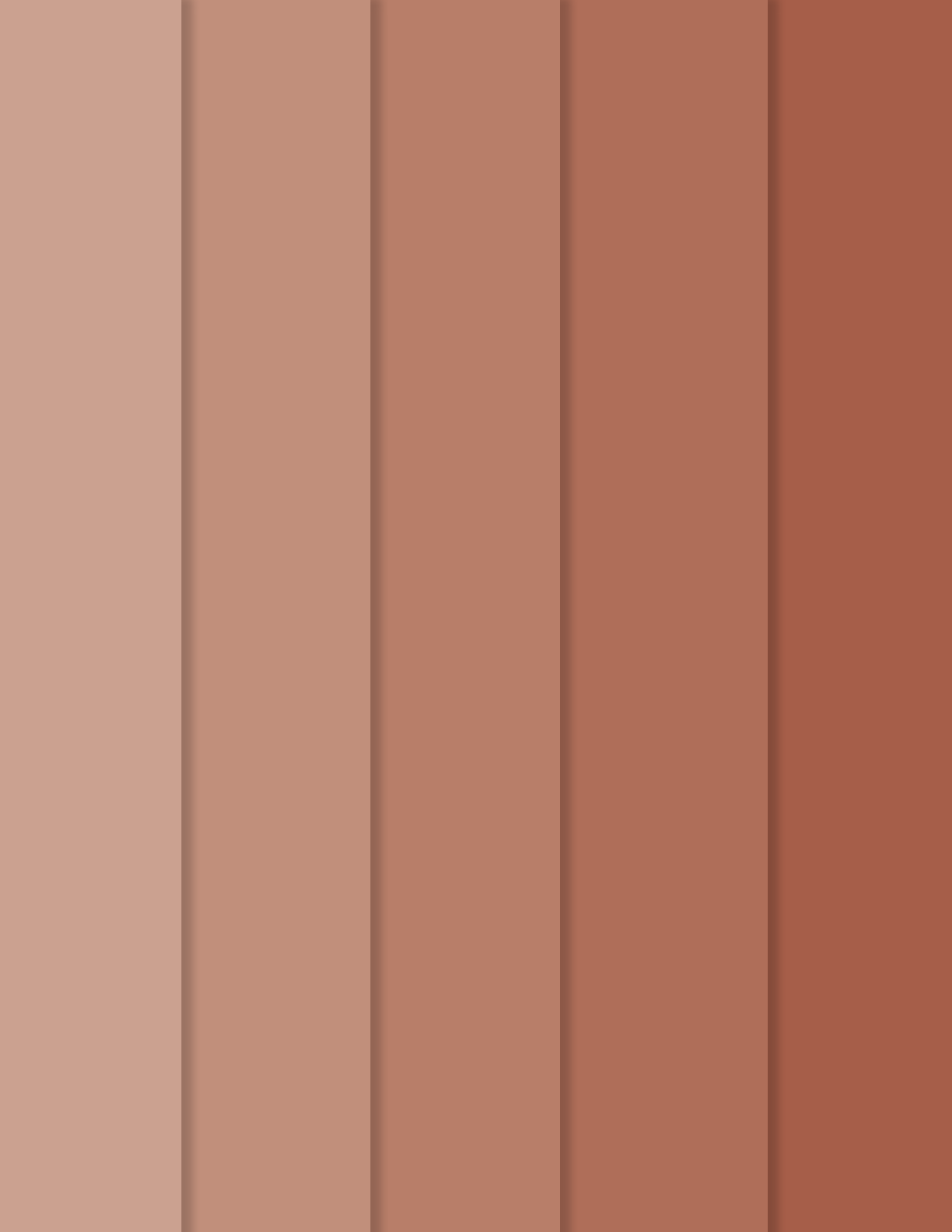
Annual Report

2015-16

INDIAN INSTITUTE OF TECHNOLOGY
BHUBANESWAR



ANNUAL REPORT

2015-2016

INDIAN INSTITUTE OF TECHNOLOGY BHUBANESWAR

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From Director's Desk

I joined the institute on 22nd April 2015 as Director and it gives me immense pleasure to share a brief on the developments of IIT Bhubaneswar over the last academic year here, with the detailed illustrations following in rest of the annual report.

The year 2015-16 marks as an important year in the annals of IIT Bhubaneswar, as the long cherished dream of the Institute to move to its new campus was fulfilled with the shifting of all undergraduate, postgraduate and female Ph.D. students (close to 900 in number) and a fraction of staff and faculty members to the scenic new campus at Arugul on 18th July 2015 coinciding with the beginning of the new academic year, by a bold decision.

From January 2016, the 1st and 2nd year B.Tech classes were also started running at the permanent campus. The campus was made habitable within a short time, through a determined commencement of several services on war footing and the movement was made possible.

The institute has already started organizing important events including academic registration of students, ceremonies such as the foundation day, and important meetings like the Board meeting in its permanent campus. On 22nd September 2015, the campus also welcomed Smt. Smriti Zubin Irani, the Hon'ble Minister of Human Resource Development, as the Chief Guest of the 4th Convocation, where 109 B.Tech., 44 M.Tech., 50 M.Sc., and 12 Ph.D., students received their degrees. With this, the alumni base of the institute now stands at 586 (429 B.Tech.; 83 M.Tech.; 50 M.Sc.; and 24 Ph.D).

New Initiatives:

During the last year, several new initiatives have been taken up to set up enhanced standards of academic practices, placements, infrastructure, promotion of entrepreneurship and other operations of the institute. An attempt to bring in significant improvement in academic standards is a very challenging task. A committed effort has been made by following stringent standards in faculty selections, introduction of on-line system of feedback on courses and teaching from students, spirited implementation of corrective actions based on the feedback, rewarding of teaching excellence, monitoring of course performance, more than all continuous internal auditing of academic practices besides others. These innovative actions have already started bearing fruits in terms of significant improvement in closing ranks of seat allocations in admissions including JEE 2016 and in placements. Other innovative initiatives taken up include the following:

- A well thought of perspective plan has been drawn for the growth of IIT Bhubaneswar including academic programmes, student intake, faculty, staff and infrastructure, to rise the student strength from the current 1350 seats to 4500 seats by 2022.
- A technology incubator including bringing out a policy to create an eco-system for innovation and entrepreneurship has been started and four teams of students and faculty have enrolled.
- A new pedagogy is proposed for academics at IIT Bhubaneswar. Several new breadth courses of high relevance like general studies and current affairs, entrepreneurship & small ventures and Odissi dance are introduced
- An in-house ERP system development has been initiated and several operations like student feedback, faculty appraisal, academic transcript and certificate generation, on-line survey and alumni database could already be implementation in a very short time.
- Review and auditing of the academic practices of the institute is being carried out.

Academic Programmes:

The institute offers B.Tech Programme in Electrical, Mechanical and Computer Sciences, Infrastructure and Metallurgical and Materials Engineering; M.Tech. Programmes in 9 specializations, M.Sc. in 5 disciplines (Mathematics, Physics, Chemistry, Geology and Atmosphere & Climate Sciences); and Ph.D. programme in all the 7 schools. Currently the Institute has 1038 Students (B.Tech. - 589, M.Tech. - 71, M.Tech. - Ph.D. – 66, M.Sc. - Ph.D. - 141, Ph.D. – 171), 100 full-time faculty members including one Chair Professor. In addition, the Institute has 10 officers and other supporting staff. By the end of the current academic year, the capacity and student strengths of the institute stand at 1350 and 1039, respectively.

New Academic Programmes:

The institute took a decision to introduce four 5-year Dual degree programmes and a new B.Tech. programme in Electronics & Communication Engineering from 2016-17.

Commencement of the Permanent Campus:

The following facilities could be created at the permanent of campus of the institute after the decision is taken and before shifting the students to the campus, in a short span of two months:

- A Health Centre with round the clock availability of experienced doctors,
- An effective transport facility for the students and staff to commute between the campus and transit academic campuses at Samantapuri and Toshali complex.
- All amenities including electricity, water, sanitation and catering service in the hostels.
- Play fields right in hostels apart from a temporary common ground to promote sports activity
- A 24 hour high alert security system through manual guarding and also automated CCTVs.
- Gigabit Ethernet to individual hostel rooms and Internet access through fiber optic as well as point-to-point Wireless bridges.
- Telephone connectivity with Wireless in the local loop as well as cellular mobile connectivity through newly erected mobile towers.
- A mini-market to provide food and general merchandise and ATM facilities.
- Construction of parts of the boundary wall filling up the several long gaps.
- Furnishing the hostels and mess,
- Setting up classrooms by converting part of the 1st year lab complex and setting up of laboratories, e-class rooms, library and general computing facility in the lab complex.

Publications & Patents:

Within six years of existence in the city of Bhubaneswar, the faculty members have already contributed to creating new knowledge by publishing more than 650 research papers in National and International Journals of repute, which includes high impact journals such as Physical Review Letters, Nature Geoscience, and Nanoscale. The publication record in 2015-16 is as follows: 213 research papers in peer reviewed journals and 141 papers presented in various conferences in India and abroad with 10 Book chapters. Also 3 patents have been granted and 5 have been filed.

Research & Development Activities:

The Research and Development activities of the Institute are growing at a very fast pace. The total value of projects funded so far (2010-2016) by different agencies is Rs. 58.50 crore, which includes Rs. 56 crore towards sponsored research projects and Rs. 2.50 crore towards consultancy projects. During the current year (2015-16), projects worth of Rs. 27.50 crore have been received, which include Rs. 26.53 crore towards sponsored research projects and Rs. 97.35 lakh towards consultancy projects. The major funding agencies are DST, CSIR, UGC, ISRO, DRDO, ICSSR, DAE, CPRI, DAC, DBT, Deity, NALCO, NPOL, IUSSTF, INCOIS etc. In addition to the above, the faculty members of the Institute have submitted 35 project proposals worth Rs. 49.34 crore under the Impacting Research Innovation and Technology (IMPRINT) program, a flagship program of MHRD. The various domains under which these projects have been submitted are, Advance Materials, Energy, Nanotech Hardware, Health Care, Defense, CS & ICT, Environmental Sciences & Climate Change, Water Resources & River Science, Manufacturing and Sustainable Urban Design. The faculty members have also submitted six research project proposals worth of Rs. 12.20 crore under the Uchhatar Avishkar Yojana (UAY), another major initiative of the MHRD. Besides IMPRINT and UAY, 35 more research project proposals worth Rs. 19.65 crore have been submitted by the faculty members to different funding agencies for consideration.

The Institute has recently submitted proposals worth Rs. 92.45 crore for setting up of five Centres of Excellence (CoE) such as (a) Centre for Advance Research in Next Generation Networks (CARNGN) (b) Centre of Excellence in Precision and Micro Manufacturing (c) Centre of Excellence on Cooling and Energy Store Technology (d) Centre of Excellence on Land, Water, Energy and Climate (e) Centre of Excellence on Regional Climate and Coastal Hazards.

I would like to mention some of the worth quoting R&D initiatives, here. The Institute has received funding from the Ministry of Earth, Science, Govt. of India for setting up of the Bay of Bengal Coastal Observatory, a first of its kind in the country, with an initial funding or Rs. 9.23 crore for which the State Govt is in the process of providing 40 acres of land in Ganjam district. A Memorandum of Understanding (MoU) has been signed with the Paradeep Phosphate Limited (PPL) in the presence of the Hon'ble President and Hon'ble Prime Minister on 4th November, 2015, which is a major initiative in the direction of industry academia partnership. An MoU has also been signed with the Govt. of Odisha for setting up of a Centre for Management and Training for Rural Road Research in the Institute campus funded by the Department of Rural Development, Govt. of Odisha. The Govt. of Odisha has sanctioned a seed grant of Rs. 1.0 crore for establishment of Innovation-cum- Incubation Center in the Institute, having dual focuses of (a) Affordable Housing and (b) New Materials and Nanotechnology. Another MoU for collaborative is going to be signed with the Bharat Heavy Electricals Limited (BHEL) very soon.

Unnat Bharat Abhiyan:

Unnat Bharat Abhiyan is a flagship mission of the MHRD, in which our Institute is participating actively. This programme targets to use the expertise available in the Institute to improve the quality of rural life through innovative and affordable technological interventions. The villages adopted under UBA are: "Argul", "Podapada", "Kansapada" and "Khudupur" near the permanent campus of IIT and two more villages in the district of Cuttack and Jajpur. The village selected in the Banki Block of Cuttack district is "Jorkul" and the village selected in the Jajpur district is the "Sunduria". The issues to be addressed in the 1st phase are, improvement in quality of School Education, internet connectivity in the schools and villages near the campus, water purification, sanitation, health care, skill development, awareness towards digital India, renewable energy use etc. Some of the on-going activities taken up by different Departments of the State Govt. related to rural development will be connected with the UBA programme.

Workshop/Conferences/Continuing Education Programme:

A number of conferences and workshops have been organized by the institute to foster scholarly exchange of ideas and research collaboration. A few of the notable ones are listed below. (i) A workshop on "Innovative and Sustainable Energy Technologies-iSET-01" in collaboration with Planning and Coordination Dept., Govt of Odisha (ii) the Global Wireless Summit-2015, (iii) International conference on Microwave, Optical and Communication Engineering (ICMOCE-2015) (School of Electrical Sciences); (iv) A workshop on "Affordable Housing: Materials and Technologies" (School of Infrastructure); (v) A colloquium on "Dynamical Analysis of Cluster-Molecule Reactivity" and a workshop on "Belle Analysis" (School of Basic Sciences) (vi) Workshops on "Robotics" and "Patent Writing" by the Design & Innovation Centre, (vii) A workshop on "Business Plan, Opportunities and Risks and Sources of Funding" by E-cell, (viii) A workshop on the implementation of "Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act 2013" organized by the Women's Grievance Redressal Committee;

One of the Flagship programs of the Ministry of Human Resource Development, Government of India – GIAN (Global Initiative of Academic Networks) has been initiated to conduct short time courses inviting Guest Faculty from abroad and currently about 25 short time courses have been processed. Amongst them, (i) A short term Course on "Soil Structure Interaction" (School of Infrastructure); (ii) A short term Course on "Postcolonial World Literature" (School of Humanities, Social Sciences and Management) have already been successfully organized.

Awards and Honours:

A number of recognitions have been bestowed on our students and teachers in 2015-16. Dr. R. Jha became the regular Associate of International Centre for Theoretical Physics and also became the Executive committee member of optical Society of India. Dr. Shyamal Chatterjee received the Ganesh Mishra Memorial award from the Institute of Engineers. Dr. Debadatta Swain received AT-RASC 2015

Young Scientist Award by the International Union of Radio Science. Prof R. K. Panda has been elected as a fellow of Indian Water Resources Society. Dr. Meenu Ramadas received the ASCE State of the Art of Civil Engineering Award 2016 by the ASCE and the G M Nawathe Puraskar 2015 award by Indian Society for Hydraulics. Dr. Debalina Ghosh has been elevated to the grade of Senior Member of IEEE, highest professional grade of the IEEE. Dr. Subhransu Ranjan Samantaray received the NASI-SCOPUS Young Scientists Award. Dr. Lalan Kumar Received SPS travel grant for ICASSP 2016, Shanghai, China.

Placements:

The year 2015-16 witnessed a dramatic rise (85% over last year) in placement over the previous years, both in terms of number of placement and annual CTC offered, due to a special drive taken up by the Institute. The undergraduate placement reached the 96% mark. A total of 110 students have been placed and total job offers were 119. This means that 9 students received two job offers. 34 companies from core industries as well as service/IT industries visited the Institute. PSU's like Coal India Limited, RITES, HPCL, BPCL participated for the first time. The average annual CTC offered was about Rs. 8 Lakhs. The highest annual CTC offered was 16 Lakhs.

Student activities:

As it has evolved in the IIT system, the Students' Gymkhana at IIT Bhubaneswar is a central hub for all round development of students. The major councils under Students' Gymkhana are Social & Cultural, Science & Technology and Sports & Games, which remain active throughout the year. The annual techno-management fest Wissenaire'16, socio-cultural fest Alma Fiesta'16, and Entrepreneurship meet E-Summit'16 have set a distinguished mark in the eastern zone. Other notable events include UTSAV, a children Fest for physically disabled children, SPIC-MACACY events, NAI DISHAYEN – interaction and teaching program for students in villages adjoining the campus. Neuromancers (the Programming Society), the Robotics Society, the Web and Design Society participated in the technical fests of other IITs. The Dramatics society won second prize in Rangmanch, an event held at IIT Kharagpur during Spring Fest 2016. CineWave, the Cinematic Society won the first position in the ODISHA 'We Care Film Festival' for the second consecutive time for a movie made on the perspective of a disabled man titled ' How I Feel '. CineWave also participated in a 48 hour short filmmaking competition in one of the biggest socio cultural fests in India Rendevouz of IIT Delhi and won the first prize despite fierce competition. The short film which won us the first prize was titled 'Azaad Parindey'. IIT Bhubaneswar also won the 3rd prize in quiz competition in the Inter IIT Tech mmet-2016 held at IIT Mandi.

Green Campus Initiatives:

With the objective developing the IIT campus into a green and echo friendly campus, a variety of theme based plantations have been taken up during the last year. The institute has planted as many as 5,000 plants including a mango orchard of 70 varieties, teak plantation around the boundary, medicinal trees and flowering variety along the avenues and to develop green covers besides many other theme based ones. Efforts are being made to plant as many as 20,000 – 40,000 trees in the coming season to cover the whole campus.

Visits by Distinguished Personalities:

Several distinguished personalities visited the Institute on different occasions, addressed the faculty, students and staff. The visitors include, Shri S C Jamir, Governor of Odisha; Bharat Ratna Prof. C. N. R. Rao, National Research Professor & Honorary President, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore; Smt Smriti Irani, Minister for HRD, Govt of India; Shri Naveen Patnaik, Chief Minister of Odisha; Padmabhushan Dr R Chidambaram, Scientific Advisor; Prof. V. Chandrasekar, Colorado State University, USA; Shri Achal Malhotra, Indian Embassy, Vienna and Former Ambassador of India to Armenia and Georgia; Prof. Kiran Seth, IIT Delhi and Founder of SPIC MACAY; Dr. Joseph Fiksel, Ohio State University, USA, and Faculty & Executive Director of the Sustainable and Resilient Economy program; Zellman Warhaft Cornell University, Ithaca, NY,USA; Shri Gokul Chandra Pati, Chief Secretary of Odisha; and Ambassador Lalit Mansingh, besides many other luminaries from different walks of life.

Shri Pankaj Ramanbhai Patel, Chairman, Board of Governors (BOG) visited IIT Bhubaneswar on 21st April 2016 and addressed the institute community. Mr S K Roongta, former Chairman visited the campus on 18th July 2015 and addressed the students.

Events of the Institute:

The Institute celebrated International Yoga Day on 21st June 2015, wherein students, faculty and staff participated. The celebrations on Sunday were preceded by two days of introduction and practice sessions where participants were introduced to Yoga, Pranayama and Meditation.

The 8th Institute Day was celebrated on 22 July 2015. The event was graced by Shri Gokul Chandra Pati, IAS, Chief Secretary, and Government of Odisha as the Chief Guest.

On 29th July 2015, plantation of a 'Mango Orchard' consisting of 500 trees of 60 different mango varieties was inaugurated by Dr. N.K.Krishna Kumar, Deputy Director General (Horticulture Science), Indian Council of Agricultural Research, New Delhi.

The 4th Annual Convocation of the Institute was organized on 12th September 2015. The Chief Guest for the Convocation was the Human Resource Development Minister and Chairperson, IIT Council, Smt Smriti Zubin Irani.

IIT Bhubaneswar observed Swachh Bharat Abhiyan on 2ndOctober 2015 at 9.30 am at the Permanent Campus, Argul to commemorate the birth anniversary of the Father of the Nation, Mahatma Gandhiji.

Ishān Vikās progam, an initiative taken by MHRD, Government of India to introduce school children from the North-Eastern states to institutes of higher education in India, was hosted by IIT Bhubaneswar during December 7-18, 2015. The four participating schools were Oil India H.S.School Duliajan, Dibrugarh (Assam), DPS Duliajan, Dibrugarh (Assam), VKV Nirjuli, Papumpare (Arunachal Pradesh) and VKV Yazali, Lower Subansiri (Arunachal Pradesh). A total of 40 students of class XI and their accompanying teachers participated in the two week program.

