distribution of Hindi to English and English to Hindi Dictionaries to all the sections of the Institute, conduction of Hindi Film Quiz Competition, Hindi Essay Writing competition etc. Prizes & certificates were given to the winners of the competition.

Students Activities

Placement

The batch11 students who are due to graduate in June 2016 have bagged offers for Ph.D. positions from various universities in India and abroad. In India, they have secured positions at TIFR, NCBS and IITs. From abroad, students have received offers from various universities including 13 universities under top 50 global rankings in respective subjects, some of them are University of Oxford, ETH Zürich, University of Illinois at Urbana-Champaign, University of Wisconsin-Madison, Texas A&M University, University of Michigan, RWTH Aachen University, University of British Columbia, Rice University.

Cultural festival: Udbhava

Udbhava is the annual cultural festival of NISER organized by the Students Gymkhana. Typically spread over several days the festival offers a window to our students to unfold their creativity. The annual fest includes food fest, NISER ball, Rangoli, Sapere Aude, Abhivyakti, Talent Show, DJ Nite, Spelling Bee, Treasure Hunt, Mime, Shipwreck, They extend the activities to the entire NISER family. Udbhava-15 was conducted during 18 – 20 March 2016.

SPIC-MACAY NISER Chapter

It is heartening to note that after a long association with SPIC-MACAY for quite some time, NISER students now have a formal NISER chapter. The student volunteers, in spite of their tight academic schedule, organize various events round the year. On 17th March 2016, the SPICMACAY NISER chapter organized a concert of the renowned Sarod exponent Pt. Tejendra Narayan Majumdar who was accompanied by the famous Tabla maestro Shri Soumen Sarkar.

Another concert of Pt. Vishwamohan Bhatt, the world renowned Mohan Veena exponent and a Padma Shri, SangeetNatak Academy and Grammy awardee was organized on 14 November 2015.

Sports

Sports and games constitute a major part of campus life for our students. It is not just a coincidence than the words like "students", "science" and "sports" start with the same letter. Sports wise also, our students have quite a busy annual calendar. Apart from the regular sporting activities, the students organize their NISER Premier League and NISER Football League twice a year and the Annual Sports Meet.

The graduating batch of students participated enthusiastically in the sports events and won Institute General Championship twice in 2012-2013 and 2014-2015. The students of this batch brought laurels to the institute clinching 12 individual and 3 team medals at Inter IISER Sports Meet during their stay. 6 students of this batch also captained the various team sports in inter college events. Going forward, I am sure the students will have better sports infrastructure when our Sports Complex with the Students Activity Centre, Gym, aquatic complex, etc. are ready.

Drama and Music Club

NISER students have a very vibrant drama and music club. The students showcase their artistic creativity through activities on various festive occasions. To name a few, they put up cultural activities during Holi, Diwali, Eid, Chirstmas. Koffee with Kishore is another event that the students organize every year on a grand scale to commemorate the birthday of the legendary singer Kishore Kumar.

Social Initiative: ZARIYA:

The social service club of NISER has been actively taking measures to address some major societal issues which include education of children residing in the slums, donation of clothes to the needy and cleanliness drives.Our students at NISER have given an expression of their compassionate minds by forming an organization named "Zariya" to serve as a medium for translating their concern and feeling for their fellow beings.

"EXSURGO- You run, they learn" - a youth marathon where participants from institutions from across the city ran for the cause of "Child Education" on 20 march 2016. The money raised through the event was donated for sponsoring education for out of school children. They also organized blood donation camps

Walking book fairs organise periodic book exhibition to aid the social club, Zariya. Portion of the profits made gets invested in creating the library of books inthe slums for the slum kids, opposite the Institute of Physics campus. They also hold personal reading and story-telling sessions to create a habit of readings among the slum kids.

NEST-2015

Intake to the Flagship programme: NEST-2015

National Entrance Screening Test (NEST) for admission to National Institute of Science Education and Research (NISER), Bhubaneswar and University of Mumbai - Department of Atomic Energy Centre for Excellence in Basic Sciences (UM-DAE CBS), Mumbai was conducted at 79 Centres in 49 cities across the country on 30th May 2015.

For NEST-2015, 8 new centres were added. Those are Balangir (OD), Dharwad (KA), Ghaziabad (UP), Jamshedpur (JH), Jodhpur (RS), Kanpur (UP), Rourkela (OD) and Thrissur (KL).

As against 33503 in 2014, 46617 applications were received for NEST-2015. The number reinforces the growing popularity of science education in general and NISER in particular.

The results were declared on 19th June 2015 and subsequently admission counselling was held for offering admission to the 5 yrs integrated MSc programme.

Brief summary of the application is as follows:

Gender	**GEN**	**OBC**	**DTVJNT**	**SC**	**ST**	**PD**	**Total**
Male	15212	7823	56	2447	919	178	26635
Female	12514	5450	49	1364	538	67	19982
						Total	**46617**

State of Domicile	Number	Percentage
Odisha (OD)	12672	27.183
Kerala (KL)	5486	11.768
Uttar Pradesh (UP)	4746	10.181
West Bengal (WB)	3684	7.903
Bihar (BR)	2486	5.333
Rajasthan (RJ)	2302	4.938
Maharashtra (MH)	2181	4.679
Madhya Pradesh (MP)	1437	3.083
Andhra Pradesh (AP)	1423	3.053
Haryana (HR)	1265	2.714
Telangana (TS)	1150	2.467
Jharkhand (JH)	1085	2.327

Tamil Nadu (TN)	1014	2.175
Delhi NCR (DL)	986	2.115
Himachal Pradesh (HP)	857	1.838
Punjab (PB)	632	1.356
Chhattisgarh (CT)	622	1.334
Uttarakhand (UK)	491	1.053
Karnataka (KA)	469	1.006
Assam (AS)	393	0.843
Gujarat (GJ)	330	0.708
Tripura (TR)	268	0.575
Arunachal Pradesh (AR)	237	0.508
Jammu & Kashmir (JK)	114	0.245
Chandigarh (CH)	105	0.225
Puducherry (PY)	76	0.163
Meghalaya (ML)	39	0.084
Goa (GA)	23	0.049
Manipur (MN)	14	0.03
Dadra & Nagar Haveli (DN)	10	0.021
Sikkim (SK)	9	0.019
Andaman & Nicobar (AN)	3	0.006
Daman & Diu (DD)	3	0.006
Mizoram (MZ)	2	0.004
Nagaland (NL)	2	0.004
Lakshadweep (LD)	1	0.002
TOTAL	**46617**	**100**

NISER Act

NISER has an affiliation with Homi Bhabha National Institute (HBNI), a deemed University within the Department of Atomic Energy, for the award of degrees. Efforts are on to make NISER a Constituent Institute of HBNI. Considering the vision and size of NISER and to keep the Institute at par with other Institutes of national importance such as IITs, IISc, IISERs, etc. a separate NISER Act is deemed imperative and must be made at the very earliest. A draft Act and Rules & Bylaws has been approved by the BoG, NISER and been sent to DAE for further processing at the AEC and higher levels.

List of NISER Administrative Staff

SL No	Name of the Employee	Designation
1	Dr. A. K. Naik	Registrar
2	Shri. Y. K. Srinath	Finance Officer
3	Shri. Deepak Srivastava	Stores & Purchase Officer
4	Mrs. Shabnam Khanum	Assistant Personnel Officer
5	Shri. Dinesh Bahadur Singh	Assistant Personnel Officer
6	Shri. Rajeev Kumar Singh	Assistant Personnel Officer
7	Shri. Bibhupada Tripathy	Administrative Officer-III
8	Shri. Ramakant Kar	Administrative Officer-III
9	Smt. A B Rosy	Office Assistant (MS)
10	Shri. D. Lingaraj	Office Assistant (MS)
11	Shri. Sujit Kumar Bastia	Office Assistant (MS)
12	Smt.Smruti Kanungo	Office Assistant (MS)
13	Ms. Monalisa Baliarsingh	Office Assistant (MS)
14	Shri. Vijay Singh	Office Assistant (MS)
15	Shri. Madhusudan Padhy	Office Assistant (MS)
16	Smt. Lipsa Das	Office Assistant (MS)
17	Smt. Lopamudra Sahoo	Office Assistant (MS)
18	Shri. Nabin Kumar Sahoo	Office Assistant (MS)
19	Smt. Banita Pradhan	Office Assistant (MS)
20	Smt. Elina Das	Office Assistant (MS)
21	Shri. Amarendra Kumar Behera	Office Assistant (MS)
22	Shri. Ranjan Kumar Das	Office Assistant (MS)
23	Shri. Abhaya Kumar Mohanty	Assistant Personnel Officer
24	Shri. Hiralal Das	Assistant Personnel Officer
25	Smt. Apolina Lakra	Office Assistant (MS)

26	Shri Susanta Kumar Sethi	Operator (General Function)
27	Ms. Sasmita Sahoo	Operator (General Function)
28	Ms. Sandeepa Sahoo	Operator (General Function)
29	Shri Subrat Ranjan Hota	Operator (General Function)
30	Shri Jogendra Jena	Operator (General Function)
31	Shri Tusar Kanta Sahoo	Operator (General Function)
32	Shri Pradeep Kumar Mishra	Assistant Personnel Officer
33	Shri Chandra Sekhar Mahapatra	Assistant Personnel Officer
34	Shri Gopal Krishna Rath	Assistant Personnel Officer
35	Shri Purna Chandra Sahu	Assistant Personnel Officer
36	Ms. Bishnupriya Das	Operator (General Function)
37	Shri D. Govinda Rao	Deputy Controller of Accounts
38	Shri Dolananda Pradhan	Assistant Personnel Officer
39	Shri Dhaneswar Nayak	Assistant Personnel Officer
40	Shri Sanjay Kumar Patro	Assistant Personnel Officer
41	Shri Chitta Ranjan Nayak	Clerk - A
42	Ms. Babita Pradhan	Clerk - A
43	Shri M Siba Prasad Rao	Clerk-A
44	Shri Biplab Kanungo	Clerk - A
45	Shri Bijay Kumar Behera	Clerk - A

Scientific and Technical Staff

SL. No.	NAME OF EMPLOYEES	DESIGNATION
1	Shri. Ranjan Kumar Rana	Scientifc Assistant 'D' Electrical
2	Shri. Jitendra Narayan Dash	Scientifc Assistant 'D' Library
3	Shri. Dipak Kumar Rout	System Administrator
4	Shri. Deepankar Dash	System Manager
5	Shri. Susanta Kumar Parida	Laboratory Operator
6	Shri. Bikash Chandra Behera	Laboratory Operator
7	Shri. Ramprasad Panigrahi	Laboratory Operator
8	Dr. Shyamasree Basu	Scientific Officer 'E'
9	SK Safatulla	Technician-B (Library)

10	Dr. Sudakshina Prusty	Scientific Officer 'F'
11	Ms. Anuradha Das	Technician-C
12	Smt. Smita Prusty	Technician-C
13	Shri Sanjaya Kumar Mishra	Laboratory Operator
14	Shri Alok Kumar Jena	Laboratory Operator
15	Shri Deepak Kumar Behera	Laboratory Operator
16	Shri Rudranarayan Mohanty	Laboratory Operator
17	Shri Pravakar Mallick	Laboratory Operator
18	Shri V.A. Sakthivel	Laboratory Operator
19	Ms. Suchismita Dash	Library Technician
20	Shri Rabindra Kumar Maharana	Library Technician
21	Dr. Gunda Santosh Babu	Scientific Officer 'D'
22	Shri Subhransu Sekhar Panda	Operator (Lab. Function)
23	Shri Mukesh Kumar Meena	Operator (Lab. Function)
24	Dr. Arun Kumar	Scientific Officer 'E'
25	Shri Amit Sankar Sahu	Operator (Lab. Function)
27	Dr. Saurabh Chawla	Scientific Officer 'D'
28	Shri Souvagya Mahapatra	Scientific Officer 'D' Civil
29	Shri Dilip Jha	Scientific Officer 'D' Electrical
30	Shri Saikat Hira	Scientific Officer 'E'
31	Shri Amit Kumar Panigrahi	Scientific Assistant
32	Shri Bhagaban Dhal	Scientific Assistant
33	Shri Pramod Kumar Nath	Scientific Assistant
34	Shri Binod Bhagat	Scientific Assistant
35	Dr. Ranbir Singh	Scientific Officer 'D'
36	Shri Ajit Kumar Raut	Scientific Assistant 'B'
37	Shri Ajit Kumar Mohanty	Scientific Assistant 'B'

Audited Statement of Accounts
&
Statutory Auditor's Report
Financial Year 2015-16

National Institute of Science Education
and Research, Bhubaneswar

Auditor

P K NAYAK & CO.

CHARTERED ACCCOUNTANTS
446, Sahid Nagar, Bhubaneswar-751007, Odisha
Tel.: 0674-2547560, Email: pknayakco@yahoo.com

P K NAYAK & CO.
Chartered Accountants

446 – SAHID NAGAR
Bhubaneswar-751007
Tel.: 0674-2547560 / 2545560
Fax : 0674 - 2545491
Email: pknayakco@yahoo.com

INDEPENDENT AUDITORS' REPORT

TO
THE MEMBERS
National Institute of Science Education and Research,
P.O:Jatni,Dist:Khurda,Odisha
PIN-752050

We have audited the accompanying financial statements of National Institute of Science Education and Research ('The Institute'), which comprise the Balance Sheet as at 31 March 2016, the Income and Expenditure account and the cash Receipt & Payment account for the year then ended, and a summary of significant accounting policies and other explanatory information.

Management's Responsibility for the Standalone Financial Statements

The management is responsible for the preparation of these financial statements that give a true and fair view of the financial position, financial performance of the Institute in accordance with the accounting principles generally accepted in India. This responsibility also includes maintenance of adequate accounting records for safeguarding the assets of the Institute and for preventing and detecting frauds and other irregularities; selection and application of appropriate accounting policies; making judgments and estimates that are reasonable and prudent; and design, implementation and maintenance of adequate internal financial controls, that were operating effectively for ensuring the accuracy and completeness of the accounting records, relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these financial statements based on our audit. We have taken into account the accounting and auditing standards generally accepted in India.

We conducted our audit in accordance with the Standards on Auditing issued by the Institute of Chartered Accountants of India. Those Standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and the disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal financial control relevant to the Institute's preparation of the financial statements that give a true and fair view in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on whether the Institute has in place an adequate internal financial controls system over financial reporting and the operating effectiveness of such controls. An audit also includes evaluating the appropriateness of the accounting policies used and the reasonableness of the accounting estimates made by the Institute as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion on the standalone financial statements.