The 8th Foundation Day of the Institute was celebrated on 12th February 2015. Shri Naveen Pattnaik, Hon'ble Chief Minister of Odisha graced the occasion as Chief Guest.

The Institute celebrated the Matri Bhasha Diwas on 21st February 2016 to commemorate the International Mother Language Day

The Institute celebrated the National Science Day on 28th February 2016. The Chief Guest for the occasion was Prof. Pulin B. Nayak, Professor and Former Director, Delhi School of Economics, who delivered the Science Day Lecture on "Revisiting India's Growth"

The International Women's Day was celebrated on 8th March 2016. The event was graced by Chief Guest Ms. Kiran Manral, eminent author and social activist, and Guest of Honour, Prof. P. Yasodhara, Honorary Director of National Institute of Social Work and Social Sciences (NISWASS), Bhubaneswar.

On 16 th Jan 2016, the Start-up India Movement has been inaugurated by our beloved Prime Minister Mr. Narendra Modi. Faculty and students of IIT Bhubaneswar participated in the programme by Skype.

The institute organized important national events such as Independence day, Republic day, Sadbhavana divas to rededicate itself for the respective national causes.

There are many plans being executed, developments are taking shape and the next year will see realizations of the same. Thank you.

R V Raja Kumar

Prof R V Raja Kumar
Director

Board of Governors

Shri S. K. Roongta Chairman, Bharat Aluminium Co. Ltd Former Chairman, SAIL & Former MD, Vedanta Aluminium & Power D-91, The Pinnacle, DLF Phase – 5, Gurgaon- 122009	**Chairman** [Till 01.11.2015]
Shri Pankaj Ramanbhai Patel Chairman & Managing Director Cadila Healthcare Limited Zydus Tower, Satellite Cross Roads Ahmedabad – 380 015, Gujarat	**Chairman** [From 11.02.2016]
Prof R V Raja kumar as Director, IIT Bhubaneswar [As per the provisions of Statutes 9(16)]	**Chairman** [From 02.11.2015 to 10.02.2016]
Prof. R V Raja Kumar Director, IIT Bhubaneswar Toshali Bhawan, Satyanagar, Bhubaneswar-751 013	Member [From 22.04.2015]
Prof. Sujit Roy Director In-Charge IIT Bhubaneswar	**Member** [Till 21.04.2015]
Shri L N Gupta, IAS Principal Secretary Skill Development & Technical Education Government of Odisha, Bhubaneswar - 751001	**Member**
Prof. S. Parasuraman Director, Tata Institute of Social Science P.B. No.8313, Deonar Mumbai-400088	**Member**
Shri Rabindra Nath Nayak Former CMD, Powergrid Corporation of India Limited B1/201, PWO, Gurgaon-122 002, Haryana	**Member**

Prof. Ramakrishna Ramaswamy School of Physical Sciences Jawaharlal Nehru University New Delhi – 110 067	**Member**
Shri R Gopalkrishnan Director, Tata Sons Ltd. Bombay House, 24, Homi Mody Street Mumbai – 400 001	**Member**
Prof. Swarup Mohapatra Professor, School of Mechanical Sciences IIT Bhubaneswar	**Member** [Till 31.12.2015]
Prof. R. K. Panda Professor, School of Earth, Ocean & Climate Sciences IIT Bhubaneswar	**Member**
Prof. V. R. Pedireddi Professor, School of Basic Sciences IIT Bhubaneswar	**Member**
Shri Debraj Rath Registrar (Acting) IIT Bhubaneswar	**Secretary** [Till 31.08.2015]
Dr. D Gunasekaran Registrar IIT Bhubaneswar	**Secretary** [From 01.09.2015]

Finance Committee

Shri S. K. Roongta Chairman, Bharat Aluminium Co. Ltd Former Chairman, SAIL & Former MD, Vedanta Aluminium & Power D-91, The Pinnacle, DLF Phase – 5, Gurgaon- 122009	**Chairman** [Till 01.11.2015]
Shri Pankaj Ramanbhai Patel Chairman & Managing Director Cadila Healthcare Limited Zydus Tower, Satellite Cross Roads Ahmedabad – 380 015, Gujarat	**Chairman** [From 11.02.2016]
Director, IIT Bhubaneswar [As per the provisions of Statutes 9(16)]	**Chairman** [From 02.11.2015 to 10.02.2016]
Prof. R V Raja Kumar Director, IIT Bhubaneswar Toshali Bhawan, Satyanagar, Bhubaneswar-751 013	**Member** [From: 22.04.2015]
Prof. Sujit Roy Director In-Charge IIT Bhubaneswar	**Member** [Till 21.04.2015]
Shri R. Subrahmanyam Additional Secretary (TE) Deptt. of Higher Education Ministry of Human Resource Development Government of India, Shastri Bhawan New Delhi – 110 115	**Member**
Ms. Darshana M Dabral JS & FA, Deptt. of Higher Education Ministry of Human Resource Development Government of India Shastri Bhawan, New Delhi – 110 115	**Member**
Prof. Ramakrishna Ramaswamy School of Physical Sciences Jawaharlal Nehru University New Delhi – 110 067	**Member**
Prof. R. K. Panda Professor, School of Earth, Ocean and Climate Sciences IIT Bhubaneswar	**Member**
Shri Debraj Rath Registrar (Acting) IIT Bhubaneswar	**Secretary** [Till 31.08.2015]
Dr. D Gunasekaran Registrar IIT Bhubaneswar	**Secretary** [From 01.09.2015]

Building and Works Committee

Prof. R V Raja Kumar Director, IIT Bhubaneswar Bhubaneswar-751 013	Chairman [From: 22.04.2015]
Prof. Sujit Roy Director In-Charge IIT Bhubaneswar	Chairman [Till: 21.04.2015]
Prof. R. K. Panda Head, School of Infrastructure IIT Bhubaneswar	Member
Prof. P. R. Sahu Head, School of Electrical Sciences IIT Bhubaneswar	Member
Shri S. R. Sethy Chief Engineer, Buildings PWD, Government of Odisha	Member
Shri Umesh Mishra Chief Engineer, CPWD, Bhubaneswar - 751020	Member
Mr. S. Sahu Senior General Manager (Technical) CESU, Bhubaneswar, Odisha	Member
Shri Debraj Rath Registrar (Acting) IIT Bhubaneswar	Member Secretary [Till 31.08.2015]
Dr. D Gunasekaran Registrar IIT Bhubaneswar	Member Secretary [From 01.09.2015]

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Dr. Sailendra Narayan Routray
Assistant Registrar, Establishment

Shri Pradeep Kumar Sahoo
Assistant Registrar, Store & Purchase

Shri Bimlendu Mohanty
Superintending Engineer (Civil)

Dr. Bibhuti Bhusan Sahoo
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Shri Basudev Mohanty, **Assistant Librarian**

Shri Rabi Kumar Patnaik, **CDPO**

Shri Biswaranjan Pradhan, **AEE (Electrical)**

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Courses of Studies

4-Year B.Tech. Programme

- Civil Engineering
- Computer Science and Engineering
- Electrical Engineering
- Electronics and Communication Engineering
- Mechanical Engineering
- Metallurgical and Materials Engineering

Joint M.Sc.-Ph.D. Programme

- Physics
- Chemistry
- Mathematics
- Geology
- Atmosphere and Ocean Sciences

2-Year M.Tech. Programme

- Climate Science and Technology
- Electronics and Communication Engineering
- Power System Engineering
- Transportation Engineering
- Structural Engineering
- Material Science and Engineering
- Mechanical Systems Design
- Thermal Science and Engineering

Ph.D. Degree Programme

- School of Basic Sciences
- School of Earth, Ocean and Climate Sciences
- School of Electrical Sciences
- School of Humanities and Social Sciences
- School of Infrastructure
- School of Mechanical Sciences
- School of Minerals, Metallurgical and Materials Engineering

ACADEMIA

SCHOOLS AT IIT BHUBANESWAR

School of Basic Sciences

Head of School

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Faculty Members

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The School of Basic Sciences conducts research in various areas of Science with special focus in various frontier areas of contemporary research fields of Biosciences, Chemistry, Mathematics and Physics.

In the areas of chemical sciences, the focussed research areas to highlight are design and development of metal complexes towards catalysis and anti-cancer drugs, functionalization of nanoparticles and nanoparticles based biosensors, coordination chemistry, magnetic materials and magneto structural correlation and bio-inspired coordination chemistry. Further, major ongoing programsare in "Catalysis for Fine Chemicals" within the platform of sustainable and green chemistry as well as chemistry beyond the molecules through molecular recognition, with the knowledge of non-covalent interactions, for the synthesis of exotic organic and organic-inorganic hybrid materials and covalent organic frame work structures with an emphasis on nanochemistry and technology. In addition, classical molecular dynamics simulations to establish the structure and dynamical properties of the hydrogen bonding system are also prominently studied.

In biosciences the areas of emphasis are G-protein coupled receptor biology, peptide/protein design and engineering, molecular modeling, computational biology, the structure-function studies of various proteins of eye lenses, leprosy, tuberculosis and mechanism and regulation of a class of enzyme ATPases involved in various biological pathways and human diseases.

In physics, the research areas of prominence are black holes, tunnelling in AdS, entanglement entropy, topological insulators and AdS/CFT correspondence, plasmonics and fiber optics mediated micro- and nano-structured devices with an emphasis on design, fabricate as well characterization, interaction of charged particles with biomolecules, clusters, aromatic hydrocarbon etc., quantum interference of diatomic molecules and nanostructure formation on materials by ions, study of the phase coherent transport in mesoscopic electronic systems, materials with unconventional magnetic and electronic properties, nano-structure materials and energy storage devices, molecular dynamics simulations, quantum transport and quantum biology.

The main focus of research in mathematical analysis is on variational inequalities and complementarity problems, complex dynamics and fractals. Research is being carried out in combinatorial matrix theory, graph theory, generalized inverses of matrices, optimization theory, geometric programming and queueing theory. Some of us are actively engaged in computational areas of research such as computational fluid dynamics, stochastic modeling and simulation, computational applied probability models, numerical methods, soft computing and artificial neural networks.

In addition, research focus in interdisciplinary areas especially in the field of material science towards generating nanomaterials for the development of devices based on nanotechnology assembling and clustering is of special significance.

Research Areas

- Organometallic Chemistry
- Catalysis for Fine Chemicals
- C-H Functionalization
- Solid State Organic Chemistry
- Organic Covalent Frames Works,
- Supramolecular Chemistry of Organic, Organic-Inorganic Metal Hybrids
- Nano chemistry
- Large Scale Quantum Simulations
- Nanostructure and Nanotechnology, Graphene, Advanced Energy Materials
- Atomic Scale Biological Systems
- Optimization Theory
- Variational Inequalities and Complementarity Problems
- Soft Computing
- Fractional Programming
- Numerical Methods
- Computational Fluid Dynamics
- Applied Functional Analysis
- Synthesis of modified nucleic acid as anticancer or antiviral drug.
- Optimization Techniques
- Optical Properties, Rheology, Fast dynamics, Electrical properties
- Biophysical Chemistry & Biochemistry (In vitro preparation of different small heat shock proteins (sHSPs) [such as alpha-crystallin, Hsp16.3, hsp16.9, Hsp18 etc] and study the effect of small molecules on the structure and functional activity of these proteins)
- Metal Based Anticancer Drug
- Nanomaterials
- Theoretical Chemistry
- Functional Materials, Luminescent Materials, Sensors
- Statistical Mechanics
- Computational Biophysics
- Optical Devices
- Black Holes
- Plasmonics
- Optical Fiber
- Queueing Theory
- Stochastic Processes
- Applied probability models
- Nano Technology
- Fluorogenic and Chromogenic Chemosensors
- Magnetic Materials and MRI Contrast Agents
- Synthesis and Characterization of Task Specific Ionic Liquids and Their Application
- Chemical and cellular biology
- Chemomechanistic physiology and regulation of a class of enzyme called ATPase
- Biochemistry of protein degradation and its regulation
- Protein-DNA and protein-protein interaction involved in different physiological pathways.
- Spectroscopy
- Multiferroics
- Development of novel methodology and total synthesis of biologically active natural products
- Development of chemically modified small molecules as therapeutic agent.
- Molecular modeling and computational biology
- 2D semiconductor nanomaterial, metal clusters, dilute magnetic semiconductor, Soft matter
- Solar cell, light emitting diode and sensors
- G-protein coupled receptor biology
- Biomolecules
- Complex Dynamics
- Nanomagnetism
- Quantum Field Theory

- Thermoelectrics
- Topological phases of Matter
- Fractals
- Experimental Atomic, Molecular and surface physics
- Polynomial Root finding
- String Theory
- Non-Equilibrium Statistical Mechanics
- Graph Theory
- CP violation
- Beyond Standard Model Physics
- Field Theory
- Numerical analysis of PDEs
- Natural products and natural product inspired bioactive molecule synthesis
- Theoretical and computational chemistry
- Electronic structure methods to study bound and metastable states
- Vibrations and Wave Propagation - Numerical methods
- Elementary Particle Physics
- Integro-partial differential equations
- Synthetic Method Development
- B Physics
- Protein Chemistry (Understanding the molecular basis for the low activity of endothelial nitric oxide synthesis and its relevance to the cardio-vascular diseases)
- Metal Mediated Organic Transformations (Homogeneous Catalysis)
- Non-adiabatic dynamics and spectroscopy
- Mathematical Physics
- Modeling for Ultrasonic Non-destructive Testing (USNDT)
- Mathematical Elasticity and Fluid Dynamics
- Open Quantum Systems- Decoherence and Dissipation
- Low rank tensor approximations for high dimensional PDEs

Sponsored Research Projects

S.N.	Title of Project	Sponsoring Agency	Name of the Investigator	Role
1	Development of computational methods for stochastic models with Markovian arrival/service process and their applications	DST, SERB	Dr. Abhijit DattaBanik	PI
2	India-CMS collaboration project	DAE-DST	Dr. S. Bahinipati	PI
3	The Role of Clock ATPase KaiC in the Temporal Control of DNA Replication	Vanderbilt International Research Grants Program, Vanderbilt University, USA	Dr.AnasuyaRoychowdhury (Jointly with Prof. Carl Johnson)	PI
4	Development of a general synthetic approach directed towards the total synthesis of bioactive iridoid class of terpenoids	DST, SERB	Dr. Tabrez Khan	PI
5	Influence of osmolytes on the structure, dynamics and hydrogen bond properties of water in aqueous solution and other aqueous binary mixtures at different thermodynamic conditions	DST, SERB	Dr.SnehasisChowdhuri	PI
6	Study on the development of ultra-sensitive optical fiber accelerometer	DRDO	Dr. Rajan Jha	PI

S.N.	Title of Project	Sponsoring Agency	Name of the Investigator	Role
7	Design, synthesis and biological evaluation of novel FtsZ inhibitors as potential anti tubercular agents	DBT	Dr. Shantanu Pal	PI
8	Intramolecular 1,3-dipolar cycloaddition of nitrile oxides to embellished bicyclo[2.2.2]octenones and its derivatives: studies on the synthesis of isotwistane framework of pupukeananes	Prof. G. N. Mahapatra Endowment Award from Utkal University	Dr. Shantanu Pal	PI
9	Role of C-terminal Region of Mycobacterium tuberculosis Hsp16.3 for its Structure, Stability and Chaperon Function - A Biophysical and Site Directed Truncation Study	CSIR	Dr.Ashis Biswas	PI
10	Omitted values in Complex dynamics	DST, SERB	Dr.Tarakanta Nayak	PI
11	Development of Transition Metal Functionalized Gold Nanoparticles and Their Potential Applications	CSIR	Dr. Srikanta Patra	PI
12	Design and Development of heterodimetallic complex of ruthenium iridium and palladium and their chemical and biological aspects	DST, SERB	Dr. Srikanta Patra	PI
13	Development of Higher order compact scheme to capture Taylor column phenomena in rotating fluids	DST, SERB	Dr.T V S Sekhar	PI
14	Validity of Quasi-static Approximation in Magneto hydrodynamic Flows and Heat Transfer - a Numerical Study	CSIR	Dr.T V S Sekhar	PI
15	Synthesis and study of thermoelectric properties of Half-Heusler Alloys with non-trivial topological order	BRNS, DAE	Dr.Niharika Mohapatra	PI
16	Role of A-site cation and disorder on the magneto-dielectric properties of double perovskites, A2BB'O6	DST, SERB	Dr.Niharika Mohapatra	PI
17	Magnetic Properties of Self-Assembled Bivalent, Trivalent and Mixed-valent [2x2] Transition Metal Grids	UGC/DAE-CSR	Dr. A. K. Singh	PI
18	Centre of Excellence on Novel Energy Materials (CENEMA)	MHRD	Prof. Saroj Kumar Nayak Prof. S. Roy	PI Co-PI
19	Dr S K Dash Centre of Excellence on BioScience, Engineering and Technology (SKBET) and SKBET Chair	Dr S K Dash Foundation, USA	Prof. Saroj Kumar Nayak	PI
20	Ion bombardment on nano-structured metal-oxides: Study of structural, physical, optical and electronic properties	DST	Dr.Shyamal Chatterjee	PI

Achievement

- Dr. Rajan Jha become the Regular Associate of International Centre for Theoretical Physics
- Dr. T. V. S. Sekhar received the Teaching Excellent Award in February 2016 from IIT Bhubaneswar
- Dr.Shyamal Chatterjee received theGanesh Mishra Memorial award from the Institute of Engineers (India) -2016

Visits Abroad

S.N	Faculty Name	Place of visit	Dates of visit		Purpose of visit	Funding Agencies
			From	To		
1	Dr.Anasuya Roychowdhury	Vanderbilt University, Nashville, USA	2015-12-07	2015-12-25	Collaborative research work and invited talk	Vanderbilt International Grant Program, Vanderbilt University, USA
2	Dr.Anasuya Roychowdhury	Nanjing, China	2015-04-23	2015-04-29	Invited speaker and Session Chair for the session: Cell Mechanics (Quest B: Panel B7) on April 27, 2015 at The 5th Annual World Congress of Molecular & Cell Biology (25-28 April, 2015) Nanjing, China.	IIT Bhubaneswar (PDA)
3	Dr.Shyamal Chatterjee	Helmholtz-Center Dresden-Rossendorf, Germany	2015-06-06	2015-07-04	Collaborative research	
4	Dr.Akshay Kumar Ojha	Glasgow	2015-07-12	2015-07-15	Presenting paper in 27th European Conference on Operational Research (EURO 2015)	IIT Bhubaneswar (PDA)
5	Dr. T. V. S. Sekhar	Oxford University, UK	2015-09-01	2015-09-04	To present a paper	IIT Bhubaneswar and DST

Book Chapters

- On Fatou components and omitted values, Geometry, groups and dynamics, Contemporary Mathematics, C.S. Arvinda et al, Dr.Tarakanta Nayak, American Mathematical Society, 2015.
- An Approach to Solve Multi-objectiveLinear Fractional Programming Problem, Proceedings of Fifth International Conference on Soft Computing for Problem Solving, Suvasis Nayak, Prof. A.K. Ojha, Springer, 2016.