P. K. NAYAK & CO. BHUBANESWAR CHARTERED ACCOUNTANTS

Contd...P/2

P. K. NAYAK & CO.

Opinion

In our opinion and to the best of our information and according to the explanations given to us, the aforesaid financial statements give the information required by the Act in the manner so required and give a true and fair view in conformity with the accounting principles generally accepted in India,

Further to our observations annexed hereto, we report as follows:

1. 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.

2. In our opinion proper books of accounts have been kept by the Institute so far as appears from our examination of those books.

3. The Balance Sheet and the Income and Expenditure Account dealt with by this report are in agreement with the books of accounts maintained by the Institute.

4. In our opinion and to the best of our information and according to explanations given to us the said accounts give a true and fair view:

   (i) In the case of the Balance Sheet, of the state of affairs of the Institute as at 31st March, 2016.

   AND

   (ii) In the case of Income and Expenditure Account of the excess of expenditure over income for the year ended on that date.

For **P. K. NAYAK & CO.**
Chartered Accountants
FRN - 318155E

Sucanta Kumar Sahoo

(CA. S. K. Sahoo)
Partner
M. No. 060588

Place : Bhubaneswar
Date:03.09.2016

BALANCE SHEET AS AT 31ST MARCH, 2016

Amount in Rs.

Particulars	Schedule	As at 31st March, 2016	As at 31st March, 2015
CORPUS/CAPITAL FUND AND LIABILITIES			
CORPUS/CAPITAL FUND	1	6,796,773,950	6,602,717,987
RESERVES AND SURPLUS	2	-	-
EARMARKED/ENDOWMENT FUNDS	3	-	-
SECURED LOANS AND BORROWINGS	4	-	-
UNSECURED LOANS AND BORROWINGS	5	-	-
DEFERRED CREDIT LIABILITIES	6	-	-
CURRENT LIABILITIES AND PROVISIONS	7	49,353,528	48,011,879
TOTAL Rs.		**6,846,127,478**	**6,650,729,866**
ASSETS			
FIXED ASSETS	8	1,110,244,248	858,126,038
INVESTMENTS- FROM EARMARKED/ENDOWMENT FUNDS	9	-	-
INVESTMENTS-OTHERS	10	87,108,571	61,694,105
CURRENT ASSETS, LOANS, ADVANCES ETC.	11	5,648,774,659	5,730,909,723
MISCELLANEOUS EXPENDITURE (to the extent not written off or adjusted)		-	-
TOTAL Rs.		**6,846,127,478**	**6,650,729,866**
SIGNIFICANT ACCOUNTING POLICIES	24		
CONTIGENT LIABILITIES AND NOTES ON ACCOUNTS	25		

As per our report of even date attached

For P. K. NAYAK & CO.
Chartered Accountants
FRN - 318155E

Sucanta Kumar Sahoo

(CA. S. K. Sahoo)
Partner
M. No. 060588

(T. N. Sahoo)
Dy.Controller of Accounts

(CMA. Y.K.Srinath)
Finance Officer

(Prof.V.Chandrasekhar)
Director

Date:03.09.2016
Place: Bhubaneswar

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31ST MARCH, 2016

Amount in Rs.

Particulars	Schedule	For the Year Ended 31st March, 2016	For the Year Ended 31st March, 2015
INCOME			
Income from Sales/ Services	12	-	-
Grant / Subsidies	13	455,468,868	356,280,170
Fees / Subscriptions	14	10,195,556	8,041,730
Income from Investment	15	-	-
Income from Royalty, Publication etc.	16		-
Interest Earned	17	29,395,099	50,708,956
Other Income	18	-	-
Increase/(decrease) in stock of Finished goods and work-in-progress	19	-	-
TOTAL(A)		**495,059,523**	**415,030,856**
EXPENDITURE			
Establishment Expenses	20	244,119,229	197,138,290
Other Administrative Expenses etc.	21	156,879,211	73,705,488
Expenditure on Grants, Subsidies etc.	22	-	-
Interest	23	-	-
Depreciation(Net total at the year-end-corresponding to Schedule 8)		156,027,681	154,344,572
TOTAL(B)		**557,026,121**	**425,188,350**
Balance being excess of Expenditure over Income(B-A)		61,966,598	10,157,494
Add: Depreciation Adjustment		-	
Add: Prior Period Expenditure		(601,269)	436,570
Less: Prior Period Income		190,160	372,011
BALANCE BEING SURPLUS/(DEFICIT) CARRIED TO CORPUS/CAPITAL FUND		**(61,175,169)**	**(10,222,053)**
SIGNIFICANT ACCOUNTING POLICIES	24		
CONTIGENT LIABILITES AND NOTES ON ACCOUNTS	25		

As per our report of even date attached

For **P. K. NAYAK & CO.**
Chartered Accountants
FRN - 318155E

Sucanta Kumar Sahoo

(CA. S. K. Sahoo)
Partner
M. No. 060588

Date:03.09.2016
Place: Bhubaneswar

(T. N. Sahoo)
Dy.Controller of Accounts

(CMA. Y.K.Srinath)
Finance Officer

(Prof.V.Chandrasekhar)
Director

RECEIPTS AND PAYMENTS ACCOUNT FOR THE PERIOD FROM 1ST APRIL,2015 TO 31ST MARCH, 2016.

Amount in Rs.

RECEIPTS	For the Year Ended 31st March, 2016	For the Year Ended 31st March, 2015	PAYMENTS	For the Year Ended 31st March, 2016	For the Year Ended 31st March, 2015
I.Opening Balances			**I. Expenses**		
			a) Establishment Expenses		
a) Cash in Hand	8,682	3,606	**(corresponding to Schedule 20)**		
b) Bank Balances:			i. Pay and Allownaces	198,092,585	120,180,233
i) In current accounts	163,931,706	201,397,624	ii. Manpower (Outsourced)		16,445,493
ii) In deposit accounts	-	-	iii. Staff Welfare Expenses		-
iii) In Savings accounts	469,695,665	541,646,711	iv. Other Expenditure		-
			v. New Pension Contribution		9,269,040
			b) Administrative Expenses		
II. Grants Received			**(corresponding to Schedule 21)**		
a) From Government of India	710,000,000	518,346,000	i. Laboratory Consumable		-
b) From State Government	-	-	ii.Computer Consumables		-
c) From other sources	-	-	iii. Rent, Rates & Taxes		-
			iv. Duties & Taxes		-
III. Income on Investments	-	-	v. Other Expenditure	126,459,645	46,080,096
			vi. Prior Period Expenses		-
IV. Interest Received			vii. Niser XII plan	213,621,965	12,466,892
On Bank Deposits	29,395,099	50,708,956			
			II. Payments made against funds for various projects		-
V. Other Income					
a) Registration Fee (Msc & Phd)	466,136	7,486,454			
b) Job Application Fee	720,500		**III. Investments and deposits made**		-
c) Students Dues	-	703,800			
			IV. Expenditure on Fixed Assets & Capital		
d) Application fees	-	1,000	**Work- in- progress**		
e) Receipts of CIF, SCS	16,800	71,900	a) Purchase of Fixed Assets	231,680,879	375,443,893
f) RTI Application Fees	110	339	b) Expenditure on Capital WIP	5,953,568	5,125,794
g) Sale of Tender paper	225,550	265,500			
h) Guest House Rent	21,940	-	**V. Refund of Surplus money/loans**		
i) License Fees	245,935	175,602			
j) Misc. Receipt	4,317	-	**VI.Finance Charges(Interest)**		-
k) Transcript Fees	31,100	32,500			
l) Identity Card/Health Card(Deplicate) Fee	7,025	1,175	**VII. Other Payments**		
m) Income From IGCAR	-	420	a) Sundry Creditors	14,396	19,390,030
n) Summer course fee	-	12,000	b) Summer course fee	1,000	25,019,639
			c) Advance to Staff & Suppliers and Other	30,459,971	23,013,241
			d) Fellowship	671,500	21,289,892
			e) Scholarship	29,065,310	18,306,041
VI. Amount Borrowed		-	f) NISER R&D	151,332	1,017,919
			g) DCS & EM Mumbai		-
VII. Any other receipts (Loans, Advances & Expenses Recovered)			h) DCSEM-Medical Expenses	136,930	-
a) Security Deposit	9,665,087	-	i) IGCAR	30,402	-
b) E.M.D	970,687	5,489,290	j) Deposit (Asset) (LC)	191,944,499	-
c) Fellowship	-	322,500	k) Deans Allowance Receivable	48,000	66,000
d) NISER R&D	-	35,000	l) Prepaid Expenses	4,905,749	543,231
e) Conference/ Seminar	-	-	m) Lapsed Deposits (EMD/SD)		60,000
f) Prior Period Income	111,190	372,011	n)Security Deposit (Refundable)	96,840	2,382
g) Duties & Taxes	19,957,652	149,727	o) Duties & Taxes	19,878,745	
h)CBS, MUMBAI - (Msc Program Registration Fees)	70,000	80,000	p) EMD	5,729,731	
i)DCSEM-Medical Expenses-Receivable	393	53,754	q) NPS Receive SERB Delhi	346,560	
j) Statutory Recoveries	12,888,639	-	r) Scholarship Ashutosh Payable	270,900	
k) Student Dues	9,305,143	-	s) Statutory Recoveries	12,882,384	
l) Scholarship Ashutosh Payable	556,840	-	t) Student Dues	482,474	
m) NPS Receive SERB Delhi	348,480	-	u) Conference/ Seminar	210,066	
n) NISER R& D Payable	116,332	-	v) Loans & Advance (Asset)	114,247,479	
o) LSPC of Prof T. K. Chandrasekhar	241,413	-			
p) Ghuru Murughan Ganeshan	94,390	-	**VIII. Closing Balances**		
q) Deans Allowance Receivable	78,000	-	a) Cash in hand	32,375	8,682
r) Deposit (Asset) (LC)	166,530,033	-	b) Bank Balances:		
s) Loans & Advance (Asset)	6,628,526	-	i) In current accounts	344,916,783	163,931,706
t) Fellowship Receiveable	756,500	-	ii) In deposit accounts	-	-
u) Scholarship Payable	13,957,169	-	iii) In savings accounts	85,988,234	469,695,665
v) Sundry Creditors	220,253	-			
w) Liabilities for expenses	14,325	-			
x) NISER R& D Receivable	1,038,705	-			
TOTAL Rs.	**1,618,320,302**	**1,327,355,869**	**TOTAL Rs.**	**1,618,320,302**	**1,327,355,869**

For **P. K. NAYAK & CO.**
Chartered Accountants
FRN - 318155E

(CA. S. K. Sahoo)
Partner
M. No. 060588

(T. N. Sahoo)
Dy.Controller of Accounts

(CMA. Y.K.Srinath)
Finance Officer

(Prof.V.Chandrasekhar)
Director

Date:03.09.2016
Place: Bhubaneswar

Schedule -1 : Corpus / Capital Fund
(Schedule forming part of Balance Sheet as at 31.03.2016)

Amount In Rs.

Particulars	Current Year(2015-16)		Previous Year(2014-15)	
Balance as at the beginning of the year	7,550,000,000		7,550,000,000	
Add: Contribution towards Corpus/Capital Fund	700,000		-	
Add: XII Plan New Project	**488,346,000**		**188,346,000**	
Advance Materials for Different applications Grant	71,400,000		11,400,000	
Basic Research in Cellular and Moducular Grant	50,000,000		10,000,000	
Centre for Fundamental Studies Grant	17,396,000		5,896,000	
Experimental Condensed Matter Ultra Cold Atom Grant	114,100,000		31,600,000	
Experimental High Energy Physics Programme Grant	25,100,000		15,100,000	
Microbes Immunity and Rearch Biology Grant	56,900,000		21,900,000	
Novel Organic Compounds for Boimedical Grant	123,400,000		83,400,000	
Outreach Programmes in Maths and Systems Biology Grant	1,050,000		50,000	
Theoretical High Energy and Condensed Matter Grant	29,000,000		9,000,000	
Less: Grant Transferred to Revenue	71,749,038		26,280,170	
		7,967,296,962		7,712,065,830
Add/(Deduct): Balance of net income/ (expenditure) transferred from the Income and Expenditure Account	-	(1,170,523,012)	-	(1,109,347,843)
Balance as at the year end Total Rs.		**6,796,773,950**		**6,602,717,987**

Schedule -2 : Reserves & Surplus
(Schedule forming part of Balance Sheet as at 31.03.2016)

Particulars	Current Year(2015-16)		Previous Year(2014-15)	
1. Capital Reserve:				
As per last Account	-		-	
Addition during the year	-		-	
Less: Deduction during the year	-	-	-	-
2. Revaluation Reserve				
As per last Account	-		-	
Addition during the year	-		-	-
Less: Deduction during the year	-	-	-	
3. Special Reserve				
As per last Account	-		-	
Addition during the year	-		-	
Less: Deduction during the year	-	-	-	-
4. General Reserve				
As per last Account	-		-	
Addition during the year	-		-	
Less: Deduction during the year	-	-	-	-
TOTAL Rs.		-		-

For **P. K. NAYAK & CO.**
Chartered Accountants
FRN - 318155E
Sucanta Kumar Sahoo
(CA. S. K. Sahoo)
Partner
M. No. 060588

P. K. NAYAK & CO. BHUBANESWAR CHARTERED ACCOUNTANTS

(T. N. Sahoo)
Dy.Controller of Accounts

(CMA. Y.K.Srinath)
Finance Offic

(Prof.V.Chandrasekhar)
Director

Schedule -3 : Earmarked/Endowment Fund

(Schedule forming part of Balance Sheet as at 31.03.2016)

Particulars	Fund-wise break up								Totals			
	Fund WW		Fund XX		Fund YY		Fund ZZ		Current Year(2015-16)		Previous Year(2014-15)	
a) Opening balance of the funds		-		-		-		-		-		-
b) Additions to the funds:												
i. Donations/grants	-		-		-		-		-		-	
ii. Income from Investments made on account of funds	-		-		-		-		-		-	
iii. Other additions	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL Rs. (a + b)		-		-		-		-		-		-
c) Utilisation/Expenditure towards objectives of funds												
i. Capital Expenditure												
Fixed Assets	-		-		-		-		-		-	
Others	-		-		-		-		-		-	
Total		-		-		-		-		-		-
ii. Revenue Expenditure												
Salaries, Wages and allowances	-		-		-		-		-		-	
Rent	-		-		-		-		-		-	
Other Administrative expenses	-		-		-		-		-		-	
Total		-		-		-		-		-		-
TOTAL Rs. (c)		-		-		-		-		-		-
Net Balance at the year end (a+b-c)		-		-		-		-		-		-