Paper published in Peer-reviewed SCI-Journals

- Equilibrium balking strategies in renewal input batch arrival queues with multiple and single working vacation, D.Guha, V. Goswami and A. D. Banik, Performance Evaluation, 2015, 94, 1-24.
- Equilibrium balking strategies in renewal input queue with Bernoulli-schedule controlled vacation and vacation interruption, G. Panda, V. Goswami, A. D. Banik andD.Guha, Journal of Industrial and Management Optimization, 2016, 12, 851--878.
- Algorithmic computation of steady-state probabilities in an almost observable GI/M/c queue with or without vacations under state dependent balking and reneging,D. Guha, V.Goswami and A. D. Banik, Applied Mathematical Modelling, 2016, 40, 4199-4219.
- Single server queues with batch Markovian arrival process and bulk renewal or non-renewal service, A. D.Banik, Journal of System Science and Systems Engineering, 2015, 24, 337-363.
- Inclusive and exclusive measurements of B B decays to χ c1 χc1 and χc2 χc2 at Belle, Belle Collaboration (V. Bhardwaj (South Carolina U.), S. Bahinipati et al.)., Phys. Rev. D, 93 (2016) no.5, 2016.
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- A common and versatile synthetic route to (−) and (+) pentenomycin I, (+) halopentenomycin I and dehydropentenomycin, S. Das, A. Panda and S. Pal, Carbohydrate Research, 2015, 416, 24-31.
- Solvation structure and dynamics of ions in concentrated urea solution, P. Chettiyankandy, S. Chowdhuri, J. Mol. Liq., 2016, 216, 788.
- Temperature insensitive PCF interferometer coated with graphene oxide tip sensor, J. N. Dash and R. Jha, IEEE Photonics Technology Letters, 2016, 28, 1006.
- Intensity modulated SMF cascaded tapers with hollow core PCF based micro cavity for curvature sensing, S. Dass, J. N. Dash and R. Jha, Journal of Optics: Pure and Applied, 2016, 18, 035006.
- Metal Wire Waveguide Based All Plasmonic Refractive Index Sensor for Terahertz Frequencies, P. Padhy, P. K. Sahu and R. Jha, Sensors and Actuators B, 2016, 225, 115-120.

- Micron wire assisted Inline Mach-Zehnder Interferometric Curvature Sensor, S. Dass and R. Jha, IEEE Photonics Technology Letters, 2016, 28, 31-34.
- Ultrasensitive THz -Plasmonics gaseous sensor using doped graphene, A. Purkayastha, and R. Jha, Sensors and Actuators B,2016, 227, 291-295.
- Highly sensitive D shaped PCF sensor based on SPR for near IR, J. N. Dash and R. Jha, Optical and Quantum Electronics, 2016, 48, 137.
- Inline Microcavity Based PCF Interferometer for Refractive Index and Temperature sensing, J. N. Dash and Rajan Jha, IEEE Photonics Technology Letters, 27(12), 1325-1328 (2015).
- Fabry-Perot based strain insensitive photonic crystal fiber modal interferometer for inline sensing of refractive index and temperature, J. N. Dash and Rajan Jha, Applied Optics , 54 (35), 10479-10486, (2015).
- Graphene oxide encapsulated gold nanoparticles based stable fiber optic sucrose sensor, J. K. Nayak, P. Parhi and R. Jha, Sensors and Actuators B, 2015, 221, 835-841.
- Graphene Based Conducting Metal Oxide Coated D-Shaped Optical Fiber SPR Sensor, A. Patnaik, K. Senthilnathan and R. Jha, IEEE Photonics Technology Letters, 2015, 27, 2437-2440.
- Refractometry Based on Macrobending Using Photonic Crystal Fiber Modal Interferometer, J. N. Dash and R. Jha, IEEE Sensors Journal,2015, 15, 5291-5295.
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- Synthesis, X-ray structure and in vitro cytotoxicity studies of Cu(I/II) complexes of thiosemicarbazone: special emphasis on their interactions with DNA, Saswati, A. Chakraborty, S. P. Dash, A. K. Panda, R.Acharyya, A. Biswas, S. Mukhopadhyay, S. K Bhutia, A. Crochet, Y. P. Patil, M. Nethaji and R. Dinda, Dalton Trans, 2015, 44, 6140-6157.
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- Order-Parameter Scaling in Fluctuation Dominated Phase Ordering Dynamics R. Kapri, M.Bandyopadhyay and M.BarmaPhysical Review E,2016, 93, 012117.
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- Strain engineering the work function in monolayer metal dichalcogenides, N. A. Lanzillo, A. J.Simbeck and S. K. Nayak, J. of Physics. Cond. Mat, 2015, 27, 175501
- Atomically thin layers of B-N-C-O with tunable composition, B. Ozturk, A. de-Luna-Bugallo, E.Panaitescu, A. N. Chiaramonti, F. Liu, A. Vargas, X. Jiang, NeeravKharche, O. Yavuzcetin, M. Alnaji, M. J. Ford, J.Lok, Y. Zhao, N. King, N. K. Dhar, M. Dubey, S. K. Nayak, S. Sridhar and S. Kar, Science Advances, 2015, 1, 1500094.
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- Band structure modulation in MoS2 multilayers and heterostructures through electric field and strain, N. A. Lanzillo, T. P.O'Regan and S. K. Nayak, Computational Materials Science, 2015, 18, 957-984.
- Supercapacitors based on patronite-reduced graphene oxide hybrids: experimental and theoretical insights, S.Ratha, S. R. Marri, N. A. Lanzillo, S.Moshkalev, S. K. Nayak, J. N. Behera and C. S. Rout, J. of Mater. Chem. A, 2015,3, 18874.

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- Palladium (II) in electrophilic activation of aldehydes and enones: efficient C-3 functionalization of indoles, S. S. Mohapatra, P. Mukhi, A. Mohanty, S. Pal, A. O. Sahoo, D. Das and S. Roy, Tetrahedron Letters ,2015, 56, 5709-5713.

Paper published in Peer-reviewed Conference Proceedings

- Equilibrium abandonment strategies in a cloud management system (CMS): A queueing approach, Gopinath Panda, VeenaGoswami, A. D. Banik, 10th Conference on Stochastic Models of Manufacturing and Service Operations, June 1-6, 2015 Volos, Greece, SMMSO 2015,University of Thessaly Press, 179--186,
- Study of Cytosine in gas phase and its relevance to radiation therapy, Subhasish Das, Pranab Kumar Dhara, KousikSamanta, Shyamal Chatterjee, International topical conference on charged particle collisions and electronic processes in atoms, molecules and materials, q-PaCE - 2016, 2016, PP_50,
- ATPases: Smart Mechanics to Work Diverse, AnasuyaRoychowdhury, The 5th Annual World Congress of Molecular & Cell Biology, Nanjing, China, April 25th-28th, 2015., Quest B: Panel B7: Cell Mechanics , 2015, pp 262,
- Structural modeling of C5a receptor: Molecular insights into agonism and antagonism, Rana, S., World congress of Synthetic Biology, Current Synthetic &System Biology, 2015, 3:3,
- The Model Structures of C5A Receptor (C5AR): Insights into Agonism, Inverse Agonism and Antagonism, Rana, S., 60th Annual meeting of Biophysical Society, Biophysical Journal, 2016, 55a-56a,
- Highly birefringent PCF based micro-displacement sensor using tapered fiber, Jitendra Narayan Dash, SumitDass and Dr. Rajan Jha, Frontiers in Optics, Laser Science, JW2A.53, OSA (2015). (18-22 OCT San Jose California)., 2015,
- All SMF Inline Mach-Zehnder interferometer with micro cavity for curvature sensing, SumitDass, Jitendra Dash, RajanJha, Frontiers in Optics, FTh3E. 5, OSA (2015). (18-22 OCT San josecalifornia), 2015,
- Refractometry Using Microcavity Based PCF modal Interferometer, Jitendra Narayan Dash and Rajan Jha, WRAP ,IISC Bangalore, (16-17 Dec), 2015,
- An Approach to solve Multi-objective Linear Fractional Programming problems, SuvasisNayak, A.K.Ojha, 5th International conference on Soft computing for Problem solving(SOCPROS-2015), 18-20 December 2015 at IIT Roorkee, 2016, 711-721.
- Nonlinear Mixed Variational-like Inequality with respect to eta-alpha monotone mapping in Banach Spaces, GayatriPany, SabyasachiPani, ICRTMAA, Dec21--23, 2014, IIT Rorkee, Springer Proceedings in Mathematics &Statistics 143, 185-196.
- Multi-objective Colliding Bodies Optimization, Arnapurna Panda, SabyasachiPani, SOCPROS-2015, Dec18-20, IIT Roorkee, Springer SB 2016, page, 651-664.
- Augmented RBF-FD method for unbounded domains, Nikunja Bihari Barik and T. V. S. Sekhar, IMA conference on Numerical Methods for Simulation, 2015, 1-4 September, 2015, P.No. 32,
- An efficient upwind based RBF-FD method for steady convection-diffusion problems, Nikunja Bihari Barik and T. V. S. Sekhar, The International Conference on current Trends in PDEs: Theory & Computations, 2015.
- Interaction of electrons and ions with molecules, Shyamal Chatterjee, National Seminar on Design, Synthesis, Interactions, Chemical and Biochemical Activities of Different Functional Molecules, February 04-06, 2016, Burdwan University, 2016, Page 26, IL-13.
- Interaction of electrons and ions with molecules and surfaces, Shyamal Chatterjee, Conference on Exploring Fundamental Physics Using Atomic Systems (EFPAS-2015), PRL, Ahmedabad, 2015, 6-8 May, 2015, Page 38.
- Modifying the wettability of Cu2O nano-columnar array by nitrogen ion irradiation, Satyanarayan Dhal and Shyamal

Chatterjee, 18th International Conference on Radiation Effects in Insulators (REI-18), Jaipur, India, 2015, 26th to 31st October, 2015, Page No:67.

- Study of Cytosine in gas phase and its relevance to radiation therapy, Subhasish Das, Pranab Kumar Dhara, KousikSamanta and Shyamal Chatterjee, International topical conference on charged particle collisions and electronic processes in atoms, molecules and materials, ISM Dhanbad, 2016, 9-11 January, 2016, Page No. 179.
- Welding Technology at Nanoscale for Micro-Electro-Mechanical Systems, Satyanarayan Dhal and Shyamal Chatterjee, Technical Annual 57th session, Institute of Engineers, 2016, 57, 57.

Invited Lectures / Presentation by Faculty Members

- Equilibrium abandonment strategies in a cloud management system (CMS): A queueing approach, Gopinath Panda, VeenaGoswami, A. D. Banik, 10th Conference on Stochastic Models of Manufacturing and Service Operations, June 1-6, 2015 Volos, Greece,
- On graphs with simply structured Laplacian eigenvectors, SasmitaBarik, International Conference on Graph Theory and its Applications (ICGTA-2015), 2015, December 16-19.
- ATPases: Smart Mechanics to Work Diverse, AnasuyaRoychowdhury, The 5th Annual World Congress of Molecular & Cell Biology, Nanjing, China, April 25th-28th, 2015.
- Nucleotide Regulation of Replication Initiation, AnasuyaRoychowdhury, Department of Biological Sciences Seminar, Vanderbilt University, USA, December 14, 2015.
- The Biology of Life & Ecosystem: An Introduction to Bio Sciences, S. Rana, "Ishan Vikas" program initiated by MHRD, 10th Dec 2015.
- The Chemistry in Day to Day Life: Fun Facts Known & Unknown, S. Rana, "Ishan Vikas" program initiated by MHRD, 11th Dec 2015.
- Bioinformatics in Engineering Functional Peptides, S. Rana, 10th January 2016 at College of agriculture, OUAT, Bhubaneswar.
- Structure and Pharmacology of Anaphylatoxin Receptor, S. Rana, 21st January 2016 at the conference
- "Accelerating Biology 2016: Decoding the Deluge", organized by CDAC, Pune.
- Einstein's General Theory of Relativity and Black Holes, Chandrasekhar Bhamidipati, 100 years of General Theory of Relativity- Einstein's path breaking Scientific Discovery, one day workshop at M.R.P.G. College, Vizianagaram, Andhra Pradesh, 2015.
- Opportunities and Challenges in the World of GPCRs Embedded in Soft Matter Like Environment, S. Rana, 23rd January 2016 at the symposium "Frontiers in Material Sciences", organized by Dept. of Chemistry, Ravenshaw University in association with IAS (Bangalore), INSA (New Delhi) and NASI (Allahabad).
- The Event Horizon of Black Holes, Chandrasekhar Bhamidipati, WarpEd, Astronomy and Astrophysics event, N.I.T. Rourkela, Odisha, 2016.
- General Theory of Relativity, Chandrasekhar Bhamidipati, SERC Preparatory School in Theoretical High Energy Physics, IISER Bhopal, 2015.
- Newton's Laws of Motion and Beyond, Chandrasekhar Bhamidipati, Teacher's Recharge Program, IOP, Bhubaneswar, 2015.

- Photonic Crystal Fiber Sensor: One solution to many problems, Rajan Jha, National Conference in Advances in Sensors: Lab to Field, 29-30 January (2016), RCI Hyderabad.
- Optical Fiber Sensors: Principles to Practice, Rajan Jha, OSA Student chapter, KIIT Bhubaneswar, 12 Dec., Bhubaneswar.
- Utilizing Plasmon like behaviour at Terahertz for Waveguides and Sensing Applications, Rajan Jha, Workshop on Applications and Needs of Terahertz (THz) Technologies for Defense and Security, IIT Delhi, November 2, 2015.
- Photonic Crystal Fiber Modal Interferometer based Highly Sensitive Sensors, Rajan Jha, 26th Mid-Year Meeting Indian Academy Of Sciences, 3rd- 4th July, IISc Bengaluru.
- Co-operative excitonic transitions and white light emission in Au8-CdS hybrid nanorods, S. Rath, O Halder and A. Pradhani, National Conference on Semiconductor Materials and devices, 2016, 4-6 March,2016.
- The magic of Mobius maps, TarakantaNayak, Orissa University of Agriculture and Technology, Bhubaneswar, 18 March 2016.
- Complex dynamics of simple maps, TarakantaNayak, Workshop on Topological Dynamics, Dec 10 -- 12, 2015, National Institute of Technology, Karnataka, Surathkal.
- Pareto Optimal solutions of multi-objective linear fractional programming problems with interval coefficient, A.K.Ojha, 27 th European conference on Operational Research(EURO2015) at Strathclyde University, Glasgow from 12-15 July 2015.
- Multi-Objective Linear fractional Programming problems using epsilon constraint , as Keynote speaker, A.K.Ojha, International conference on Electrical, Electronics and optimization Techniques(ICEEOT)2016 from 3-5 March 2016, IEEE conference at DMI College , Palanchur,Chennai,Tamilnadu.
- Sir C. V. Raman, The Pride of India, Akhilesh Kumar Singh, Ravenshaw University, Cuttack on World Science Day.
- Interaction of electrons and ions with molecules, Shyamal Chatterjee, National Seminar on Design, Synthesis, Interactions, Chemical and Biochemical Activities of Different Functional Molecules, February 04-06, 2016, Burdwan University.
- Interaction of electrons and ions with molecules and surfaces, Shyamal Chatterjee, Conference on Exploring Fundamental Physics Using Atomic Systems (EFPAS-2015), PRL, Ahmedabad, 2015, 6-8 May.

Seminars/Workshops/Conferences Organized

- Belle Analysis Workshop, 12-13-2015 to 12-21-2015, IIT Bhubaneswar. (Convenor: Dr. S. Bahinipati)
- Fun with Lights, 04-08-2016, IIT Bhubaneswar (for High School Students). (Convenor: Dr. R. Jha)

Colloquiums organized

S.N	Title	Date
1	On the role of optimization in computational and applied mathematics by Prof. Luis Melara from Shipenberg University, USA	2016-03-16
2	Experiments with Entangled Photons by Prof. H.S. Mani (CMI, Chennai))	2016-04-04
3	Nanoscale electronics and mechanics with graphene, Prof.MandarDeshmukh (TIFR, Mumbai)	2016-03-28
4	Dynamical Analysis of Cluster-Molecule Reactivity, Prof. Julius Jellinek (ANL, Argonne, IL, USA)	2016-03-21
5	100 years of superconductivity and new excitements, Prof.Tanmoy Das (IISc, Bangalore)	2016-02-23
6	Thermoelectricity, History, Renaissance, Advances and Challenges, Prof. S. D. Mahanti (Michigan State University, USA)	2016-02-08

Colloquiums organized *(contd.)*

S.N	Title	Date
7	Chemistry and Physics of Correlated Electrons, Prof. S. Ramasesha (Solid State and Structural Chemistry Unit, IISc, Bangalore)	2016-01-21
8	Enantiodiscrimination by Single and Multiple Quantum NMR and New Techniques to Push the Limits of NMR Sensitivity, Prof. N. Suryaprakash from NMR Research Center, IISc Bangalore	2015-12-08
9	New Form of Matter: De-confined state of Quarks and Gluons, Prof.BedangadasMohanty (NISER, Bhubaneswar)	2015-11-13
10	An Overture for String Theory, Prof.Koushik Ray (IACS, Kolkata)	2015-11-06
11	Space-time and Non-Commutative Geometry,Prof. A. P. Balachandran (Syracuse University, NY, USA)	2015-10-01
12	Unfolding of length scales in a virus life-cycle, Prof.SomenBhattacharjee (RKMVU, Belur and Institute of Physics, Bhubaneswar	2015-09-07
13	MADHYAM MARG by Professor Gokulananda Das, retired Professor (Department of Mathematics), and ex-vice chancellor Utkal University, Bhubaneswar	2016-04-19

Industrial Visit

Date	Name of the Industry	No. of Students
November 03, 2015	Talcher Heavy Water Plant	21

Visiting Experts

S.N	Name of the Visitor	Name of Company / Dept	Date of Interaction
1	Prof. Ravindra B. Bapat	Indian Statistical Institute, New Delhip	01.04.2015
2	Prof. Subodh Shenoy	TIFR Centre for Interdisciplinary Sciences, Hyderabad	10.04.2015
3	Prof. A.K. Pati	Harish Chandra Research Institute, Allahabad	07.05.2015
4	Dr. T.K. Paul	DGM, Chem Surface Team, ONGC Ltd, Ahmedabad	18.05.2015
5	Mr. Ram Chandra Sahu	Deputy Fire Officer, Orissa Fire Service, Sambalpur	10.06.2015
6	Prof. Tapas Kumar Kundu	JNCASR, Bangalore	04.08.2015
7	Prof. Somendra M Bhattacharjee	Ramakrishna Mission Vivekanada University, Kolkata/Institute of Physics, BBSR	04.09.2015
8	Prof. A.P Balachandran	Syracuse University, USA	01.10.2015
9	Prof. Bedangadas Mohanty	NISER, Bhubaneswar	13.11.2015
10	Dr Bijay Agarwalla	Post Doctoral Fellow, University of Toronto	19.11.2015
11	Dr. R Prabhu	Post-doctoral fellow, Ben-Gurion University of Negev, Beersheva, Israel	20.11.2015
12	Prof. N. Suryaprakash	NMR Research Centre, IISc Bangalore	08.12.2015

School of Earth, Ocean and Climate Sciences

Head of School

Prof. Subhasish Tripathy

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Adjunct Faculty

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The School is actively progressing towards its goal of generating highly skilled manpower in different specialized areas of Earth System Sciences. In addition to the joint M. Tech. - Ph.D. program in Climate Science and Technology, the School is also offering two joint M.Sc.- Ph.D. programs in Geology, and Atmosphere & Ocean Sciences. A number of students are pursuing Ph.D. and addressing recent science questions such as global climate change, water management etc. The alumni of the School are placed at various institutes of higher learning and industries.

The faculty members are specialized in the field of Climate Change, Environmental Geochemistry, Waste Utilization, Hydro-Geochemistry, Isotope Geochemistry, Soil and Water Contamination, Environmental Impact Assessment, Marine Geophysics, Tropical Cyclone Modeling, Cloud Microphysics, Aerosols and Climate, Tropical Dynamics, Satellite Oceanography, Ocean Modeling, Paleoclimatology, Paleoceanography, Micropaleontology, Monsoon Variability, Hydrogeology, and Oceanography etc.

The School created advance laboratories and research facilities for masters and research students. Existing facilities are continuously getting augmented. Realizing the potential of the School Ministry of Earth Sciences, Government of India has approved and sanctioned the initial grant to establish the Bay of Bengal Coastal Observatory (BoBCO) at the Innovation Centre for Climate Change near Gopalpur.