For **P. K. NAYAK & CO.**
Chartered Accountants
FRN - 318155E

Sukanta Kumar Sahoo

(CA. S. K. Sahoo)
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M. No. 060588

(T. N. Sahoo)
Dy.Controller of Accounts

(CMA Y.K.Srinath)
Finance Officer

(Prof.V.Chandrashekar)
Director

Schedule -4 : Secured Loans and Borrowings

(Schedule forming part of Balance Sheet as at 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)		Previous Year(2014-15)	
1. Central Government		-		-
2. State Government (Specify)		-		-
3. Financial Institutions				
a) Term Loans	-		-	
b) Interest accured and due	-	-	-	-
4. Banks:				
a) Term Loans	-		-	
Interest accured and due	-		-	
b) Other Loans (specify)	-		-	
Interest accured and due	-	-	-	-
5. Other Institutions and Agencies		-		-
6. Debenture and Bonds		-		-
7. Others(specify)		-		-
TOTAL Rs.		-		-

For **P. K. NAYAK & CO.**
Chartered Accountants
FRN - 318155E

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(CMA. Y.K.Srinath)
Finance Officer

(Prof.V.Chandrasekhar)
Director

Schedule -5 : Unsecured Loans and Borrowings
(Schedule forming part of Balance Sheet as at 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)		Previous Year(2014-15)	
1. Central Government		-		-
2. State Government (Specify)		-		-
3. Financial Institutions		-		-
4. Banks:				
a) Term Loans	-		-	
b) Other Loans (specify)	-	-	-	-
5. Other Institutions and Agencies		-		-
6. Debenture and Bonds		-		-
7. Fixed Deposits				
8. Others(specify)		-		-
TOTAL Rs.		-		-

Schedule -6 : Deferred Credit Liabilities
(Schedule forming part of Balance Sheet as at 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
a) Acceptances secured by hypothecation of capital equipment and other assets	-	-
b) Others	-	-
TOTAL Rs.	-	-

For **P. K. NAYAK & CO.**
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Schedule -7 : Current Liabilities and Provisions

(Schedule forming part of Balance Sheet as at 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)		Previous Year(2014-15)	
A. CURRENT LIABILITIES				
1. Acceptances		-		-
2. Sundry Creditors:				
a) For Goods	287,653		81,796	
b) Others - EMD	6,770,416		11,529,460	
		7,058,069		11,611,256
3. Advances Received		-		-
4. Interest accured but not due on:				
a) Secured loans/borrowings		-		-
b) Unsecured Loans/borrowings		-		-
5. Statutory Liabilities				
a) Overdue		-		-
b) Others				
TDS (Non Salary)	72,774		161,220	
TDS (Salary)	5,110		-	
Work Contract Tax	162,265		-	
c) Other Recoveries Payables				
Statutory Deposit	-		59,000	
		240,149		220,220
6. Other Current Liabilities				
a) Student Dues				
Internal amenitie S.D.	194,000		262,000	
Excess Prog. Regd. Fees	5,200		5,200	
Caution Money (Hostel)	13,000		13,000	
Sports Fee	-		55,424	
Caution Money (Labrotary)	13,000		13,000	
Caution Money (Library)	1,030,000		899,000	
Caution Money (Institute)	1,895,000		1,616,000	
Mess Advance	-		1,301,647	
Programme Registration	233,950		186,000	
Student Welfare Fund	121,440		90,440	
Mess Dues	-		19,970	
Scholarship (Asutosh)	285,940		-	
Earned Leave	12,713		12,713	
		3,804,243		4,474,394
b) Security Deposit				
Thames Consultant Pvt. Ltd.	22,722		22,722	
Jena Travels	101,000		101,000	
4S Interiors	2,539,832		-	
Bhagarathi Sahoo	5,504		-	
B K Giri	13,133		-	
CEETAK	33,743		-	
Cleen "N" Cleen	960,320		-	
Damodar Engineers Pvt. Ltd.	169,062		-	
Deepak Kumar Mishra	18,954		-	
Geeken Seating Collection Pvt. Ltd.	5,536,542		-	
Orissa Engineering Udyog Pvt. Ltd.	30,020		-	
Shri Rabindra Kumar Mallick	128,501		-	
Subhashree Engineering	4,890		-	
Pest Control India Pvt. Ltd.	360		360	
Biswajit Mishra	126,694		126,694	
Nirmal Chandra Sar	78,411		16,980	
Larsen & Turbo Ltd.	445,000		445,000	
Numeric Power Systems Ltd.	14,343		14,343	
Deepak Ku Das	34,285		29,747	
Laser Science Services (I) Pvt Ltd	450,900		450,900	
Tathagata Engineering	65,049		3,292	
		10,779,265		1,211,038
c) Other Payables				
NPS Recovery	8,580			
Professional Tax	(2,325)			
NPS Employees Subscription	1,047,912		885,210	
		1,054,167		885,210
TOTAL Rs. (A)		**22,935,893**		**18,402,118**

P.K. NAYAK & CO. CHARTERED ACCOUNTANTS BHUBANESWAR

Schedule -7 : Current Liabilities and Provisions
(Schedule forming part of Balance Sheet as at 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)		Previous Year(2014-15)	
B. PROVISIONS				
1. For Taxation	-		-	
2. Gratuity	-		-	
3. Superannuation / Pension	-		-	
4. Accumulated Leave Encashment	-		-	
5. Trade Warranties / Claims	-		-	
6. For Expenses Payable	-			
Audit Fees	49,450		44,944	
Admission Fee Payable	14,325			
Fellowship	1,453,042		9,369,675	
Contingency Expenditure	-		81,371	
Hire Charges Vehicle	-		508,936	
House Keeping Expenses	855,311		37,798	
Honorarim/Remuneration	345,000		395,000	
News Paper & Magazine	-		2,222	
Outsourced Manpower	1,234,491		752,981	
Outsourced Security	1,693,033		-	
Medical Expenses	-		145,806	
Postage & Telegram	-		18,794	
Electricity charges	3,729,517		66,566	
Repair & Maintainance Expenses Payable	762,000			
Professional update allowance	2,616,250		2,338,125	
Pay and Allowances	13,123,588		11,136,039	
Telephone & Telex	180,919		91,550	
PRIS	-		4,565,788	
Niser RD	-		35,000	
Water Charges	22,986		19,166	
Ghuru Murughan Ganeshan	94,390		-	
LSPC of Prof.T.K.Chandrasekhar	241,413		-	
NPS-Receive SERB Delhi	1,920		-	
Sub-total Rs. (B)		**26,417,635**		**29,609,761**
Total Rs. (A+B)		**49,353,528**		**48,011,879**

For **P. K. NAYAK & CO.**
Chartered Accountants
FRN - 318155E

Sucanta Kumar Sahoo

(CA. S. K. Sahoo)
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(T. N. Sahoo)
Dy. Controller of Accounts

(CMA. Y.K.Srinath)
Finance Officer

(Prof.V.Chandrasekhar)
Director

Schedule -8 : Fixed Assets
(Schedule forming part of Balance Sheet as at 31.03.2016)

Amount in Rs.

			GROSS BLOCK					DEPRECIATION			NET BLOCK	
				Addition during the year								
Sl. No.	Particular of Assets	Rate	WDV as on 01.04.2015	more than 180 days	less than 180 days	Deductions (/ (Sale / Adjustt.) during the year	Cost/valuation at the year-end	Depreciation for the year	Deductions during the year	Total upto the year-end	As at the current year-end on 31.03.2016	As at the Previous year-end on 31.03.2015
1	Land	-	27,617,405	-	-	-	27,617,405	-	-	-	27,617,405	27,617,405
2	Furniture & Fixtures	10%	247,929,123	43,125,303	36,108,298	-	327,162,724	30,910,858	-	30,910,858	296,251,867	247,929,123
3	Computers	60%	5,559,106	4,752,974	7,968,516	202,666	18,077,930	8,456,203	-	8,456,203	9,621,727	5,559,106
4	Software	60%	1,170,745	-	-	-	1,170,745	702,447	-	702,447	468,298	1,170,745
5	Lab Equipments	15%	289,962,274	9,910,293	33,180,217	4,000,000	329,052,784	46,869,401	-	46,869,401	282,183,383	289,962,274
6	Tools Equipments	15%	175,335	-	-	-	175,335	26,300	-	26,300	149,035	175,335
7	Books	60%	6,122,189	2,555,998	2,993,391	14,520	11,657,058	6,096,218	-	6,096,218	5,560,841	6,122,189
8	Journals	100%	27,509,956	103,253	45,900,921	-	73,514,130	50,563,670	-	50,563,670	22,950,461	27,509,956
9	Air Conditioners	15%	1,611,930	554,224	429,640	-	2,595,794	357,146	-	357,146	2,238,648	1,611,930
10	Vehicles	15%	563,511	-	-	-	563,511	84,527	-	84,527	478,984	563,511
11	Bicycle	15%	4,261	-	-	-	4,261	639	-	639	3,622	4,261
12	Machinery & Equipments	15%	48,834,672	430,950	48,505,954	-	97,771,576	11,027,790	-	11,027,790	86,743,786	48,834,672
13	EPABX	15%	13,332	-	-	-	13,332	2,000	-	2,000	11,332	13,332
14	Kitchen Equipments	15%	6,197,067	-	-	-	6,197,067	929,560	-	929,560	5,267,507	6,197,067
15	Telephones	10%	9,228	-	-	-	9,228	923	-	923	8,305	9,228
16	Capital Assets(WIP)	-	191,143,003	2,038,364	3,915,204	-	197,096,571	-	-	-	197,096,571	191,143,003
17	NISER XII Plan Asset	-	3,702,901	172,901	169,716,675	-	173,592,477	-	-	-	173,592,477	3,702,901
	TOTAL Rs.		**858,126,039**	**63,644,260**	**348,718,816**	**4,217,186**	**1,266,271,928**	**156,027,681**	**-**	**156,027,681**	**1,110,244,248**	**858,126,039**

For **P. K. NAYAK & CO.**
Chartered Accountants
FRN - 318155E

(CA. S. K. Sahoo)
Partner
M. No. 060588

(T. N. Sahoo)
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(CMA Y.K.Srinath)
Finance Officer

(Prof.V.Chandrasekhar)
Director

Schedule -9 : Investments from Earmarked/Endowment Funds
(Schedule forming part of Balance Sheet as at 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
1. In Government Securities	-	-
2. Other approved Securities	-	-
3. Shares	-	-
4. Debentures and Bonds	-	-
5. Subsidiaries and Joint Ventures	-	-
6. Others (to be specified)	-	-
TOTAL	-	-

Schedule -10 : Investments-Others
(Schedule forming part of Balance Sheet as at 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
1. In Government Securities	-	-
2. Other approved Securities	-	-
3. Shares	-	-
4. Debentures and Bonds	-	-
5. Subsidiaries and Joint Ventures	-	-
6. FD against LC's	87,108,571	61,694,105
TOTAL Rs.	**87,108,571**	**61,694,105**

For **P. K. NAYAK & CO.**
Chartered Accountants
FRN - 318155E

(CA. S. K. Sahoo)
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Finance Officer

(Prof.V.Chandrasekhar)
Director

Schedule -11 : Current Assets, Loans, Advances etc.

(Schedule forming part of Balance Sheet as at 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)		Previous Year(2014-15)	
A. CURRENT ASSETS:				
1. Inventories:				
a) Stores and Spares	-		-	
b) Loose Tools	-		-	
c) Stock-in-trade				
Finished goods	-		-	
Work-in-progress	-		-	
Raw Materials	-	-	-	-
2. Sundry Debtors	-			
a) Debts Outstanding for a period exceeding six months	-		-	
b) Others	-		-	
3 Cash balances in hand	-	32,375	8,882	
4 Bank Balances			-	
a) SBI	344,916,783		163,931,706	
b) UBI	16,652,131		415,614,351	
c) IOB	40,452,369		33,767	
d) IOB	28,883,734	430,905,017	54,047,547	633,636,053
5. Post office Savings Accounts		-		-
Total(A)		**430,937,392**		**633,636,053**
B. LOANS, ADVANCES AND OTHER ASSETS:				
a) Advances to employees etc		3,541,237		1,764,303

P.K. NAYAK & CO. CHARTERED ACCOUNTANTS BHUBANESWAR

Schedule -11 : Current Assets, Loans, Advances etc.
(Schedule forming part of Balance Sheet as at 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)		Previous Year(2014-15)	
b) Other Entities engaged in activities similar to that		-		-
c) Others				
NBHM Support DHA	167,174		167,174	
Deans Allowance Receivable	42,000		72,000	
Advances to Suppliers :				
Balmer Lawrie & Co. Ltd.	559,442		761,007	
Blue Star Ltd.	105,175		105,175	
Director IMMT BSSR	-		112,922	
Cheap Tubes, USA	39,080		39,080	
Exim Logistics Pvt Ltd	40,568		2,000,000	
Kurt J Lesker	-		32,901	
Malvern Instruments Ltd	-		144,620	
National Centre for Cell Sc.	5,000		5,000	
Carl Zeiss Microimaging GmbH, Germany	30,778		30,778	
HCL Infosystem Ltd.	19,828		19,828	
MTI Corporation USA	87,762		87,762	
Bruker Biospin AG, Switzerland	342,019		-	
Centre for Cellular & Molecular Bio.,Bang.	10,594		-	
Deltronic Crystal Industries, Usa	398,803		-	
India International Centre	300,000		-	
Oerlkon Leybold Vacuum GmbH, Germany	360,672		-	
Perkin Elmer (India) Pvt Ltd	56,180		-	
Pfeiffer Vacuum Gmbtt	754,216		-	
Pravartaka Infotech LLP, Bangalore	27,000		-	
Shree Mahabir Service Station	51,959		-	
Sisro Medicare, Coimbator	36,397		-	
Thermo Fisher Scientific (Asheville),LLC	149,032		-	
M/s A One Hospitality	96,603		96,603	
Scholarship -ICMR	50,345		(33,942)	
Scholarship -UGC	1,863,648		5,376,538	
Scholarship-INSPIRE	28,325,812		15,063,774	
CBS Mumbai	-		70,000	
DCS & EM,Mumbai	4,900,000,000		4,800,000,000	
Scholarship -CSIR	11,781,063		6,506,357	
IGCAR	30,402			
Ramanujam Fellowship DST Receivable	-		85,000	
DCS & M,VECC,Kolkata	246,210,423		246,210,423	
		5,191,941,975		**5,076,953,000**
Security Deposit		**16,955,092**		**16,827,442**
2. Advances and other amounts recoverable in cash or in kind or for value to be received:				
a) on Capital Account		-		-
b) Prepayments		-		-
c) Others				
JEST-2010	7,038		7,038	
DCSEM-Medical Expenses Receivable	207,523		70,986	
R&D Receivable	56,754		1,095,459	
IOAA - 2016	210,066		-	
KYPY 2013	11,833		11,833	
Electricity Charges Receivable	-		378	
Prepaid Expenses	4,905,749		543,231	
		5,398,963		**1,728,925**
3. Income Accured:				
a) On Investments from Earmarked/Endowment Fund	-		-	
b) On Investment-Others	-		-	
c) On Loans and Advances	-		-	
d) Others	-	-	-	-
4. Claims Receivables		-		-
Total (B)		**5,217,837,267**		**5,097,273,670**
TOTAL Rs.(A+B)		**5,648,774,659**		**5,730,909,723**