Thrust areas

- Environmental and Hydro Geochemistry
- Geogenic pollution and salt water intrusion
- Surface and Groundwater Hydrology and Hydrogeology
- Watershed Management
- Non-point Source Pollution of Water Resources
- Tropical Meteorology
- Tropical Cyclones and Extreme events
- Boundary Layer Meteorology
- Satellite Oceanography and Meteorology
- Numerical Weather Prediction and Meso-scale Modeling
- Climate Dynamics and Variability
- Monsoon Variability
- Geothermal Energy
- Organic Geochemistry and Waste Utilization
- Paleoclimatology and Paleoceanography
- Marine Micropaleontology and Sedimentology
- Aerosols-Clouds interactions
- Ocean-Atmosphere Interactions & Modelling
- Coastal Dynamics
- Regional Climate Variability
- Physical and Bio-Geo-Chemical Oceanography
- Ocean color applications and Circulation Modeling
- Seismology
- GPS Geodesy

New Laboratories/Laboratory Experiments Set up

S.N.	Faculty Name	Laboratory	Experiment(s)
1	Dr. Raj Kumar Singh	Thin Section preparation unit (part of Petrology Lab)	Rock cutting and polishing
2	Dr. Raj Kumar Singh	Sediment coring unit (part of Sedimentary Petrology Lab)	Gravity sediment core
3	Dr. Sourav Sil	Ocean Observation Lab	Physical and Geo chemical observations
4	Dr. Abhishek Kumar Rai	Geophysical and Computational Geoscience Lab	• Resistivity survey for groundwater potential estimation. • Seismic hazard and Microzonation
5	Prof. Subhasish Tripathy	Geochemistry Lab	Geo-Chemical Analysis
6	Dr. Sandeep Pattnaik	Modeling and Visualization Lab	• Modeling and Simulation • Data analysis & visualization • High Performance Computing • RS and GIS • Statistical Modeling
7	Dr. Syed Hilal Farooq	Geochemistry Lab	Detection and Quantification of Total Organic Carbon and other organic compounds
8	Dr. Debadatta Swain	Remote Sensing & Geographic Information System Lab	Land Surface Temperature Investigations in the city of Bhubaneswar
9	Dr. Debadatta Swain	Ocean Observations & Instrumentation Lab	Hydrography of Lake Chilika
10	Dr. Vinoj. V	Atmospheric Science Lab	Solar Radiation Measurements

New Equipment

1. Rock cutting and polishing section
2. Gravity sediment corer
3. Multi-parameter profiler
4. Tide-Wave Recorder
5. Conductivity, Temperature and Depth Profiler with Dissolve Oxygen Sensor
6. Differential Global Positioning SystemSponsored Research Projects

S.N.	Title of Project	Sponsoring Agency	Name	Role
1	Millennial to centennial scale variability in the Asian summer monsoon: Foraminiferal perspective from the East China Sea	NCAOR, MoES	Raj K. Singh	PI
2	Simulation of Coastal Processes on the North West Bay of Bengal	DST-SERB	Sourav Sil	PI
3	Multi-scale Analysis of Circulation and variability in the north western bay of Bengal using HF Radar observations	INCOIS, MoES		
4	Vertical Structure of Mesoscale Eddies in the Western Bay of Bengal from ARGO and Altimetry	IITBBS Seed Project		
5	Establishment of Bay of Bengal Costal Observatory	MoES	S. Tripathy and faculty members of the School	PI
6	Monsoon Dynamics and thermodynamics from the land surface through convection to the continental-scale (INCOMPASS)	IITM-MoES	S. Pattnaik	PI
7	Understanding and Characterization of systematic errors in the WRF-ARW boundary layer parameterization over the Bhubaneswar and its neighbourhood regions	ISRO		PI
8	Arsenic Mass Balancing	DST	S. H. Farooq	PI
9	Development and Application of Extended Range Forecast System for climate risk management in Agriculture	DAC&FW	U. C. Mohanty	PI
10	High resolution regional ocean-atmosphere couples modeling system for the prediction of intense vortices over Indian seas	INCOIS, MoES		
11	Improved understanding and representation of land surface processes for short, medium and long range prediction of monsoon rainfall	IITM, MoES		
12	Indo-US Joint Network Center for Advanced Modeling of Tropical Land-Atmosphere-Ocean System for Simulation of Extreme Weather Events	IUSSTF, New Delhi		

S.N.	Title of Project	Sponsoring Agency	Name	Role
13	Improvement of Groundwater Level and Quality through improved agricultural management in eastern India	DIT	R. K. Panda	R. K. Panda
14	Setting up a Centre for Innovation in affordable housing and low strength materials	Planning & Coordination Dept., Govt of Odisha		
15	Does Tropical Cyclone Heat Potential (TCHP) play a significant role in intensification of tropical cyclones? A comprehensive analysis for the North Indian Ocean	INCOIS, MoES	D. Swain	PI
16	Seasonal & inter-annual variability of Relative Heat Content in the Indian Ocean	ISRO/RESPOND		
17	Quantifying the impact of urbanisation and climate change on the microclimate of Bhubaneswar	DST-UKIERI		
18	Simulations of day and night Sea Surface Temperature in the North Indian Ocean: A one-dimensional modelling approach	IIT BBS Seed Project		
19	Integration of air mass trajectory models and 187Os/188Os isotope data to trace the long-range transport of atmospheric dust in India.	DST	Vinoj. V	PI
20	Investigation of aerosol outflow from Indo-Gangetic plain	ISRO		

Consultancy/Development Projects

S.N.	Title of Project / work	Agency/Firm/ Sponsors	Principal/ Co-Principal Investigator	Duration		Total Budget (Rs. In Lakhs)
				From	To	
1	Co-operation and Expert Advice for Improvement of Short and Extended Range Prediction of Rainfall in the Tropics	Regional Integrated multi-Hazard Early Warning System (RIMES), AIT, Pathumthani, Thailand	Prof. U. C. Mohanty	2014-05-01	2016-05-31	10.00

Achievement

- Prof. Rabindra Kumar Panda became the Fellow of Indian Water Resources Society
- Dr. Debadatta Swain received the Young Scientist Award by the International Union of Radio Science, Belgium

Visits Abroad

S.N	Faculty Name	Place of visit	Dates of visit		Purpose of visit	Funding Agencies
			From	To		
1	Dr. Raj Kumar Singh	University of Melbourne, Australia	2016-01-21	2016-01-25	2nd IODP Expedition 346 post cruise meeting	IITBBS
2	Dr. Raj Kumar Singh	Institute of Geosciences, Christian Albrechts University Kiel, Germany	2015-05-16	2015-07-19	Guest scientist visit under INSA-DFG exchange program	DFG Germany, IITBBS
3	Prof. Uma Charan Mohanty	Purdue University, USA	2015-06-07	2015-06-29	Collaborative Research	IIT-Delhi and Purdue University
4	Prof. Uma Charan Mohanty	Hurricane Research Division, Florida, USA	2015-06-15	2015-06-18	Collaborative Research	IIT-Delhi and Purdue University
5	Prof. Uma Charan Mohanty	Colombo, Sri Lanka	2016-01-04	2016-01-08	8th International Perspective on Water Resources and the Environment (IPWE 2016) Conference	United Nation University, Tokyo
6	Dr. Vinoj. V	Imperial College, London, U.K.	2015-07-07	2015-07-12	Invited Talk	Imperial College
7	Dr. Vinoj. V	London School of Economics, London, U.K.	2015-07-07	2015-07-12	Invited Expert	London School of Economics
8	Dr. Debadatta Swain	Gran Canaria, Spain	2015-05-15	2015-05-25	Receiving the AT-RASC 2015 Young Scientist Award and paper presentation in the 1st URSI Atlantic Radio Science Conference	International Union of Radio Science & IIT BBS

Book Chapters

- Surface Generated Organic Matter: An Important Driver for Arsenic Mobilization in Bengal Delta Plain, In Arsenic in Central Gangetic Plain, (Eds.) H. Prommer, AL. Ramanathan, A. Mukharjee, B. Nath, Farooq S.H. and Chandrasekharam, D., Springer, 2015, pp. 179-196.

Paper published in Peer-reviewed SCI-Journals

- Abrupt changes in Indian Summer Monsoon strength during 33,800 to 5,500 yr BP., Dutt, S., Gupta, A.K., Clemens, S., Cheng, H., Singh, R.K., Kathayat, G., Edwards, R.L., Geophysical Research Letters, 2015, DOI: 10.1002/2015GL064015.
- Inter-aquifer water transfer through combination well for artificial recharging of the deeper aquifer system in Patna urban area, Dwivedi, S.N. and Singh, R.K., Current Science, 2015, 108(7), 1219-1221.
- Non-annular response of sea ice cover in the Indian sector of the Antarctic during extreme SAM events, Pranab Deb, M. K. Dash, Dey and P. C. Pandey, International J. of Climatology, 2016.
- Extra Tropical Anticyclonic Rossby Wave Breaking and Indian Summer Monsoon, Dhrubajyoti Samanta, Mihir K. Dash, B. N. Goswami and P. C. Pandey , Climate Dynamics , 2016, 46(5), 1547-1562.
- The May 21st, 2014 Bay of Bengal Earthquake: Implications for Intraplate Stress Regime, A. Rai, S. Tripathy, S. Sahu, Current Science, 2015, 108(9), 1706-1712.
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- Mapping and Assessment of Aquifer through GIS, Seismic and Electrical Imaging in Hardrock terrain of Khurda District, Odisha , P. Nayak, A. Rai, S. Tripathy, Indian Geophysical Union, 2015, 113.
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- Abrupt changes in the Indian summer monsoon since MIS 3., A.K. Gupta, R.K. Singh, M. Das, M. Prakasam, and Som Dutt., In 103rd Indian Science Congress, during 6-8th January 2016 at University of Mysore.
- Paleoceanographic significance of late Quaternary deep sea benthic foraminifers of the Japan Sea - a preliminary result, R.K. Singh, M. Das, A. Holbourn, A. Kanjilal, A. Ranjan, S. Gallagher, and W. Kuhnt, In 25th Indian Colloquium of Micropaleontology and Stratigraphy, during 18 – 20, December 2015 at Institute of Science Aurangabad, Maharastra.
- Assessment of Chilika lake sediments as paleo-proxy for climate reconstruction, S.S. Barik, R.K. Singh and S. Tripathy, In National Climate Science Conference, during 2-3rd July 2015 at IISc, Bangalore.
- Assessment of Late Quaternary variation in Asian Monsoon using foraminifera from the sediments of the IODP site U1429A, U.V.Abhijith and R.K. Singh, National Climate Science Conference, during 2-3rd July 2015 at IISc, Bangalore.
- Variability in Indian monsoon over past 5000 years, Som Dutt, A.K. Gupta, H. Cheng, S.K. Rai, and R.K. Singh, Impacts on South Asian societies. In 30th Himalayan-Karokaram Thrust (HKT) conference, during 6-8 October 2015 at WIHG Dehradun.
- Modelling of Realistic Land Surface Processes for Improved Simulation of Heavy Rainfall Events Associated with Indian Summer Monsoon, U. C. Mohanty, Krishna K. Osuri and H. P. Nayak , WMO 3rd International Monsoon Heavy Rainfall Workshop, 22-24 September, 2015, New Delhi.
- Observational Prospective on Occurrence of Heavy Rainfall Events over Odisha during Summer Monsoon Season, S. Pattanayak, M. Swain and U. C. Mohanty, WMO 3rd International Monsoon Heavy Rainfall Workshop, 22-24 September, 2015, New Delhi.

Invited Lectures/Presentation by Faculty Members

- Assessing deep sea temperature variability in East China Sea using population abundance and Mg/Ca ratio of benthic foraminifera, Singh, R. K., 2nd IODP Expedition 346 post cruise meeting, 22-24 January 2016. University of Melbourne, Australiating.
- Discovery of Polar Region, P. C. Pandey, NIST, Behrampur

- Climate Change, P. C. Pandey, Odisha Mathematical Society.
- Prediction of Tropical cyclones over Bay of Bengal using HWRF modeling system, Prof. U. C. Mohanty, Hurricane Research division, NOAA, Florida, USA, 16 June 2015.
- Prediction of Extreme Weather Events and rainfall over Sri Lanka, Prof. U. C. Mohanty, Department of Irrigation, Colombo, Sri Lanka, on 7th January, 2016.
- Quantification and Control of Non-point Source Pollution of Water Resources in Agricultural Watersheds, R. K. Panda, Mathematical modelling of Water pollution, 2015.
- Estimation of Root-zone Soil Moisture at Finer Scale for Agriculture Risk Management, R. K. Panda, Development of Climate Risk Management Tool in Agriculture using Extended Range Forecast System, 2015, 15-20 Dec.
- Aerosols and the Indian Monsoon Rainfall, Vinoj. V, India Meteorological Society, Bhubaneswar Chapter
- Dust Aerosols and the Indian Rainfall, Vinoj. V, Grantham Research Institute at Imperial College, London, U.K
- Atmospheric Aerosols and the Indian Summer Monsoon Rainfall, Vinoj. V, Indian Institute of Space Science and Technology, Thiruvananthapuram
- West Asian Link to the Indian Monsoon Rainfall, Vinoj. V, National Climate Science Conference, IISc, Bangalore
- Weather and Climate, D. Swain, Inter-District Childrens Science Congress on the theme Understanding Weather and Climate, 2015, Sep 27, Bhubaneswar.
- Climate Change. Whats Next!!!, D. Swain, District Coodinators' Workshop for National Childrens Science Congress-2015 , 2015, July 11, Bhubaneswar.

Seminars / Conferences / Workshops organized

- Stakeholder's Meeting on Quantifying the impact of urbanisation and climate change on the micro-climate of Bhubaneswar during 27th July 2015
- Development of Climate Risk Management tools in Agriculture using Extended Range Forecast during 15th – 20th December 2015

Industrial /Field Visits

Date	Name of the Industry/Field Work	No. of Students
December 2-15	Geological Field work in and around Ambaji, Gujarat	16
December 2-15	Visit to Sukinda Chromite Mines and Talcher Coal Field	15
December 7-11	Indian National Centre for Ocean Information Services, Hyderabad	12
December 9-12	Indian Institute of Tropical Meteorology, Pune	15

Visiting Experts

1. Mr. Deepak Narayan Subramani, MIT, USA, visited SEOCS on 6th August, 2015 and gave a talk on "Optimal Path Planning in Dynamic Environments and Nonlinear Non-Gaussian Bayesian Data Assimilation.
2. Prof. V. Chandrasekhar, International Research of Colorado State University (CSU), USA visited SEOC on 19 August 2015 and delivered a talk entitled "Urban Remote Sensing Network for Disaster Mitigation".
3. Prof. Sumon K. Sinha, President, Sinhatech, USA, visited our Institute on 7th August, 2015 and gave a popular talk on " Developing a Low-Cost Unmanned Aerial Platform for very low Altitude Sea Surface Measurements.
4. Dr. R. Venkatesan, NIOT, Chennai delivered a talk on " Law of Sea and Ocean Policy & quot; 07-08/01/2016.
5. Prof. Sumon K Sihna, President, Sinhatech, USA, delivered a talk on " Obtaining Real Time in- situ Meteorological Data with Small Unmanned Aerial Vehicles & quot; 21/01/2016.
6. Dr. Glen Gawarkiewicz (Senior Physical Oceanographer, WHOI, USA) visited during 13th – 14th March 2016.
7. Prof. Tarun K. Dalai delivered a talk on "Role of organic carbon degradation and carbonate dissolution in generation of dissolved inorganic carbon (DIC) in the Hooghly estuary: Clues from DIC and its isotope composition (delta 13C), 21/03/2016.
8. Dr. R. Mohanty, Former Additional Director, Atomic Mineral Directorate delivered a talks on "Geology and its Influence on Natural Background Radiation" 28/03/2016 & 30/03/2016.

School of Electrical Sciences

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The School of Electrical Sciences has the focus to shape graduates into hardcore professionals who would become effective leaders and noteworthy innovators in the technological areas of Electrical Engineering, Electronics and Communication Engineering, Instrumentation Engineering, Computer Science and Knowledge Engineering. The School is engaged in a wide spectrum of research in established and emerging technologies through nationally and internationally funded sponsored research and industrial consultancy as well as through various research collaborations.

The school, widely known for its multidisciplinary programs, currently focuses on five major research areas: Communications and Signal Processing, Power and Renewable Energy Systems, Control Systems, Power Electronics and Drives, Microelectronics and Semiconductor Devices, and Computing Techniques and Systems. In its role as research-oriented School, it will help solve the most challenging social, cultural, technical, and health- related problems through both basic and applied research. The School also aims to produce effective leaders and noteworthy innovators in the broad aspects of Electrical Sciences.

While producing competent professionals and responsible citizens, it is also the endeavour of the School to ensure that the graduates adhere to ethical values in life and be sensitive to environmental and social issues. It is also part of the mission to motivate and encourage the students to engage in lifelong learning which would help them keep abreast with contemporary developments in their fields of operation and enable them to use this power of knowledge as leverage to become outstanding performers in whatever careers they choose.

Thrust Areas

- Power System Optimization and Control
- Distributed Generation
- Power Quality, Custom Power Devices
- PMU and wide-area measurement
- Micro-grid planning and protection
- Renewable Energy Systems
- DC-DC Converters for renewable energy sources
- Switched Mode Power Converters and Electrical Drives Systems
- Power electronics applications in power systems
- Fractional Order System
- Applied Soft Computing
- Application of soft computing techniques to power systems
- Soft Computing/Evolutionary Computing/Computational Finance
- Software Testing and Verification
- Program Analysis
- Industrial Application of High Voltage for Air Pollution Control
- Radar and Audio Signal Processing
- Image Processing
- Biomedical Signal Processing
- Biometrics
- Computer Vision
- Human Computer Interface
- Digital Communication
- Advanced Modulation Formats
- Optical Communication
- Antenna design
- Ground Penetrating Radar and Through-Wall-Imaging Radar
- Metamaterial design
- Wireless Communications
- Fading Channel Receivers
- Receiver design for 5G mobile communications
- High Voltage Engineering
- Radiation effects on semiconductor devices

New Laboratories/Laboratory Experiments Set up

S.N.	Faculty Name	Laboratory	Experiment(s)
1	Dr. Prasant Kumar Sahu	DEC Lab	1. Design and implementation of 3-bit synchronous up/ down counter 2. Design and implementation of Multiplexer and De-multiplexer using logic gates and study of IC74150 and IC 74154 3. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147 4. Design and implementation of 2Bit Magnitude Comparator using logic gates 8 Bit Magnitude Comparator using IC 7485 5. Design and implementation of 16 bit odd/even parity checker /generator using IC74180.
2	Dr. Debalina Ghosh	Radiating Systems Laboratory	Antenna Return Loss Measurement; UWB Pulse Generation and Measurement
3	Dr. N. C. Sahoo	Renewable Energy Systems Lab	Work in progress for setting up new experiment on DFIG based wind energy system
4	Dr. M. Sabarimalai Manikandan	Signals and Systems Laboratory	
5	Dr. M. Sabarimalai Manikandan	Electronic System Design Lab	
6	Dr. M. Sabarimalai Manikandan	DSP Lab	
7	Dr. Padmalochan Bera	Database Systems Laboratory	Experiments on Database Design, Implementation and Query Processing and Optimization; Database Implementation Projects - RDBMS package used: Oracle, MySQL; DB Languages:SQL, PL/SQL; DB Interface design platform(s): JDBC, PHP, ASP.NET
8	Dr. Padmalochan Bera	Computer Network Laboratory	Experiments on TCP Flow control, Error Control and Congestion Control Algorithms; Routing Protocol implementations; Web Server, Chat Server, Telnet and FTP Server Implementation; Self Learning based Switch Table Synthesis; Performance Analysis of various Network Topologies (parameters: Delay, PDR, Throughput); Tools used: Socket Programming, NS2 simulator
9	Dr. Debi Prosad Dogra	Computer Architecture & Organization Laboratory	Various experiments on designing Complex ALU functions, Microprocessor interfacing, Implementation of I/O interfaces, Memory Organization, etc.
10	Dr. M. Satpathy	Data Analytics Laboratory	Experiments related to big data analysis
11	Dr. Manoranjan Satpathy	Design and Analysis of Algorithms (DAA) Lab	Experiments related to the DAA course

New Equipments Acquired

Sl. No.	Name of the Equipment	Location
1	EEG MACHINE Make: Allengers Model:Virgo32 With Adaptor	Biomedical Signal Processing Lab
2	(a) Multipara Monitor, Make:Allenger Model:Libra-A-106 plus (b) Central Monitoring System, Make:Allanger, Model : libra-cms	Biomedical Signal Processing Lab
3	WARP V3 KIT ,FMC-RF-2X245 Module, Cable and Accessories	Communication Engg. lab
4	IoT setup (CC2650 KIT; CC3200 KIT; EZ430 RF 2500MSP430;ASK PRO Board)	Communication Engg. lab
5	Spectrum Analyser(18ghZ)	Communication Engg. lab
6	VNA(24GHz)	Communication Engg. lab
7	Xbee Zigbee PRO S2B 63 mW Module	PSS Lab
8	Ambient Light Sensor & Humidity Temperature Sensor	PSS Lab
9	Digital Lux meter UV	DEI Lab
10	Ozone Gas Analyser. Ozone concentration Range 0 to 3000ppm, Make: Aurozone	DEI Lab
11	Digital Storage Oscilloscope 200MHz, 2Gs/s; 4 Isolated Channels TFT Color Display, Make: Tektronix, Model: TPS2024B, Sl.No.:C020672	Control System Lab
12	8086 Microprocessor Trainer Kit, Model no-M086-02A	Electronics Circuit Lab
13	TEMT 6000 Breakout Board, Humidity Temperature sensor DHT-II, X Bee Pro 63 MW wire Antenna Sensor	Electric Machines Lab.