For **P. K. NAYAK & CO.**
Chartered Accountants
FRN - 318155E

Sucanta Kumar Sahoo

(CA. S. K. Sahoo)
Partner
M. No. 060588

P. K. NAYAK & CO. BHUBANESWAR CHARTERED ACCOUNTANTS

(T. N. Sahoo)
Dy. Cont. of Accounts

(CMA. Y.K.Srinath)
Finance Officer

(Prof.V.Chandrasekhar)
Director

Schedule -12 : Income from Sales/Services

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
1) Income from sales		
a) Sale of Finished Goods	-	-
b) Sale of Raw Material	-	-
c) Sale of Scraps	-	-
2) Income from Services	-	-
a) Labour and Processing Charges	-	-
b) Professional/Consultancy Service	-	-
c) Agency Commission and Brokerage	-	-
d) Maintenance Services (Equipment/Property)	-	-
e) Others (Specify)	-	-
TOTAL Rs.	-	-

Schedule -13 : Grants/Subsidies

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
(Irrevocable Grants & Subsidies Received)		
1) Central Government	455,468,868	356,280,170
2) State Government(s)	-	-
3) Government Agencies	-	-
4) Institutions/Welfare Bodies	-	-
5) International Organisations	-	-
6) Others (Specify)	-	-
TOTAL Rs.	**455,468,868**	**356,280,170**

For **P. K. NAYAK & CO.**
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Director

Schedule -14 : Fees/Subscriptions

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
1. Registration Fees (Msc & Phd)	8,917,779	7,481,294
2. Application Fees	-	1,000
3. License Fees	245,935	175,602
4. Sale of Tender Paper	225,550	265,500
5. CIF, SCS Receipt	16,800	71,900
6. RTI Application Fees	110	339
9.Transcript Fees	31,100	32,500
10.Identity card/Health Card fee	7,025	1,175
11.Income from IGCAR	-	420
12.Summer course fees	4,500	12,000
13. Miscellaneous Receipts	4,317	-
14. Guest House Rent	21,940	-
15. Job Application Fees	720,500	-
		-
TOTAL Rs.	10,195,556	8,041,730

Schedule -15 : Income from Investments

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Investment from Earmark Fund		Investment Others	
	Current Year(2015-16)	Previous Year(2014-15)	Current Year(2015-16)	Previous Year(2014-15)
(Income on Invest. From Earmarked/Endowment Funds transferred to Funds				
1. Interest				
a) On Govt. Securities	-	-	-	-
b) Other Bonds/Debentures	-	-	-	-
2. Dividends:	-	-	-	-
a) On Shares	-	-	-	-
b) On Mutual Fund Securities	-	-	-	-
3) Rents	-	-	-	-
4) Others (Specify)	-	-	-	-
TOTAL	-	-	-	-
Transferred to Earmarked/Endowment Funds	-	-	-	-

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Schedule -16 : Income from Royalty, Publication etc.

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
1) Income from Royalty	-	-
2) Income from Publications	-	-
3) Others (specify)	-	-
TOTAL	-	-

Schedule -17 : Interest Earned

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
1) On Term Deposits:		
a) With Scheduled Banks	-	-
b) With Non-Scheduled Banks	-	-
c) With Institutions	-	-
d) Others	-	-
2) On Savings Accounts:	-	
a) With Scheduled Banks	29,395,099	50,708,956
b) With Non-Scheduled Banks	-	-
c) With Institutions	-	-
d) Others	-	-
3) On Loans:		
a) Employees/ Staff	-	-
b) Others	-	-
4) Interest on Debtors and Other Receivables	-	-
TOTAL Rs.	**29,395,099**	**50,708,956**

For **P. K. NAYAK & CO.**
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Schedule -18 : Other Income

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
1. Profit on Sale/disposal of Assets:		
a) Owned Assets	-	-
b) Assets acquired out of grants, or received free of cost	-	-
2. Export Incentives realised	-	-
3. Fees for Miscellaneous Services	-	-
4. Miscellaneous Income	-	-
TOTAL	-	-

Schedule -19 : Increase/(Decrease) in Stock of Finished Goods & Work-in-progress

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
a) Closing Stock	-	-
Add: Finished Goods	-	-
Add: Work in Progress	-	-
b) Less: Opening Stock	-	-
Add: Finished Goods	-	-
Add: Work in Progress	-	-
NET INCREASE/(DECREASE) (a-b)	-	-

Schedule -20 : Establishment Expenses

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
a) Pay and Allowances	136,721,449	116,570,683
b) Manpower (Outsourced)	25,570,009	16,951,882
c) Stipend to Trainee	350,201	246,592
d) Contribution to NPS	11,862,866	10,154,250
e) Leave Travel Concession	2,279,398	3,081,684
f) Fellowship to Phd Scholars	37,622,061	27,398,241
g) Fellowship to Post Doctoral Scholars	7,239,530	1,568,752
h) Contigency to PHD Students	3,797,878	1,154,745
i) Honorarium & Scholarship	5,665,942	5,015,799
j) PRIS	5,030,012	9,125,830
k) Medical Expenses	3,418,437	1,600,297
l)Children Education Allowance	1,082,807	996,727
m) Leave Encashment	441,519	472,073
n) Leave Salary Contribution	420,870	22,994
o) Professional Update Allowance	2,616,250	2,777,741
TOTAL Rs.	**244,119,229**	**197,138,290**

For **P. K. NAYAK & CO.**
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Suvendra Kumar Sahoo

(CA. S. K. Sahoo)
Partner
M. No. 060588

(T. N. Sahoo)
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Finance Officer