Sponsored Research Projects

S.N.	Title of Project	Sponsoring Agency	Name	Role
1	Speech Based Access of Agricultural Commodity Prices and Weather Information in 12 Indian Languages/ Dialects	Deity	Dr. P.K. Sahu	PI
2	Enhancement of the Bandwidth of Planar Antennas using Electromagnetic Bandgap (EBG) Structures	SERB	D. Ghosh	PI
3	Integration and intelligent management of renewables via ICT for smart micro-grid networks	DST, Govt of India	N C Sahoo	PI
4	Solar powered DC systems for domestic electrification and rural application	P & C Dept, Govt of Odisha	N C Sahoo	PI
5	Power Quality Enhancement and Control of Distributed Generation in Grid Interactive Systems	IIT Bhubaneswar	Dr. Srinivas Bhaskar Karanki	PI
6	Solar Powered DC Systems for Domestic Electrification and Rural Application	P & C Department, Odisha	Dr. Sankarsan Mohapatro	Co PI

Sponsored Research Projects *(contd.)*

S.N.	Title of Project	Sponsoring Agency	Name	Role
7	Design and Development of Lightweight Wearable Wireless Acoustic Wave Sensor Array Based Audio-Visual Digital Stethoscope Device	Government	DST	PI
8	SMDP-C2SD: Design and development of the analog to information converter (AIC) sub-system Design and development of low-power cost-efficient pulse photoplethysmography (PPG) waveform delineation ASIC for wearable wellness and health monitoring devices	Government	Deity	Co PI
9	Automated Security Verification and Diagnosis of Smart Grid Advanced Metering Infrastructure - a formal analytics based approach	IIT Bhubaneswar	Dr. Padmalochan Bera	PI
10	Design and Development of MIMO based Transceiver for Emergency Application	DST	Barathram. Ramkumar	PI
11	Design and Development of Lightweight Wearable Wireless Acoustic Wave Sensor Array Based Audio-Visual Digital Stethoscope Device	DST	M.S. Manikandan and Baratram. Ramkumar	Co PI
12	4. Development of a comprehensive wide-area based back-up protection scheme for power transmission network	DST	Dr S R Samantaray	PI
13	5. Development of intelligent relaying scheme for micro-grids with DG penetration	CPRI Bangalore	Dr S R Samantaray	PI
14	Performance studies of Silicon Carbide X-ray detectors in high-energy neutron & gamma radiation (ITER-like) environment	BRFST, India	Dr. Neti V L N Murty	PI
15	Speech Based Access of Agricultural Commodity Prices and weather information in 13 Indian languages and dialects	Deity, India	Dr. Neti V L N Murty	Co PI
16	Design and development of low-power cost-efficient pulse photoplethysmography (PPG) waveform delineation ASIC for wearable wellness and health monitoring devices	Deity, India	Dr. Neti V L N Murty	PI
17	Computer vision guided mass gathering surveillance using crowd flow analysis	DST	Debi Prasad Dogra	PI

Consultancy/Development Projects

S.N.	Title of Project / work	Agency/Firm/ Sponsors	Principal/ Co-Principal Investigator	Duration		Total Budget (Rs. In Lakhs)
				From	To	
1	DPR for Proposed National Institute of New Energy and Innovations at Bhubaneswar	MNRE, Govt of India	------	2015-06-01	2015-11-30	5.0
2	Vetting of Schematic Drawing along with transmission loss calculation for 6.6KV/415V OHDC line.	Megha Engineering & Infrastructure Ltd	NA	2015-09-15	2015-11-15	0.33
3	Technical and Functional Test of the Customized GAGAN GPS PDAs	Conservator of Forest, Head Quarters, Odisha		2015-05-12	0000-00-00	1.95
4	Implementation of Water Quality Monitoring and Management System	Pentagon Rugged Systems India (Pvt.) Ltd.		2016-04-15	0000-00-00	1.47
5	Advanced Research Laboratory on Big Data Analytics, IIT Bhubaneswar	Affine Analytics Pvt. Ltd., Bangalore	Dr. Manoranjan Satpathy	2015-10-30	2016-09-30	
6	C/C++ implementation with adequate GUI for sparsity based abnormal event detection	Indo-Korea Science and Technology (IKST) Center		2016-02-17	2016-06-30	7.0
7	C/C++ implementation with adequate GUI for temporal analysis of motif mixtures using Dirichlet processes	Indo-Korea Science and Technology (IKST) Center		2016-02-17	2016-06-30	8.0
8	Testing of GPS-PDA for Forest Department	Forest Department, Bhubaneswar	Dr. P. R. Sahu and	2015-05-15	2016-05-02	1.95
9	Projects related to Big Data Analytics	Affine Analytics Pvt Ltd	Dr. M. Satpathy			20

Achievement

- Dr. Debalina Ghosh became the Senior Member of IEEE, highest professional grade of the IEEE
- Dr. Subhransu Ranjan Samantaray received the NASI-SCOPUS Young Scientists Awards, 2015
- Dr. Subhransu Ranjan became the Member of National Academy of Sciences, India (MNASc), 2015
- Dr. Subhransu Ranjan became the Exceptional Reviewer of IEEE Trans. On Power Delivery, 2015
- Dr. Lalan Kumar received the SPS travel grant for ICASSP 2016, Shanghai, China, 2016

Visits Abroad

S.N	Faculty Name	Place of visit	Dates of visit		Purpose of visit	Funding Agencies
			From	To		
1	Dr. C. N. Bhende	Lappeenranta University of Technology, Finland	2015-05-30	2015-06-28	Through joint project	DST India and Academy of Finland
2	Dr. N. C. Sahoo	Netherlands	2015-06-23	2015-06-25	A member of the delegation of MNRE, Govt of India	IIT Bhubaneswar
3	Dr. N. C. Sahoo	Canada	2015-10-26	2015-10-28	Attending IEEE Conference	IIT Bhubaneswar
4	Dr. M. S. Manikandan	University of Turku, Finland	2015-10-27	2015-10-29	Keynote Speaker & Research Collaboration	IIT Bhubaneswar
5	Dr. Padmalochan Bera	University of North Carolina, Charlotte, NC, USA	2016-06-02	2016-07-01	Research Collaboration (Area: Security Analytics and Functional Verification of Openstack Cloud Systems and Processes)	IIT Bhubaneswar (travel) and UNC Charlotte, NC, USA (stay @ UNC, Charlotte, NC, USA)
6	Dr. Padmalochan Bera	University of Illinois Chicago	2015-06-18	2016-06-18	Research Collaboration (Area: Software Defined Networks)	UIC, USA
7	Dr. Subhransu Ranjan Samantaray	Denver USA.	2015-07-26	2015-07-30	Conference	IIT Bhubaneswar
8	Dr. Subhransu Ranjan Samantaray	Henningsdorf, Germany	2015-04-23	2015-04-30	Cleopa GmbH	Cleopa GmbH
9	Dr. Lalan Kumar	Shanghai, China	2016-03-22	2016-03-24	Attending conference	IIT Bhubaneswar

Book Chapters

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- Chapter 4: Visual Attention Guided Object Detection and Tracking, Innovative Research in Attention Modeling and Computer Vision Applications, D. P. Dogra, IGI Global, Hershey, PA., 2015, R. Pal (Eds.)

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- Electrical Characteristics of 4H-SiC Metal Insulator Semiconductor Structures with different dielectrics for MESFET applications, M Hemalata Rao and N.V.L.Narasimha Murty, 46th IEEE Semiconductor Interface Specialists Conference, SISC-2015, 2-5 Dec 2015.
- On-line Gesture Based User Authentication System Robust to Shoulder Surfing, , S. Bhoi, D. P. Dogra, P. Roy. , International Conference on Computer Vision & Image Processing, IIT Roorkee, 26-28 February, 2016, Springer, 2016.

- Posture Recognition in HINE Exercises, A. Fatir, P. Roy, D. P. Dogra., International Conference on Computer Vision & Image Processing, IIT Roorkee, 26-28 February, 2016, Springer, 2016.
- Classification of Object Trajectories Represented by High-level Features using Unsupervised Learning, R. Saini, A. Ahmed, D. P. Dogra, P. Roy. , International Conference on Computer Vision & Image Processing, IIT Roorkee, 26-28 February, 2016, Springer, 2016.
- Surveillance Scene Segmentation Based on Trajectory Classification Using Supervised Learning, R. Saini, A. Ahmed, D. P. Dogra, P. Roy, International Conference on Computer Vision & Image Processing, IIT Roorkee, 26-28 February, 2016, Springer, 2016.
- Classification of Head Movement Patterns to Aid Patients Undergoing Home-based Cervical Spine Rehabilitation, K. M. Vamsikrishna, D. P. Dogra, H. Bhaskar. , ICASSP, Shanghai, March 20-25, 2016., IEEE, 2016.
- Segmentation and Recognition of Text Written in 3D using leap Motion Interface, C. Agarwal, D. P. Dogra, R. Saini, P. P. Roy., 3rd Asian Conference on Pattern Recognition, Kuala Lumpur, Malayasia, 3-6 Nov, 2015., Springer, 2016.
- Handwritten Text Recognition In Odia Script Using Hidden Markov Model, S. Bhoi, D. P. Dogra, P. P. Roy., 5th National Conference on Computer Vision, Pattern Recognition, Image Processing and Graphics (NCVPRIPG), IIT Patna, 16-19 Dec, 2015., IEEE, 2016.
- Performance Analysis of DCSK Modulation with Selection Combining Not Requiring Channel State Information, Atul Kumar, P. R. Sahu and J. Mishra, NCC 2016, March 4-6, NCC 2016.
- Performance of Modified Switch and Examine Diversity Combiner over Generalized Gamma Fading Channels, Atul Kumar, P. R. Sahu and J. Mishra, NCC 2016, March 4-6, NCC 2016 (214-219).
- The Spherical Harmonics Root-MUSIC, L. Kumar, B. Guoan, and R. M. Hegde, Acoustics, Speech and Signal Processing (ICASSP), IEEE International Conference on, 20-25 March 2016, Shanghai, China, 2016, 3046-3050.
- Inferring state models using feedback directed random testing, S. Sukumaran, M. Satpathy, Sai Keshav Kolluru, R. Mall, IEEE Asia Pacific Software Engineering Conference, December 2015, 2015.
- MSimDram: Formal model driven development of a DRAM simulator, D. Sahoo, M. Satpathy, IEEE VLSI design conference, 2016.

Invited Lectures/Presentation

- UWB in Healthcare, D Ghosh, ICEAA 2016, September 19-23, 2016
- A SoC based voltage control strategy for DC micro-grid, N. C. Sahoo, S. Mohapatro, and M. K. Senapati, IEEE Electrical Power & Energy Conference (EPEC-2015), 26-28 October 2015, Canada
- Demand side management of residential loads in a smart grid using 2D particle swarm optimization technique, S. K. Nayak, N. C. Sahoo, and G. Panda, IEEE Power, Communication and Information Technology Conference, PCITC, 15-17 October 2015, Bhubaneswar
- Solar PV Power: Existing and Upcoming Technology, N C Sahoo, SCS College, Puri, 19 February 2016
- DC-DC Converters for renewable energy sources, Dr. Srinivas Bhaskar Karanki, STC on "Advanced Power Electronic Converters for Renewable Energy & Industrial Drives", Dec 2015, NIT Patna
- High Efficiency Power Electronics converters for Energy Storage systems, Dr. Srinivas Bhaskar Karanki, Three day Faculty Development Program on Advanced Power Electronics: Applications and Control, 21-23rd 2016
- Challenges and Opportunities of Research in Wearable Medical Devices for Health and Wellness Monitoring, M. Sabarimalai Manikandan, Finnish-Indian Joint Symposium: Future Opportunities in Health, Drug Development and Diagnostics
- Functional Verification of Virtual Machine Migration in Open stack Cloud, Padmalochan Bera, Invited Talk @ CyberDNA research Center, University of North Carolina Charlotte, NC, USA, June 5, 2015

- Research roadmap on Software Defined Networks - a new Networking paradigm, Padmalochan Bera, National Workshop on Wireless Sensor Networks with Internet of Things And Cloud Computing 15-16 January 2016, Bhubaneswar
- Space Time Adaptive Systems, Barathram. Ramkumar, Continuing Education Program, ITR-DRDO
- Semiconductor Device Modeling, N V L N Murty, Colloquium on Advanced CMOS based Nano Devices, 2016, 20-22 Feb 2016
- The Spherical Harmonics Root-MUSIC, L. Kumar, B. Guoan, and R. M. Hegde, Acoustics, Speech and Signal Processing (ICASSP), IEEE International Conference on, 20-25 March 2016, Shanghai, China
- Pade based reduced order modelling and controller design, Jayanta Pal, Recent advances in Computer, Electronics & Electrical Sciences, RACEES-2016, 9-10 Jan. 2016, Hi-Tech College of Engineering, Bhubaneswar
- Alternate & Renewable Energy Scenario in India., Jayanta Pal, Recent Advances on Renewable Energy (RARE-2016);29-30 Jan. 2016, Gandhi Institute of Engineering & Technology, Gunupur, Odisha
- Large Scale Systems Modelling & Control, Jayanta Pal, Recent Advances in Power, Control & Drives for Sustainable Energy, (PCDSE-16), 4-5 March 2016, Gitam Institute of Technology, GITAM University, Visakhapatnam, Andhra Pradesh
- Reduced Order Modelling & Controller Design of Dynamic Systems,, Jayanta Pal, Recent Trends of Technology, 12-13March 2016, Avanthi Institute of Engineering & Technology, Visakhapatnam, Andhra Pradesh
- Model based testing using bounded model checking, M. Satpathy, Recent Trends in Software Testing, May 2015
- Model based testing of in-vehicle control software, M. Satpathy, S. Ramesh, Tutorial on Trustworthy Cyber Physical Systems

Seminars / Conferences / Workshops organized

- Organised a 3 days conference on International Conference on Microwave, Optical and Communication Engineering (ICMOCE 2015), during 18th to 20th December 2015
- Organised a 3 days conference on IEEE International Conference (PCITC - 2015), during 15th to 17th October 2015, SOA University, Bhubaneswar, Odisha
- Organised a 4 days International Symposium on Wireless Personal Multimedia Communications-2015 (WPMC2015) and Global Wireless Summit-2015 (GWS2015), during 13th – 16th December 2015, at Hyderabad
- Organised a 3 days workshops on High Performance Digital Signal Processing System Design and Implementation, during 15th to 17th December 2015

Industrial Visit:

Date	Name of the Industry	No. of Students
September 30, 2015	All India Radio, Cuttack	40
October 09, 2015	BSNL Regional Telecom Training Center, Bhubaneswar	55

Visiting Experts

- Navigation Guidance and Control of Space Vehicles, Prof. Bijen Das, Former Deputy Director, VSSC, Thiruvanthapuram, March 2015
- An Automatic Device for Comprehensive Evaluation of Arterial Stiffness, Dr. Ashish Kumar Sahani, Post Doc Fellow, IIT Madras, May 2015
- Signal Processing Computer Vision & communication System Design with MATLAB and Simulink, Dr. Amod Anandkumar, Senior Application Engineer, Signal Processing & Communication, Mathworks India Pvt. Ltd, May 2015
- The Changing Power Industry: How Renewable Energy Sources are Changing the Business Model, Dr. Donald E Morris, Fort Collins, May 2015
- Optimal Testing of Distribution Families, Dr. Jagadev Acharya, June 2015
- The Technology which transformed the world, Prof. Debatosh Guha, IIT Kharagpur, July 2015
- Deep web mining, Prof. Gautam Das, University of Texas, Arilington, October 2015
- ERLINK, Integrating NPTEL Pedagogy Projecta and Virtual Labs, Prof. K. R. Srivathsan, Director, CIT, Kerala, October 2015
- Software Technology and Industry Trends – A Silicon Valley Perspective, Dr. J. Ranjan Dash, Executive Consultant, Silicon Valley, October 2015
- Fundamentals of Database, data Sciences, Analytics and a 360 degree overview of software development trends in related fields, Dr. J. Ranjan Dash, Executive Consultant, Silicon Valley, November 2015
- Interdisciplinary topics of research blending applied and computational mathematics with vibration and control engineering, De. Biswa Nath Datta, Distinguished Research Professor, Northern Illinois University, November 2015
- Recent Research Development in Microwave Engineering, Prof. Animesh Biswas, IIT Kanpur, February 2016
- Crowd Modelling and Analysis for behavior Understanding in Surveillance Environment, Dr. Harish Bhaska, Khalifa University, UAE, March 2016.

Patents

S.N.	Title	Name	Role	Patent Details			
				Country	No	Year of Application	Year of Grants
1	Method and system for generating stateflow models from software requirements	Padmalochan Bera	Principle Inventors	USA	US20150261505 A1	2015	-
2	Method and system for optimizing testing efforts in system of systems testing	Padmalochan Bera	Principle Inventors	USA	US9208046 B2	2013	-
3	Video object tracking using multi-path trajectory analysis	Debi Prasad Dogra	Principle Inventors	USA	US 9,147,261 B2	2013	2015
4	Authentication using multi-tier multi-class objects	Debi Prasad Dogra	Co-Principle Inventors	USA	US 8,997,215 B2	2013	2015

School of Humanities, Social Sciences and Management

Head of School

Dr. Naresh Chandra Sahu

Faculty Members

Assistant Professors

Dr. Amrita Satapathy
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Adjunct Faculty

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Former Professor
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IIT Madras
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Prof Binayak Rath
Former VC, Utkal University

Prof. Pranaya kumar Swain,
Professor, NISER Bhubaneswar

Shri Gokul Chandra Pati, IAS
Chief Secretary (Retired), Government of Odisha

Dr. Ileana Citaristi
Professional Odissi Dancer and Choreographer

Prof Bijaya Kumar Rath
Former Secretary of Netaji Birth Place Museum Trust and Archaeologist

Padmashree Mrs. Kumkum Mohanty
Indian Allied Service, Professional Odissi Dancer and Choreographer
Former Chief Executive of the Odissi Research Cente

The School of Humanities, Social Sciences and Management at Indian Institute of Technology Bhubaneswar corroborates all the academic disciplines by shedding light on the underlying assumptions in teaching and research across language, culture, social policy, technological development, economic planning, psychological behaviours and public and private values. Study of the humanities provides students with a cultural perspective and awareness besides the ability to express clearly and accurately. The discipline enables pupils to evaluate critically ideas and actions, and to make choices on shared values and priorities. Its scope is international and approach is interdisciplinary. The School works at the intersections of Environmental Economics, Natural Resources Economics, Macroeconomics, Development, Economics & Rural Development, and Indian Writing in English, Post-Colonial Literature, Travel Writing, Business Communication, American Literature, Canadian Literature, ELT, Cross Cultural Communication, Autobiography, Consumer Behaviour, Cyber Psychology, Clinical Psychology, Cognitive Psychology, Cognitive Neuroscience, Psycholinguistics, Psychology of Personality and Marketing. Students and faculty work together in the development of the human being. The School's aim is to help students develop the communicative, analytic, and cultural knowledge to thrive in all aspects of their future lives. Currently the School offers courses for the B. Tech. programme and doctoral programs in Economics, English and Psychology. Along with our diverse academic departments, the School is home to a wide variety of interdisciplinary collaborations, path-breaking research projects, and unique areas of study.

Thrust areas

- Environmental Economics
- Climate Change and Resource Economics
- Postcolonial World Literature
- Finance Economics and Management
- Open Macroeconomics
- Development Economics
- Econometrics
- Clinical Psychology, Personality
- Hemispheric Lateralization, Laterality
- Cognitive Psychology, Cognitive Neuroscience,
- Cyber Psychology
- Consumer Behaviour
- Native North American Literature
- Indian Writing in English
- Travel Writing
- Indian Diaspora Literature
- Autobiography and Memoirs
- Neurolinguistics,

New Laboratories/Laboratory Experiments Set up

S.N.	Faculty Name	Laboratory	Experiment(s)
1	Dr. Amrita Satapathy	Language Laboratory (Since 2009)	Conducting GD/Presentation Skills
2	Dr. Punyashree Panda	Language Laboratory (Since 2010)	Conducting GD/Presentation Skills, Phonetic Training

Sponsored Research Projects

S.N.	Title of Project	Sponsoring Agency	Name	Role
1	Postcolonial World Literature	Ministry of HRD	Dr. Punyashree Panda	PI

Achievement

- Dr. Amrita Satapathy received the Teaching Excellence Award for the session Autumn 2015-16 from the Institute

Visits Abroad

S.N	Faculty Name	Place of visit	Dates of visit		Purpose of visit	Funding Agencies
			From	To		
1	Dr. Anamitra Basu	Singapore	2016-02-21	2016-02-29	Conference, meetings	IIT Bhubaneswar
2	Dr. Punyashree Panda	Aarhus University, Aarhus, Denmark	2015-12-10	2015-12-11	Presented a paper in the Contested Property Claims at Aarhus University	IIT Bhubaneswar

Book Chapters

- Mineral Production and Economic Growth in Indian States: Evidence from Panel Data Analysis, Research Issues in Applied Economics (eds.), K. Majumdra & P. K. Jena, Sahoo, A. K., N. C. Sahu and D. Sahoo, Tata-McGraw Hill Education, 2015

Paper published in Peer-reviewed SCI-Journals

- Economic Valuation of Protected areas and Recreational sites in India: some review findings, Yadav, Nidhi & N C Sahu, International Journal Policy and Decision Making, 2015,1.
- Treatment of Trauma in Train to Pakistan by Khushwant Singh, Panda, Punyashree and Sulagna Mohanty, Dibrugarh University Journal of English Studies, March 2016, Vol. 24, In Press.

- Paper published in Peer-reviewed Conference Proceedings

- Ambiguous Emotional Processing and Embodiment, Brice Beffara, Marc Ouellet, Nicolas Vermeulen, Anamitra Basu and Martial Mermillod, 5th Annual International Conference on Cognitive and Behavioral Psychology (CBP 2016), February, 22-23, 2016, pp: 11-13.
- Language Processing of Bilinguals: A VisuWord Recognition Study, Rupashree Brahmakumari and Anamitra Basu,

5th Annual International Conference on Cognitive and Behavioral Psychology(CBP 2016), February, 22-23, 2016, pp: 163-172.

- Evolution of the concept of Corporate Social Responsibility CSR: The Indian perspective, Panda, S. K., Sahoo, D and Sahu, N. C., National Seminar on Issues and Challenges in Business Management, March 2, 2016, SOA University, Bhubaneswar, Odisha., 2016, 56-59
- Corporate Social Responsibility of Mahanadi Coalfield (MCL) Ltd.: The perspective of the community, Panda, S. K., Sahoo, D and Sahu, N. C., COSMAR 2015, organised by Department of Management Studies, Indian Institute of Science, Bangalore, 24-25 Nov. 2015.
- Decomposition of productivity growth in Indian metallic mining industry: Panel estimation of stochastic production frontier, Sahoo, A. K., D. Sahoo and N. C. Sahu, COSMAR-2015, organized by Department of Management Studies, Indian Institute of Science, Bangalore, 24-25 Nov. 2015/
- Evolution of the Concept of Corporate Social Responsibility: The Indian Perspective , Panda ,S. D Sahoo & N C Sahu, National Seminar on Issues and Challenges in Business Management, March 2, 2016, SAO University, Bhubaneswar Odisha, 2106,56-59.
- Corporate Social Responsibility of Mahanadi Coalfield(MCL) Ltd. : The Perspective of Community, Panda ,S., D Sahoo & N C Sahu, COsMAR- 2015 organized by Department of Management Studies, Indian Institute of Science Bangalore,24-25 Nov.2015.
- Decompisition of Productive Growth in Indian Mettalic Mining Industry: Panel Estimation of stochastic Production Frontier, Panda ,S. D Sahoo & N C Sahu, COsMAR- 2015 organized by Department of Management Studies, Indian Institute of Science Bangalore,24-25 Nov.2015, 2015

Invited Lectures/Presentation by Faculty Members

- Life history of Renowned Personalities of the World and The Role and importance of Social Sciences, Dr N C Sahu, Ishan Vikas programme, 7-9, Dec.2015, Conducted by IIT Bhubneswar
- Introduction to Economics, Dr N C Sahu, Summer Course, School of Humanities and Social Sciences, NSIER Bhubaneswar, 25 May to 15 July 2015, NISER Bhubaneswar
- Importance of Communication Skills, Dr A Satapathy, Ishan Vikas programme, 7-9,Dec.2015, Conducted by IIT Bhubneswar

Seminars / Conferences / Workshops organized

- The School organized a Short term Course on "Postcolonial World Literature" from 15-25 February 2016 under the Global Initiative of Academic Networks (GIAN) programme of Govt. of India. Prof. Tabish Khair from Aarhus University, Denmark and Prof. Jyotirmaya Tripathy from IIT Madras were the International and national faculty for the course respectively. Dr. Punyashree Panda was the Local Coordinator.

School of Infrastructure

Head of School

Prof. R. K Panda

Faculty Members

Professor

Prof. R. K Panda
Research Areas: Watershed management,
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Assistant Professors

Dr. Dinakar Pasla
Research areas: Durability of materials in aggressive environments; Corrosion of steel in concrete; Development of high strength and high performance cements and concrete composites; Mineral and chemical admixtures in concrete;
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Dr. Puspendu Bhunia
Research areas: Nutrients removal and recovery from wastewater; Vermi-filtration of domestic and industrial wastes; Treatment of textile wastewater
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Dr. Sumanta Haldar
Research areas: Offshore Wind Energy Foundations; Soil-Structure Interaction; Dynamics of Soil and Foundation
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Dr. Rajesh Roshan Dash
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Dr. Arindam Sarkar
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Dr. Hanumantha Rao Bendadi
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Dr. Debasis Basu
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Dr. Goutam Mondal
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Dr. Manaswini Behera
Research Areas: Water and Wastewater treatment; Bioenergy recovery during waste water treatment (microbial fuel cell); Industrial wastewater treatment and reuse
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Dr. Meenu Ramdas
Research Areas: Hydrology; Climate change; Probabilistic models for droughts
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Adjunct Faculty

Prof. P.C.Pandey
Former Professor
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In the arena of worldwide infrastructural escalation, School of Infrastructure at IIT Bhubaneswar has come up to dedicate excellence in engineering education, creation of knowledge, innovation in research and leadership in professional services. The mission of the School is to offer unbounded academic environment in undergraduate and postgraduate teaching, doctoral program, research, and public service. Presently the School offers programs as follows:

- B.Tech. in Civil Engineering
- M.Tech. in Structural Engineering &Transportation Engineering
- Ph.D. in Civil Engineering

The academic activities of the School emphasizes deep understanding of fundamental principles, development of creative ability to handle the challenges of Civil Engineering, and the analytical ability to solve problems which are interdisciplinary in nature. The School also encourages its students to engage in extracurricular activities, essential for development, promotion of team spirit, and refining their budding managerial skills.

The school is having a highly dedicated team of faculty members with a strong passion for furthering the cause of teaching and research. They have outstanding research contribution in their own fields of specialization, the details of which are available in the relevant web pages. They welcome dedicated students for pursuing their cutting edge research and offer state of the art consultancy in the area of Civil Engineering and Infrastructure which strengthens IIT Bhubaneswar's service to the nation.

Department of Civil Engineering, School of Infrastructure presently runs with eight well equipped laboratories as follows:

- Advanced Computational Engineering Laboratory
- Concrete Technology Laboratory
- Environmental Engineering Laboratory
- Geotechnical Engineering Laboratory
- Structural Engineering Laboratory
- Surveying Laboratory
- Transportation Engineering Laboratory
- Water Resources Engineering Laboratory

All the laboratories are equipped with modern facilities to support teaching and to carry out state of the art research works in any micro specialization of Civil Engineering.

Thrust Areas

- Nutrients removal and recovery from wastewater
- Treatment of textile wastewater
- Durability of materials in aggressive environments;
- Dynamics of Soil and Foundation
- Soil-Structure Interaction
- Offshore Wind Energy Foundations
- Non-motorized Transport
- Mineral and chemical admixtures in concrete; Repair and rehabilitation of structures
- Flow modelling
- Corrosion of steel in concrete; Development of high strength and high performance cements and concrete composites
- Pavement Material Characterization
- Low Volume Roads
- Geotechnics of Waste and its Utilization
- Soil-Structure Interaction
- Public Transport Operation
- Urban Planning (Transport)
- Water and Wastewater treatment
- Seismic Analysis and Design of Pipelines
- Structural Dynamics and Earthquake engineering
- Earthquake Engineering and Structural Dynamics
- Vermi-filtration of domestic and industrial wastes
- Environmental Engineering
- Water and Wastewater Treatment
- Solid Waste Management
- Traffic Flow Modeling
- Local scour around hydraulic structures, Sediment transport
- Vegetative flows
- Pavement Analysis and Design
- Soil Mechanics and Foundation Engineering
- Environmental Geotechnics
- Seismic Analysis of Bridge
- Soil-Structure Interaction
- Industrial wastewater treatment and reuse
- Climate change
- Hydrology
- Probabilistic models for droughts

New Laboratories/Laboratory Experiments Set up

S.N.	Faculty Name	Laboratory	Experiment(s)
1	Dr. Pushpendu Bhunia	Environmental Engineering	Development of Cascade Type Bioreactor for Sewage Treatment
2	Dr. Suresh R Dash	Structural Engineering Laboratory	Developed a sliding box (1mx 1m x0.8m) for simulating Strike Slip fault movement
3	Dr. Rajesh Roshan Dash	Environmental Engineering Laboratory	Vermifiltration Reactor, SND reactor for nitrification and denitrification,, dual medium filtration
4	Dr. Debasis Basu	Transportation Planning Laboratory	Developing multi-modal urban transportation network of the greater Bhubaneswar city in GIS Environment
5	Dr. Manaswini Behera	Dual chambered continuous flow Microbial fuel cell set up	Wastewater treatment and electricity generation
6	Dr. Arindam Sarkar	Water Resources Engineering	Flow and sediment transport through rigid and flexible vegetation

New Laboratories/Laboratory Experiments Set up *(contd.)*

S.N.	Faculty Name	Laboratory	Experiment(s)
7	Dr. Arindam Sarkar	Water Resources Engineering	Temporal evolution of scour depth around single and group of submerged structures
8	Dr. B. Hanumantha Rao	Soil Mechanics	Circumferential volume change measuring device
9	Dr. Umesh Chandra Sahoo	Pavement Materials Laboratory	Short Term Ageing of Bitumen using RTFO
10	Dr. Umesh Chandra Sahoo	Pavement Materials Laboratory	Accelerated Rut Testing using Wheel Tracking Device
11	Dr. Umesh Chandra Sahoo	Transportation Engineering Laboratory	Measurement of Roughness using Handheld Roughometer

Sponsored Research Projects

S.N.	Title of Project	Sponsoring Agency	Name	Role
1	Treatment of Textile Wastewater via Ultrasonic and Anaerobic and Aerobic Treatment Route	DST	Puspendu Bhunia	PI
2	Fate of Microbial Pathogens in existing wastewater Treatment Systems: Sand filtration as a polishing option for treated effluent, Department of Science and Technology	DST	Dr. R.R. Dash	PI
3	Measures for Improving the attractiveness of non-motorized transport in urban area	Dean R&D, IIT BBS	Dr. Debasis Basu	PI
4	Design and Evaluation of Composite Transportation Networks in Multi-modal System for Travel Demand Management in Urban Areas	MHRD through Future of Cities Initiative, IIT KGP	Dr. Debasis Basu	Co PI
5	Flow field around group of submerged structures and its application to sediment transport	DST	Arindam Sarkar	PI
6	Seismic response of fly ash brick infill wall with opening	IIT Bhubaneswar	Dr. Goutam Mondal	PI
7	Performance Evaluation of Pavements with Stabilized Bases/ Subbases for Rural Roads	NRRDA, Ministry of Rural Development, Govt. of India	Dr. U. C. Sahoo	PI
8	Investigation of Cyclic Behaviour of Offshore Wind Turbine Mono-Pile Foundation Considering the Effect of Climate Change	DST	Dr. Sumanta Haldar	PI
9	Investigation on the field and laboratory corrosion behaviour of steel in structural concretes	SERB DST	Dr. Dinakar Pasla	PI
10	Synthesis, Characterization and Development of Red Mud-Fly Ash Based Geo-polymer Concrete	NALCO	Dr. Dinakar Pasla	Co PI

Consultancy/Development Projects

S.N.	Title of Project / work	Agency/Firm/ Sponsors	Principal/ Co-Principal Investigator	Duration		Total Budget (Rs. In Lakhs)
				From	To	
1	Testing of materials and conducting design mix M-25, M-30, & M-40 in connection with construction of commercial cum residential complex	NBCC	RR Dash & D Pasla	2015-04-29	2016-06-29	4.38
2	Technical Scrutiny of Road and Bridge Project Proposals under PMGSY for the state of Jharkhand and Part of Orissa	NRRDA, Govt of India	Dr. U.C.Sahoo, Dr P. P. Dey, Dr. D. Basu	2015-04-01	2016-03-31	
3	Technical scrutiny of selected Road and Bridges Project Proposals under PMGSY for the states of Orissa Jharkhand and Chhattisgarh	NRRDA, Govt of India	Dr. U.C.Sahoo, Dr P. P. Dey, Dr. D. Basu	2015-04-01	2016-03-31	
4	Testing of materials and conducting design mix M-25,M-30 & M-40 in connection with construction of commercial cum residential complex	National Building Construction Corporation Ltd	Dr. P. Bhunia and Dr. D. Pasla	2015-09-01	2015-11-30	4.36
5	Surge analysis for 1000 mm diameter water rising main at Jajpur	IDCO		2015-05-12	2015-07-07	1.9
6	External expert in Traffic Engineering for the work of NIT Durgapur. Project Name	NIT Durgapur	Nil	2015-04-01	2016-12-31	2
7	Soil testing for widening & strengthening of Bhawanipatna-Gunupur-Kasipur road	Arkitech Pvt Ltd		0000-00-00	0000-00-00	0.50
8	Design and stability analysis of an embankment for new BG rail line	Tracks and Towers Infratech (P) Ltd	Dr. S Haldar	2015-02-01	2015-03-01	3.5
9	Testing of soil for embankment of BG rail line	IVRCL	Dr. S. Haldar	0000-00-00	0000-00-00	
10	Assessment of compressibility characteristics of cut spoil	Tracks and Towers Infratech (P) Ltd		0000-00-00	0000-00-00	
11	Technical Evaluation of Cement Concrete Roads in Odisha	P&C Dept., Govt. of Odisha	Dr. S. R. Dash, Dr. P. Dinakar	2015-10-30	2016-06-29	28.158
12	Technical Scrutiny of PMGSY Projects of Odisha, Jharkhand and Chhattisgarh	NRRDA, Ministry of Rural Development, Govt. of India	Dr. S. R. Dash, Dr. P. P. Dey. Dr. D. Basu	2014-02-14	0000-00-00	

Consultancy/Development Projects *(contd.)*

S.N.	Title of Project / work	Agency/Firm/ Sponsors	Principal/ Co-Principal Investigator	Duration		Total Budget (Rs. In Lakhs)
				From	To	
13	Impact Assessment Study of City Bus Services in the Operational Areas of the State under JnNURM	Housing & Urban Development Department, Govt. of Odisha	Dr. R. R. Dash, Dr. P. P. Dey. Dr. D. Basu			
14	Assessment of structural safety of construction of balance six floor of IDCOL office building	IDCO, Bhubaneswar	Dr. D. Pasla	2015-04-01	2016-07-01	12.64
15	Assessment of Structural safety of construction of balance six floor of the IDCOL corporate office building, Bhubaneswar	IDCO	Dr. S. Haldar	2016-08-12	2016-10-13	12.64

Achievement

- Dr. Meenu Ramadas received the G M Nawathe Puraskar 2015 award by Indian Society for Hydraulics
- Dr. Meenu Ramadas received the ASCE State of the Art of Civil Engineering Award 2016 by the ASCE

Visits Abroad

S.N	Faculty Name	Place of visit	Dates of visit		Purpose of visit	Funding Agencies
			From	To		
1	Dr. B. Hanumantha Rao	University of Bochum, Germany	2016-02-24	2016-02-25	To attend the Indo-German workshop	University of Bochum

Book Chapters

- Surface Optimization of Phosphate Removal from Aqueous Solution Using a Natural Adsorbent, Trends in Environmental Science and Technology, Rout, P.R., Dash, R.R., Bhunia, P., Capital Publishers (New Delhi and Kolkata) and co-published by Springer international publishing, Cham, Switzerland , 2016,

Paper published in Peer-reviewed SCI-Journals

- Nutrient removal from binary aqueous phase by dolochar: Highlighting optimization, single and binary adsorption isotherms and nutrient release, Prangya Ranjan Rout, Rajesh Roshan Dash, Puspendu Bhunia, Process Safety and Environmental Protection, 01/2016, 2016; DOI:10.1016/j.psep.2016.01.001 [Elsevier]

- Carbonaceous organics removal kinetics in an upflow anaerobic sludge blanket (UASB) reactor treating physico-chemically pre-treated textile wastewater, AK Verma, P Bhunia, RR Dash, Desalination and Water Treatment , 2015, 54 (6), 1577-1588
- Effects of physic-chemical pre-treatment on the performance of an upflow anaerobic sludge blanket (UASB) reactor treating textile wastewater: application of full factorial central composite design, AK Verma, P Bhunia, RR Dash, RD Tyagi, RY Surampalli, TC Zhang, The Canadian Journal of Chemical Engineering, 2015, 93 (5), 808-818
- Analysis of Beams on Heterogeneous and Nonlinear Soil, Haldar, S. and Basu, D., International Journal of Geomechanics, ASCE, 2016, 10.1061/(ASCE)GM.1943-5622.0000599
- Influence of dynamic soil-pile raft-structure interaction: an experimental approach, Saha, R., Haldar, S., and Dutta, S.C. , Earthquake Engineering and Engineering Vibration, 2015, 14 (4), 625-645,
- Effect of raft and pile stiffness on seismic response of soil-piled raft-structure system, Saha, R., Dutta, S.C., and Haldar, S. , Structural Engineering And Mechanics, 2015, 55 (1), 161-189
- Design of monopile supported offshore wind turbine in clay considering dynamic soil-structure-interaction, Bisoi, S. and Haldar S. , Soil Dynamics and Earthquake Engineering, 2015, 73, 103-117
- Sonolytic decolorization of textile wastewater containing a mixture of reactive, acid and disperse dyes, Verma, A.K., Bhunia, P., Dash, R.R., Tyagi, R.D., Surampalli, R.Y., Zhang, CLEAN- Air Water Soil, 2015, 43, 767-774
- Effects of physico-chemical pre-treatment on the performance of an upflow anaerobic sludge blanket (UASB) reactor treating textile wastewater: application of full factorial central composite design, Verma, A.K., Bhunia, P., Dash, R.R., Tyagi, R., D., Surampalli, R.Y., Zhang, T.C., Can J Chem Eng, 2015, 93, 808-818
- Carbonaceous organics removal kinetics in an upflow anaerobic sludge blanket (UASB) reactor treating physico-chemically pre-treated textile wastewater, Verma, A.K., Bhunia, P., Dash, R.R., Desalin. Water Treat, 2015, 54, 1577-1588
- Nutrient removal from binary aqueous phase by dolochar: Highlighting optimization, single and binary adsorption isotherms and nutrient release, Rout, P.R., Dash, R.R., Bhunia, P., Process Safety and Environmental Protection, 2016, 100, 91-107.
- Characterization of granular lateritic soils as pavement material, Biswal D.R., Sahoo U.C. and Dash S.R., Transport Geotech, 2016, 6, 108-122
- Hydraulic resistance due to vortex generated transverse oscillations in a submerged array of circular cylinders, Paromita Chakraborty and Arindam Sarkar, Journal of Hydraulic Engineering, Taylor and Francis, DOI:10.1080/09715010.2015.1129517
- Flow characteristics through submerged rigid vegetation over a sinusoidal perturbed bed, Paromita Chakraborty and Arindam Sarkar, Journal of River Basin Management, Taylor and Francis, DOI:10.1080/15715124.2016.1164176
- Lateral placement of U-turns at median openings on six-lane divided urban roads , Mohapatra, S. S., and Dey, P. P, Transportation Letters, 2015, 7(5), 252-263
- Modelling the critical position of U-turning vehicles at uncontrolled median openings, Mohapatra, S. S., Dey, P. P., and Chandra, S., KSCE Journal of Civil Engineering, 2016, 40(1), 411-420
- Conflicting volume of U-turns at uncontrolled median openings, Mohapatra, S.S., Dey, P.P., Chandra, S., Transport-ICE Publishing, 2016, Published Online, DOI: https://10.1680/jtran.14.00089
- Evaluating the influence of additives on swelling characteristics of expansive soils, Reddy GN, Tahasildhar J and Rao BH , International Journal of Geosynthetics and Ground Engineering, 2015, 1, 13
- Environmental Geotechnics: An Indian perspective, Rajes S, Rao BH, Sreedeep, S, and Arnepalli DN , ICE publishing Environmental Geotechnic, 2015, 2(6), 331-335