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P.K. NAYAK & CO. BHUBANESWAR CHARTERED ACCOUNTANTS

Schedule -21 : Other Administrative Expenses

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
Graduation Ceremony Expenses	238,751	106,229
Freight & Forwarding Expenses	674,325	64,970
Foundation Day Expenses	100,614	231,884
Purchases (Consumables)	15,844,662	14,346,601
Office Maintenance	1,151,203	110,887
Repair & Maintenance	7,927,753	7,291,477
Advertisement	1,522,821	1,340,110
Audit Fees	50,106	44,944
Bank Charges & Commission	27,928	32,053
CRA Service Charges	41,974	40,310
Electricity Charges	26,627,061	437,317
NISER Inaguration Day Expenses	7,754,545	-
Fuel for DG set	449,824	99,480
Hospitality Expenses	2,545,145	1,684,740
Membership Fees	-	141,230
Housekeeping Expenses	5,974,483	395,154
Legal Fees	28,437	6,360
Meeting Expenses	188,186	217,539
News Papers and Periodicals	57,878	42,961
Other Academic Expenses	209,645	113,868
Postage & Courier	298,485	336,927
Printing & Stationery	3,393,606	1,505,499
Rent, Rates & Taxes	2,951,457	3,795,068
Seminar/Workshop Expenses	1,043,468	89,428
Telephone & Internet charges	11,786,143	1,894,858
Travelling & Conveyance	11,137,738	7,097,043
Vehicle Maintenance Expenses	9,081,869	5,687,829
Water Charges	302,236	210,552
Lapsed Deposit(EMD&SD)	-	60,000
NISER XII PLAN		
Domestic Travel	806,547	634,293
Fellowships	824,745	40,258
Foreign Travels	2,429,555	3,525,810
Office Expenses	2,003,079	94,913
Other Expense	1,367,959	13,829,826
Supplies & Materials	38,035,483	8,155,070
Honorarium	1,500	-
TOTAL Rs.	**156,879,211**	**73,705,488**

For **P. K. NAYAK & CO.**
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Schedule -22 : Expenditure on Grants, Subsidies etc.

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
a) Grant given to Institutions/Organisation	-	-
b) Subsidies given to Institutions/Organisation	-	-
TOTAL	-	-

Schedule -23 : Interest

(Schedule forming part of Income & Expenditure for the year ended on 31.03.2016)

Amount in Rs.

Particulars	Current Year(2015-16)	Previous Year(2014-15)
a) On Fixed Loans	-	-
b) On Other Loans (including Bank Charges)	-	-
c) Others (specify)	-	-
TOTAL	-	-

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SCHEDULE 24 – SIGNIFICANT ACCOUNTING POLICIES

(Schedule forming part of the accounts for the period ended on 31.03.2016)

About the organisation :

The National Institute of Science Education and Research (NISER) set up at Bhubaneswar by the Department of Atomic Energy was registered as a Society with the Registrar of Societies, Cuttack, Orissa vide registration no:22426/16 dt. 10.07.2007 with an initial capital outlay of Rs.755.31 crores .On account of increase in the scope of the work, due to additional infrastructural facilities and to discharge statutory requirements of State Govt. Cost revision of the project was sought with an enhanced capital outlay of Rs.857.27 crores.

NISER conducts the following programmes in science education for bright and meritorious students who are selected through National Entrance Screening Test (NEST) conducted on all India basis.

a) An integrated 5 year M.SC programme in the core and emerging branches of basic sciences to students after 10+2 higer secondary schooling.
b) Integrated M.SC +PHD programmes after 10+2 from other universities.
c) PHD programme after MSC from other Universities.

Presently NISER has 368 students admitted in 5 year M.SC programme in the various streams of Basic Sciences and the strength of the students is expected to increase to around 440 sheet in 2016-17. Currently 247 PHD Scholars and 19 post doctorate fellows have been enrolled and it is expected to enrol additional 25 scholars during the current financial year and 100 PHD scholars and post doctorate fellows during 2016-17.

1. Basis of Preparation of Financial Statements

The Financial Statements have been prepared on accrual basis following going concern concept, accounting standards and in accordance with the General Accepted Accounting Principles In India (Indian GAAP) except otherwise stated elsewhere.

The accounting policies adopted in the preparation of financial statements are consistent with those of previous year.

2. Fixed Assets

Fixed assets are stated at cost of acquisition inclusive of inward freight, duties & taxes and incidental & direct expenses related to acquisition.

3. Depreciation

Depreciation has been provided on written down value method as per rate prescribed in the income Tax Act, 1961.

4. Capital Assets(WIP)

The institute is at project stage. Hence Capital Expenditure incurred on construction activities including Electrical Furnishing, Electrical installation, Electrical Transformer & Office Automation ware etc are being shown as capital work in progress in the FY 2015-16.

5. Recognition of income & Expenditure

Income & expenditure are generally recognised on accrual basis & provision made for all known liabilities.

Lab consumables and stores consumables purchased during 2015-16 is treated as recurring expenditure and the consumables are transferred to respective schools of study. Necessary records are maintained at the school concerned.

6. Foreign Exchange Transactions

Transactions involving foreign currency are accounted at the exchange rate prevailing on the date of the transaction.

7. Accounting for Registration Fees

Registration fee of students are being accounted for on receipt basis.

8. Accounting of interest earned on FD

Interest earned against lien of FD are being accounted for on accrual basis.

9. Government Grants/ Subsidies

a) Government Grants of the nature of contribution towards capital cost of setting up projects are treated as grant in aid for creation of assets.

b) Grants in respect of specific fixed assets acquired are shown as a deduction from the cost of the related assets as the project is under progress.

c) Government grants/ subsidy is accounted on realisation basis.

10. Lease

Lease rentals are expensed with reference to lease terms.

P.K. NAYAK & CO. BHUBANESWAR CHARTERED ACCOUNTANTS

11. Retirement Benefits

Liability towards gratuity payable on death/ retirement and provision for accumulated leave encashment benefit to employees is not applicable at present.

12. TAXATION

Since the Institute is a research oriented organization wholly funded by Government of India, Department of Atomic Energy there being no taxable income under Income-tax Act 1961, no provision for Income tax has been made during the year.

For **P. K. NAYAK & CO.**
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(Prof. V. Chandrasekhar)
Director

Schedule -25: Contingent liabilities & Notes on Accounts

(Schedule forming part of the accounts for the period ended on 31.03.2016)

Amounts in Rs.

A) CONTINGENT LIABILITIES

1.	Claims against the entity not acknowledge as debts	NIL
2.	Liability for partly –paid investments	NA
3.	Liabilities on account of outstanding forward exchange contracts	NA
4.	Guarantee & letters of credit outstanding	NIL
5.	Bills Discounted	NIL
6.	Other items for which the entity is contingently liable	NIL

B) Notes on accounts

1. **Prior period Income**
   a) Rs.131160 /- received /adjusted from Students caution money & mess dues deposit against payment of their mess bill.
   b) Rs. 59000/- statutory deposit adjusted as it is unclaimed now.
2. **Prior period expenditure**
   a) Adjustment of Rs. 700000/- is due to transfer of non plan expenditure to plan to show the actual position of Grants received under Plan.
   b) Adjustment of Rs. 1301647/- towards mess advance.
   c) Adjustment of Electricity Charges Receivable Rs 378/- .
3. **Lien against FD**
   Lien against FD shown in Receipt & payment s account relates to items under import & the same is in order.
4. Corresponding figures for the previous year have been regrouped/ arranged, where ever necessary.
5. Schedules 1 to 25 are annexed to and form an integral part of the Balance Sheet as at 31st March, 2016 and the Income & Expenditure Account for the year ended on that date.

For **P. K. NAYAK & CO.**
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NATIONAL INSTITUTE OF SCIENCE EDUCATION AND RESEARCH BHUBANESWAR

An Autonomous Institute under Department of Atomic Energy, Government of India

P.O.- Jatni, District - Khurda, Pin - 752050, Odisha, India

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