- Seismic Vulnerability of Reinforced Concrete Frame with Unreinforced Masonry Infill Due to Main Shock-Aftershock Earthquake Sequences, Tesfamariam, S., Goda, K. and Mondal, G. , Earthquake Spectra, August 2015, Vol. 31, No. 3, pp. 1427-1449.
- Characterization of granular lateritic soils as pavement material, Biswal, D. R., Sahoo U. C. and Dash S. R., Transportation Geotechnics, 2015
- A Rheological Study on Aged Binder Rejuvenated with Pongamia and Composite Castor Oil, Nayak Pratik and Sahoo U. C. , International Journal Pavement Engineering, 2015
- Utilization of High Volume Industrial Slag in self-compacting concrete, Shethy K.P, Dinakar P. and Sahoo U. C., Journal of Cleaner Production, 112 (2016) 581-587
- Effect of slag on the rheological and strength properties of self-compacting concrete, Kali P Sethy, Dinakar, P & Umesh C Sahoo , Key Engineering Materials, 2015, 629-630, 399-404
- Utilization of high volume of industrial slag in self compacting concrete, Kali P Sethy, Dinakar, P & Umesh C Sahoo , Journal of Cleaner Production, 2016, 112, 581-587

Paper published in Peer-reviewed Conference Proceedings

- Effect of climate change on dynamic behaviour of monopile supported offshore wind turbine structure, Bisoi, S. and Haldar, S., Japanese Geotechnical Society Special Publication, 2016, 10.3208/jgssp. IND-03, 1189-1193.
- Effectiveness study of dolochar as a filter media in slow sand filtration, 35. Vairagi P. D., Dash, R.R. , International Conference on Waste management, IIT Guwahati, April 1-2, 2016, 2016
- Evaluation of dolochar as a filter media in slow sand filtration, Vairagi P. D., Dash, R.R. , International Conference on Water Environment, Energy & Society-2016 (ICWEES-2016), March 15-18, 2016 , Texas A & M University, USA & AISECT University Bhopal, 2016
- Valuing Travel Attributes of Public Transport as Perceived by Commuters in Bhubaneswar, D Basu and A.D.Banik, 3rd Conf. of Transp. Res. Group (CTRG) , ID:725
- Performance of low cost microbial fuel cell using Earthenware separator, Sudhansu Behera, manaswini Behera, International Conference on Water, environment, energy and Society, organized by AISECT University Bhopal and Texas A & M University, 15-18 March, 2016, 2016, 120
- Performance Evaluation of low cost Microbial fuel cell employing clayware separator of different thickness, Sudhansu Behera, manaswini Behera, International Conference on Waste Management RECYCLE 2016, organized by Association of Civil Engineers, IIT Guwahati and Waste Management Research group (WMRG), IIT Guwahati, 1-2 April, 2016, 2016, 63
- Modeling the placement of conflicting traffic at uncontrolled median openings, Mohapatra, S.S., and Dey, P.P., 3rd Conference of Transport Research Group, 17th -20th December, 2015, Kolkata, India. ,
- Capacity of U-turn movement at median openings, Mohapatra, S.S. and Dey, P.P, 95th Annual Meeting of Transportation Research Board, Washington, DC, January 10-14, 2016,
- Use of Oil Type Rejuvenators for Maximum Utilization of Reclaimed Asphalt Pavement, Nayak Pratik and Sahoo U. C. , XXVth World Road Congress, Seoul, 02-06 November, 2015, 2015
- Mechanical properties of sintered fly ash light weight aggregate concretes, Manu S Nadesan & Dinakar, P, 14th NCB International seminar on Cement and Building Materials, 2015, Dec 1-4, New Delhi, 2015, 2, 701-704
- Fresh and mechanical properties of high strength self compacting concrete using metakaolin, Manu S Nadesan & Dinakar, P , The First International Conference on Calcined Clays for Sustainable Concrete, June, 23-25, Lausanne, Switzerland, 2015, 509-515

Invited Lectures/Presentation by Faculty Members

- Simulating Travel Behaviour under Hypothetical and Actual scenarios, Debasis Basu, IIEST, Shibpur
- Urban Mobility and Need for State-of-the Art Demand Modelling Technique, Debasis Basu, CISCO Networking Academy Student Conference
- Microbial fuel cell: A promising technology for bio energy from waste, Manaswini Behera, Recent Advances in Physics and Technology at Indira Gandhi Institute of Technology, Sarang on 13th March, 2016
- Soil Structure Interaction Effects in Foundation Design, Dr. Suresh R Dash, Short Course on "Advances in Foundation Design for Building & Critical Structures" at IIIT Hyderabad

Seminars / Conferences / Workshops organized

- A one day workshop was organised on Affordable Housing, during 19th July 2015.
- Global Initiative of Academic Networks (GIAN) course on Soil Structure Interaction (SSI), during 28th December – 04th January 2016

Visiting Experts

Name	Designation	Presentation Topic	Date
Prof. Andrew Charleson	Professor, School of Architecture, Victoria University of Wellington, New Zealand	Different ways of thinking about structures	15 March 2016
Prof. B. S. Pani	Professor, Civil Engineering Department, IIT Bombay	Effective effluent management for environment sustenance	16 December 2015
Ms. Soumi Ghoshal	Specification Manager – East from FOSROC Construction Chemicals	(1) Waterproofing of Structures and (2) Repair & Rehabilitation of Structures	13 October 2015
Prof. Ravindra Gettu			
Department of Civil Engineering, IIT Madras	Sustainable Concrete Technology using Admixture	16 September 2015	
Prof. Bhargab Maitra	Department of Civil Engineering, IIT Kharagpur	Transforming Urban India for a better Tomorrow: Future of Cities and Smart City Initiatives	07 April, 2015

School of Mechanical Sciences

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Dr. Swarup Kumar Mahapatra

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Prof. Prasanta K. Mishra
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Director
Gitam University, Hyderabad
Email: sivacae@yahoo.co.in

The School of Mechanical Sciences provides a well-rounded engineering education experience for its students – for both its Under-Graduates as well as Post-graduates. This curricula stresses on the technical & engineering aspects, scientific temper, communication skills, teamwork and life-long learning skills in that the graduates need to excel at the workplace and in the society in general. Presently, the School runs B.Tech in Mechanical Engineering programme, M.Tech programme in two specializations (Mechanical Systems Design and Thermal Science and Engineering) and Ph.D programme.

Research Activities

School of Mechanical Sciences at IIT Bhubaneswar through its commitment to excellence in its teaching and research has a vibrant research & development progamme. Faculty members are involved in a broad range of research areas. Some of the specific areas include Computer-Aided Design and Manufacturing, Robotics & Controls, Turbomachinery, IC Engines, Multi-Phase flow, Turbulence, Radiative heat transfer, Nano-mechanics, Composite Materials, Sandwich structures, Fracture Mechanics, Material Science, Green Supply Chain Management, Productivity Studies, Computational Fluid Dynamics, High Performance Computing, MEMS & Microsystems, Micromanufacturing, Vibro-Acoustic design and Microwave remote sensing.

The school is currently working in collaboration with international research groups such as Warwick Manufacturing Group (WMG), UK, and University of Massachusetts, USA. The school's academic vision is presently being motivated by the immense experience and knowledge of a group of eminent personalities of international repute who constitute the Academic Advisory Committee (AAC) of the school.

Thrust Areas

- Energy & Environment
- Advanced Manufacturing
- Robotics and Controls
- Product Design
- Agricultural Automation
- Cooling Technologies
- Multi-phase & Multi-physics Flows
- Biomechanics & Bio-Thermo-Fluids
- Vibration & Acoustics
- Turbulence
- High Performance Computing
- Composite & Sandwich Structures
- Industrial Engineering & Management
- Heat Transfer
- Green Supply Chain Managemen

Detailed Research Areas

- Computer-Aided Design and Manufacturing
- Robotics and Controls
- Non-conventional Manufacturing
- IC Engines
- Multi-Phase flow
- Material Science
- Bio-Mechanics
- Experimental Fluid Mechanics
- Transport Phenomena in Material Processing
- High Performance Computing
- Microwave remote sensing
- Conjugate Heat Transfer
- Radiation Modelling
- Acoustic Based Condition Monitoring
- Natural Fiber Composites
- Experimental Modal Analysis
- Dynamic Design
- Modeling and Simulation of Manufacturing Systems
- Bypass Transition in Fluid Flows
- Microfluidics
- Micro Droplet Condensation
- Surface Wettability
- Fluid Flow Metrology
- Fluid Structure Interaction and Unsteady Aero-Hydrodynamics
- Boiling Heat Transfer
- Green Supply Chain Management
- Industrial Engineering
- Operations Management
- Logistics
- Computational Fluid Dynamics
- Bio-Heat Transfer
- Turbulence
- DNS
- Technical Acoustics and Vibrations
- Composite Materials
- Sandwich Structures
- Industrial Engineering
- Operations Management
- Logistics
- Computational Fluid Dynamics
- Bio-Heat Transfer
- Turbulence
- DNS
- Technical Acoustics and Vibrations
- Composite Materials
- Sandwich Structures
- Smart Materials and Structures
- Fracture Mechanics
- Condition Monitoring
- Radiative heat transfer
- Ultrafast Transport
- Materials Processing
- Underwater Acoustic Absorbers
- Solar Energy
- Soft Computing
- Computational Acoustics
- Satellite Remote Sensing
- Inverse problems
- Multi-scale and multi-phase transport phenomena
- Modelling of solidification and microstructure evolution for advanced manufacturing processes

New Laboratories/Laboratory Experiments Set up

S.N.	Faculty Name	Laboratory	Experiment(s)
1	Dr. Yogesh G. Bhumkar & Dr. Sathyanarayana A.	Fluid Mechanics	Developed Experimental set up for UG students
2	Dr. V. Pandu Ranga	AIM Laboratory	Hexapod Stewart Platform, MyRio, Work station, Accessories
		MTM Laboratory	WEDM Machine, Ultrasonic cum Milling Machine, Power hack saw, Hydraulic surface grinding machine, Hydraulic pallet truck
		CWF Laboratory	Injection Moulding Machine, Hydraulic Press, Welding simulator, Welding down draft Table, Spot welding machine, Image analysis software, Micro hardness tester
3	Dr. V. Pandu Ranga & Dr. Akhilesh Barve	Central Workshop	Heavy duty lathes, medium duty lathes, light duty lathes, milling machine, Fork lift truck, Horizontal band saw
4	Dr. Satish Dhandole	Machines and Mechanism Laboratory	Determination of Natural frequency for cantilever beam and square plate
5	Prof. Swarup Kumar Mahapatra	Applied Thermo Fluid Laboratory	Mach-Zhender Interferrometer
6	Dr. Sathyanarayana Ayyalasomayajula	Fluid Dynamics Laboratory	• Sonic Round Jet • Forces on a Plane Surface • Impact of a Jet • Major Losses in Pipe Flow • Minor Losses in a Pipe • Hele-Shaw Cell - Visualisation of Potential Flow • Pipe Networks - Experiment & Simulation • Reynolds Experiment - Visualisation of Transition to Turbulence

Sponsored Research Projects

S.N.	Title of Project	Sponsoring Agency	Name	Role
1	High performance computing of flow past reflex shape aerofoils suitable for micro-aerial vehicles	SEED Grant, IIT Bhubaneswar	Dr. Yogesh G. Bhumkar	PI
2	Design of Optimized Natural Laminar Flow Aerofoil for Transport Aircrafts	AR&DB	Dr. Yogesh G. Bhumkar & Prof. S. K. Mahapatra	PI Co-PI
3	Development and analysis of the space-time optimized dispersion relation preserving (DRP) scheme suitable for high performance computing of fluid flows.	DST FastTrack, Govt. of India	Dr. Yogesh G. Bhumkar	PI
4	Establishment of Innovation-cum-Incubation Centre at IIT, Bhubaneswar	Planning & Co-Ordination Deptt., Govt of Odisha	Dr. Satyanarayan Panigrahi	Co- PI

Sponsored Research Projects *(contd.)*

S.N.	Title of Project	Sponsoring Agency	Name	Role
5	Design Innovation Center (DIC)	MHRD, Government of India	Dr. S. N. Panigrahi, Dr. A. K. Pradhan & Dr. M. K. Pandit	PI
6	Impact response and damage analysis of advanced composite sandwich structures	Department of Science and Technology, New Delhi, India	Dr. M. K. Pandit	PI
7	Improved Crack and Delamination Growth Resistance Technology Development for Isotropic and FRP Composite Structural Components	DST, Govt. of India	Dr. A. K. Pradhan	PI
8	Pool Boiling Crisis on Porous Coated Surface: An Experimental Study and Model Development	DST, Govt. of India	Dr. Mihir Kumar Das	PI
9	Temperature control of electronic components using PCM based heat sink under cyclic thermal loading	SERB-DST, Govt. of India	Dr. P. Rath & Dr. M. K. Das	PI
10	Coupled Physical Processes in the Bay of Bengal and Monsoon Air-Sea Interaction: Multi- Institutional Collaborative Project	National Monsoon Mission - Ministry of Earth Sciences, Govt. of India	Dr. Sathyanarayana Ayyalasomayajula	Co- PI

Consultancy/Development Projects

S.N.	Title of Project / work	Agency/Firm/ Sponsors	Principal/ Co-Principal Investigator	Duration		Total Budget (Rs.)
				From	To	
1	Re-Engineering of Walking type Reaper Binder	Department of Agriculture & Food Processing (O), Odisha, India	Dr. A. K. Pradhan, SMSc, Dr. M. K. Pandit, SMSc & Dr. A. Mandal, SMMME	2013-04-01	Ongoing	Rs. 30 lakh
2	CFD Modelling of 76mm Naval Gun Projectile in the Aid of Range Enhancement	PXE-DRDO, Balasore, Odisha	Prof. Swarup Kumar Mahapatra (PI), Dr. S.N. Panigrahi, Dr. Prasenjit Rath	2012-11-10	2015-12-26	Rs. 50 lakh

Achievement

- Prof. Swarup Kumar Mahapatra awarded with Teaching Excellence Autumn 2015-2016, IIT Bhubaneswar
- Dr. Yogesh G. Bhumkar awarded with Teaching Excellence Autumn 2015-2016, IIT Bhubaneswar
- Dr. Satyanarayan Panigrahi awarded with Teaching Excellence Autumn 2015-2016, IIT Bhubaneswar
- Dr. Mihir Kumar Pandit awarded with Teaching Excellence Autumn 2015-2016, IIT Bhubaneswar

Visits Abroad

S.N	Faculty Name	Place of visit	Dates of visit		Purpose of visit	Funding Agencies
			From	To		
1	Dr. Yogesh G. Bhumkar	University of Oxford	2015-09-01	2015-09-04	Attending Conference, Presenting Paper	SERB, Govt. of India
2	Dr. Satish Dhandole	Auckland New Zealand	2015-07-14	2015-07-17	Attending Conference, Presenting Paper	DST
3	Prof. Swarup Kumar Mahapatra	Singapore	2015-12-31	2016-01-06	Attending Conference, Presenting Paper	Institute PDA Grant
4	Dr. P. Rath	Petroleum Institute, Abu Dhabi	2014-11-29	2015-05-28	Teaching and Research Associate	ADNOC, Abu Dhabi
5	Dr. Sathyanarayana Ayyalasomayajula	University of Oxford, Oxford, UK	2015-08-31	2015-09-06	Attending IMA Conference, Presenting Paper	Institute PDA Grant

Book Chapters

- 3D Optimisation of PID Controller Parameters for 3-DOF Planar Manipulator using GA and PSO, New Developments in Expert Systems, Ravi Kumar Mandava, K. Sai Manas and Pandu R. Vundavilli, Nova, USA, 2015

Paper published in Peer-reviewed SCI-Journals

- Development of a High-Resolution Scheme for Solving the PNP-NS Equations in Curved Channels,, T.W.H. Sheu, Y.G. Bhumkar, S.T. Yuan and S.C. Syue, Communications in Computational Physics, 2016, Vol. 19, No. 02, pp. 496-533.
- Construction, Analysis and Application of Coupled Compact Difference Scheme in Computational Acoustics and Fluid Flow Problems, J. Pradhan, B. Mahato, S.D. Dhandole, Y.G. Bhumkar, Communications in Computational Physics, 2015, Vol. 18, No. 4, pp. 957-984.
- Modeling of ECDM micro drilling process using GA and PSO trained radial basis function neural network, K. Shanmukhi, Pandu R. Vundavilli and B. Surekha, , Soft Computing, 2015, Vol. 19, No. 8, pp. 2193-2202.
- Neural network-based expert system for modeling of tube spinning process, Pandu R. Vundavilli, J. Phani Kumar, Ch. Sai Priyatham and Mahesh B. Parappagoudar, Neural Computing and Applications, 2015, Vol. 26, No. 6, pp. 1481-1493.
- Multi-objective optimization of squeeze casting process using evolutionary algorithms, Manjunath Patel, G.C. Prasad Krishna, Pandu R. Vundavilli and M.B. Parappagoudar, International Journal of Swarm Intelligent Research, 2016, Vol. 7, No. 1, pp. 55-74.
- Design and analysis of higher order exponential horn profiles for ultrasonic machining, Akash Deep Chhabra, R. Vinod Kumar, Pandu R Vundavilli and B. Surekha, Journal for Manufacturing Science and Production, 2016, Vol. 16, No. 1, pp. 13-19.
- Analysis of critical success factors of humanitarian supply chain: An application of Interpretive Structural Modeling, D.K.Yadav, A. Barve, International Journal of Disaster Risk Reduction, Vol 12, pp. 335-344.
- Analysis of critical activities for GSCM implementation in mining supply chains in India using fuzzy analytical hierarchy process, Kamalakanta Muduli; Akhilesh Barve, International Journal of Business Excellence, 2015, Vol.8, No.6, pp.767 – 797.
- Investigation of influential strength of factors on GSCM adoption in mining industries operating in India, G. Kannan, K. Muduli, K. Devika, A. Barve, Resources Conservation and Recycling, Vol.107, pp. 185-194.
- Introducing passive acoustic filter in acoustic based condition monitoring: Motor bike piston-bore fault identification, D. P. Jena, S. N. Panigrahi, Mechanical Systems and Signal Processing, Vol. 70, pp. 932-946.

- Automatic gear and bearing fault localization using vibration and acoustic signals, D. P. Jena, S. N. Panigrahi, Applied Acoustics, 2015, Vol. 73, pp. 1-14.
- Estimating acoustic transmission loss of perforated filters using finite element method, D. P. Jena, S. N. Panigrahi, Measurement, 2015, Vol. 55, pp. 39-50.
- Construction, Analysis and Application of Coupled Compact Difference Scheme in Computational Acoustics and Fluid Flow Problems, J Pradhan, B Mahato, SD Dhandole, YG Bhumkar, Communications in Computational Physics, 2015, Vol. 18, No. 4, pp. 957-984.
- Behaviour of sandwich laminates subjected to thermal loading using higher-order zig-zag theory, A Padhi, MK Pandit, Journal of Sandwich Structures and Materials, 2016, Vol. 18, No. 2, pp. 174-19.
- Delamination propagation analyses of spar wingskin joints made with curved laminated FRP composite panels, P K Mishra, A K Pradhan and M K Pandit, Journal of Adhesion Science and Technology, 2016, Vol 30, No. 7, pp. 708-728.
- Application of TCE-PCM based heat sinks for cooling of electronic components: A Review, Santosh Kumar Sahoo, Mihir Kumar Das, Prasenjit Rath, Renewable and Sustainable Energy Reviews, 2016, Vol. 59, pp. 550-582.
- Prediction of Heat Transfer Coefficient in Flow Boiling over Tube Bundles using ANFIS, Abhilas Swain, Mihir Kumar Das, Heat Transfer Engineering, 2016, Vol. 37, No. 5, pp. 443-455.
- Vortex shedding from a circular cylinder with a parallel slit, Lavish, O., Venugopal, A., Amit Agrawal and S. V. Prabhu, Journal of Visualization, 2016.
- MHD Convection of Nanofluids: A Review , AJ Chamkha, SK Jena, SK Mahapatra, Journal of Nanofluids, 2015, Vol. 4, No. 3, pp. 271-292.
- Transient buoyancy-opposed double diffusive convection of micropolar fluids in a square enclosure, SK Jena, LK Malla, SK Mahapatra, AJ Chamkha, International Journal of Heat and Mass Transfer, 2015, Vol. 81, pp. 681-694.
- Interaction of short pulse collimated irradiation with inhomogeneity: An accurate model, AK Verma, P Rath, SK Mahapatra, International Communications in Heat and Mass Transfer, 2015, Vol. 72, pp. 1-9.
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- A Numerical Investigation of Surface Radiation Interaction With Magneto-Convection of an Electrically Conducting Fluid Imposed With a Transverse Magnetic Field, SK Jena, SK Mahapatra, Heat Transfer Engineering , 2015, Vol. 36, No. 1, 21-32.
- Interaction of Participating Medium Radiation with Thermosolutal Convection-A Critical Appraisal , SK Jena, SK Mahapatra, A Sarkar, Heat Transfer-Asian Research, 2015, Vol. 44, No. 1, 39-65.
- Application of TCE-PCM based heat sinks for cooling of electronic components: A Review, S. K. Sahoo, M. K. Das and P. Rath, Renewable & Sustainable Energy Reviews, 2016, Vol. 59, pp. 550-582.
- A Similarity Solution for Phase Change of Binary Alloy with Shrinkage or Expansion, A. Jakhar, P. Rath and S. K. Mahapatra, Engineering Science and Technology: An International Journal, doi:10.1016/j.jestch.2016.04.002.

Paper published in Peer-reviewed Conference Proceedings

- Simulations of acoustic field inside a cavity using a high resolution, dispersion relation preserving coupled compact difference scheme, Jitenjaya Pradhan, Yogesh G. Bhumkar and Satish D. Dhandole, International Conference on Theoretical and Computational Acoustics (ICTCA), October 11-16, 2015, Hangzhou, China.
- Solution of computational acoustics and wave propagation problems using a high order, high resolution coupled compact difference scheme, Jitenjaya Pradhan, Yogesh G. Bhumkar and Satish D. Dhandole, ICCM2015, July 14-17, 2015, Auckland, NZ.
- Effectiveness of the Pseudo-Spectral and the High Order Compact Schemes in Capturing Strong Shocks, S. Ayyalasomayajula, A. Sinhababu, Y. G. Bhumkar, IMA Conference on Numerical Methods for Simulation, September 1-4, 2015, Mathematical Institute, University of Oxford.
- Parameter Optimization of Al-SiC Metal Matrix Composites Produced using Powder-based Process, Ponugoti

Gangadhararao, A Gopala Krishna and Pandu R Vundavilli, International Conference on Robotics, Automation control and Embedded Systems, February 18-21, 2015, IEEE Proceedings, DOI: 10.1109/RACE.2015.7097265.

- Optimization of process parameters during machining of Thixoformed A356-5TiB2 in-situ Composite using Design of Experiments, S Deepak Kumar, Pandu R Vundavilli, Animesh Mandal and Madhusudan Chakraborty, International Conference on Robotics, Automation control and Embedded Systems, February 18-21, 2015, IEEE Proceedings, DOI: 10.1109/RACE.2015.7097253.
- Design of PID Controller for a 4 DOF Planar and Spatial Manipulators, Ravi Kumar M, Pandu R. Vundavilli, International Conference on Robotics, Automation control and Embedded Systems, February 18-21, 2015, IEEE Proceedings, DOI: 10.1109/RACE.2015.7097269.
- Information theoretic approach using neural network for determining radiometer observations from radar and vice versa, Srinivasa Ramanujam Kannan, Chandrasekar V, SPIE Asia-Pacific Remote Sensing, 2016, Oral presentation.
- Analysis of Critical Success Factors of Humanitarian Supply Chains in Mitigating the Cyclone Risks in Odisha: A TISM Approach, D. K. Yadav and A. Barve, International Conference on E-Business and Supply Chain Competitiveness (EBSCC 2016), February 12-14, IIT Kharagpur, India, February, 2016.
- Role of Information Technology in Disaster Risk Reduction in Coastal Regions of India, D. K. Yadav, A. Barve and S. Sharma , Young Scientist Conference, India International Science Festival (IISF 2015) December 5-7, IIT Delhi, December, 2015.
- A higher order zig-zag theory for static analysis of sandwich laminates Subjected to thermo-mechanical loads, Padhi A. and Pandit, M. K., 60th Congress of Indian Society of Theoretical and Applied Mechanics (ISTAM), MNIT Jaipur, December, 2015.
- 3D Failure Analyses of Spar Wingskin Joints Made with Curved Laminated FRP Composite Panels, Mishra P.K., Pradhan A.K. and Pandit M.K., 17th ISME Conference on Advances in Mechanical Engineering, IIT DELHI, October 03, 2015.
- 3D Finite Element Analyses of Spar Wingskin Joints made with Flat FRP Composite Laminates with Pre-embedded Delaminations, Mishra P.K., Pradhan A.K. and Pandit M.K., 60th Congress of Indian Society of Theoretical and Applied Mechanics (ISTAM), MNIT Jaipur, December, 2015.
- Numerical Study of Cyclic Melting and Solidification of Nano Enhanced Phase Change Material Based Heat Sink in Thermal Management of Electronic Components, Santosh Kumar Sahoo, Mihir Kumar Das, Prasenjit Rath, International conference on Micro/Nanoscale Heat and Mass Transfer MNHMT 2016, January 4-6, 2016.
- Forced Convection over In-line Tube Bundles with Circular and Elliptical Tubes, Rajiv Lochan Mohanty, Abhilas Swain, Mihir Kumar Das, 42nd National conference on Fluid Mechanics and Fluid Power, December 13 – 14, 2015.
- Forced Convection over Staggered Mixed Tube Bundle, Rajiva Lochan Mohanty, Abhilas Swain, Mihir Kumar Das, 17th ISME conference on Advances in Mechanical engineering, October 3 – 4, 2015.
- Gold-Fourier Kaluri Method for Estimating Vortex Shedding Frequency, Kaluri V. Rangarao., Venugopal Arumuru, The IEEE Region 10 Symposium (TENSYMP) 2016, Bali Island, Indonesia, May 09-11, 2016.
- Thermal Wave Model for Analysis of Multilayer Tissue Medium in Presence of Inhomogeneity in Laser Tissue Treatment, AK Verma & SK Mahapatra, ASME 2016, 5th International Conference on Micro/Nanoscale Heat and Mass, Singapore, January 4-6, 2016.
- Numerical Study of Cyclic Melting and Solidification of Nano Enhanced Phase Change Material Based Heat Sink in Thermal Management of Electronic Components, S. K. Sahoo, M. K. Das and P. Rath, MNHMT-2016, January 04-06, 2016, doi:10.1115/MNHMT2016-6499.
- De-Aliasing Schemes for Pseudo-Spectral Solution of the Viscous Burgers-Equation, A. Sinhababu, S. Ayyalasomayajula, IMA Conference on Numerical Methods for Simulations, 2015.

- Effectiveness of the Pseudo-Spectral and Higher Order Compact Schemes in Capturing Strong Shocks, S. Ayyalasomayajula, A. Sinhababu, Y. G. Bhumkar, IMA Conference on Numerical Methods for Simulations, 2015.

Invited Lectures/Presentation by Faculty Members

- Role of scientific computing in Large Eddy Simulations and Direct Numerical Simulations, YG Bhumkar, TEQIP-II program on CFD at the College of Engineering, Adoor, Pathanamthitta, Kerala, January 15, 2016.
- A methodology to combine numerical model simulation with active-passive combined observation for geophysical parameter retrievals, Srinivasa Ramanujam Kannan, IISc Bangalore, May 21, 2015.
- A methodology to combine numerical model simulation with, Srinivasa Ramanujam Kannan, IITM Pune, February 26, 2016.
- Numerical Methods in Radiative Heat Transfer, Srinivasa Ramanujam Kannan, FDP-TEQIP, Govt Engg College, Kottayam Kerala, 2015.
- Computational Fluid Dynamics, Prof. Swarup Kumar Mahapatra, FDP at College of Engineering, Adoor, Pathanamthitta, Kerala, January 11, 2016,
- CFD and its Application, Prof. Swarup Kumar Mahapatra, VSSUT, Burla, Odisha, March 13, 2016,
- CFD modeling of moving boundary problems, P. Rath, RTME-2016
- Research Methodology, Prof. PKJ Mahapatra, College of Engineering, Bhubaneswar, January 2016.

Seminars / Conferences / Workshops organized

- Short term course on Advances in Computational Fluid Dynamics during 8th – 12th June, 2015.
- One day workshop on Free-Hand Sketching during 22nd August 2015.
- One day workshop on 3D Printing (Stage-I), during 3rd October 2015 for the Students of IIT Bhubaneswar
- One day workshop on 3D Printing (Stage-II), during 10th October 2015, for the Students of IIT Bhubaneswar
- Four days sworkshop on Robotics, during 9th to 12th December 2015 for the Students of IIT Bhubaneswar
- Three days conference "E-Summit 16", during 22nd -24th January 2016.
- Two days workshop on Patent Writing, during 13th to 14th February 2016, for the Students of IIT Bhubaneswar
- One day workshop on Business Plan, Opportunities and Risks, and Sources of Funds for Start-Ups, during 5th March 2016.

Patents

S.N.	Title	Name	Role	Patent Details				Remarks
				Country	No	Year of Application	Year of Grants	
1	Vehicle Mounted Reverse Parking Assistant System	Dr. Satyanarayan Panigrahi	Co-PI	India	201631009727	2016		Filed

Industrial Visits

The School is actively arranging a number of visits to various types of companies for industrial exposure of its students. The following are the details of the visits carried out in the year 2015-16:

Date	Name of the Industry	No. of Students
March 29, 2016	Carriage Repair Workshop, Mancheswar, Odisha	38
October 10, 2015	NALCO Angul	37
October 14, 2015	Paradeep Phosphates Limited, Paradeep	42
September 14, 2015	Jindal Steel, Jajpur	37

Visiting Experts

- Prof. Zellman Warhaft, Cornell University, Ithaca, NY, USA visited us on March 18, 2016 and delivered a talk on "Mixing and transport in nature and engineering systems: Implications for global warming".
- Mr. Koji Ishida, Consulting Group, Ono Sokki Co. Ltd., Group Manager visited us on September 29, 2015 delivered a talk on "Sound design for industry now and the future".
- Dr. Anand Srivastava, Indian Institute of Science, Bangalore visited us on August 24, 2015 and delivered a talk on "Using multiscale modelling to gain molecular level insights into some large deformation processes in cell membranes".
- Dr. A.K. Nayak Bhabha Atomic Research Center (BARC), Mumbai, Senior Scientist in the Reactor Engineering Division visited us on April 22, 2015 and interacted with faculty members of the School.
- Prof. Rudra Pratap, Indian Institute of Science, Bangalore visited us on April 01, 2015 and interacted with faculty members of the School.

School of Minerals, Metallurgical and Materials Engineering

Head of School

Dr. Animesh Mandal

Faculty Members

MGM Chair Professor

Prof. N.P.H. Padmanabhan
Research Areas: Mineral Processing; Extractive Metallurgy; Modelling and simulation of mineral processing unit operations
Phone: +91-674-2576 176
Email: padmanabhan@iitbbs.ac.in

Associate Professor

Dr. Kalyani Mohanta
Research Areas: Ceramics and composites; Waste management; Powder processing and fabrication
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Assistant Professors

Dr. Amritendu Roy
Research Areas: Ferroic and multiferroic transition metal oxides; Electronic structure calculations; High entropy alloys
Phone: +91-674-2576 180
Email: amritendu@iitbbs.ac.in

Dr. Animesh Mandal
Research Areas: Light metals and composites; In-situ metal matrix composites; Semisolid metal processing
Phone: +91-674-2576 173
Email: animesh@iitbbs.ac.in

Dr. Kisor Kumar Sahu
Research Areas: Modeling and simulation of materials; Amorphous material and frustration; Electrochemistry
Phone: +91-674 2576 174
Email: kisorsahu@iitbbs.ac.in

Dr. Kaushik Das
Research Areas: Mechanical Behaviour of Nanomaterials; Integration of Nanomaterials to Microelectromechanical Systems (MEMS)
Phone: +91-674 2576 181
Email: kaushik@iitbbs.ac.in

Dr. Partha Sarathi De
Research Areas: High Entropy alloys; Friction stir welding and processing; Microstructure modeling of hot working processes
Phone: +91-674-2576 171
Email: parthasarathi.de@iitbbs.ac.in

Dr. Randhir Singh
Research Areas: Computational modeling of electrochemical systems; Electrolmetallurgy of reactive metals; Transport phenomena in metallurgy
Phone: +91-674-2576 179
Email: randhir@iitbbs.ac.in

Dr. Soobhankar Pati
Research Areas: Fuels Cells and Batteries; Green Processing of Metals; Sustainable Electrochemical Engineering
Phone: +91-674-2576 177
Email: spati@iitbbs.ac.in

Visiting Professors

Prof. Brij Kumar Dhindaw
Research Areas: Physical Metallurgy; Phase transformation; Solidification; Casting; Solid state joining; Composites
Phone: +91-674-2576 175
Email: dhindaw@iitbbs.ac.in

Prof. Brahma Deo
Research Areas: Mathematical modeling, simulation and process control of steel making, non linear dynamics and chaos control
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Email: bdeo@iitk.ac.in

The School of Minerals, Metallurgical and Materials Engineering (SMMME) at IIT Bhubaneswar was established in 2012. It is a unique initiative in the present science and technology education and research scenario of India. It is perhaps the only school among premier institutes where minerals, metals and materials have come into a collaborative existence with a mission to be locally relevant and globally competitive. Located in the state of Odisha, one of the most mineral rich states of India, the school is aware that the maximum economic benefit from a mineral could be achieved when economically transformed to its final product leading to ultimate benefit.

The school has an excellent fusion of faculty members from diverse background of minerals, metals and materials engineering. Currently, the school offers B.Tech program in Metallurgical and Materials Engineering, M.Tech. program in Materials Science and Engineering and Ph.D. program. The focus of school activities is therefore multi-directional with an emphasis on both teaching and research. In this regards, the school has drawn a road-map to progress via partnership with Institute of Minerals and Materials Technology (CSIR-IMMT) at Bhubaneswar and student and faculty exchange with Warwick Manufacturing Group (WMG) at Warwick University, UK. The School has also received a generous endowment of 30 million INR from MGM Group to establish a permanent Chair Professorship.

Currently, the faculty members are engaged in sponsored projects by Department of Science and Technology, UGC-DAE Consortium of Scientific Research, Kalpakkam, Planning and Coordination Department, Government of Odisha. Also, few consultancy projects with Tata Steel Limited, Tata International Limited and others are being undertaken.

Thrust areas

- Modeling and simulation of materials, processes and unit operations
- Mineral Processing
- Processing of composites (CMCs and MMCs)
- Development of light metals and alloys
- Fuels Cells and Batteries
- Ferroic and multiferroic transition metal oxides
- Nanomaterials
- Microelectromechanical Systems (MEMS)
- Recycling of materials and waste management

Laboratories

- Laboratories
- Mechanical Testing Laboratory
- Minerals Processing Laboratory
- Modeling and Simulation Laboratory
- Powder Processing Laboratory
- Electrometallurgy and Thermodynamics Laboratory
- Optical Microscopy Laboratory
- High Temperature Processing Laboratory
- Metallography Laboratory

New Equipment

- Inverted Metallurgical Microscopes
- Twin Disc Polishers
- Hydraulic Automatic Specimen Mounting Press
- Low Speed Saw
- Micro Hardness Tester
- Compact and precision Disc Cutter
- Planetary Ball Mill

Sponsored Research Projects

S.N.	Title of Project	Sponsoring Agency	Name	Role
1	Study of piezoelectric nanomaterial reinforced polymer nanocomposite films for applications in MEMS	DST - SERB	Dr. K. Das	PI
2	Designing of Novel Multiferroic Transition Metal Oxides for Memory and Energy Applications	DST - SERB	Dr. A. Roy	PI
3	Optimization of HIP process conditions for 9Cr and 18Cr ODS steel powder	UGC-DAE Consortium of Scientific Research, Kalpakkam	Dr. A. Mandal	PI
4	Novel hypereutectic Al-Si-Mg alloys for automotive application	DST	Dr. A. Mandal	PI
5	UKIERI Thematic Partnership in Low Carbon Materials Technologies, Innovation and Application	The UK India Education and Research Initiative	WMG and IITs	Member
6	Innovation and Incubation Center	Planning and Coordination Dept, Govt of Odisha	Dr. S. Pati	Co-PI
7	Green Production of Hydrogen Storage Materials from Natural Grade Ilmenite	DST	Dr. S. Pati	PI
8	Center for Energy Materials	MHRD	Dr. S. Pati	Co-PI

Consultancy/Development Projects

S.N.	Title of Project / work	Agency/Firm/ Sponsors	Principal/ Co-Principal Investigator	Duration		Total Budget (Rs. In Lakhs)
				From	To	
1	Modelling of the Cathode Assembly in Aluminium reduction Cell	Tata International Limited	Dr. R. Singh	2015-09-08	2015-04-07	0.741
2	Process optimization studies on leaching of high ash coal to produce low ash coal	Tata Steel Limited, Jamshedpur	Dr. S. Pati	2015-05-15	2016-05-31	6.75
3	Re-engineering of walker type reaper-binder	Department of Agriculture and Food Processing (O), Odisha	Dr. A. Mandal	2013-07-01	0000-00-00	30.0
4	Studies on Chemical Demineralization of High Ash Coal to obtain Low Ash Coal	Tata Steel	Prof. N.P.H . Padmanabhan	2015-05-15	2016-05-01	6.72
5	Efficient Utilization of Coal in a Sponge Iron Plant: A report	Patnaik Alloys and Steels	Dr. S. Pati	2015-07-01	2015-07-15	0.30

Visits Abroad

S.N	Faculty Name	Place of visit	Dates of visit		Purpose of visit	Funding Agencies
			From	To		
1	Prof. B.K. Dhindaw	Shanghai Jiao Tong University, China	2016-03-21	2016-03-26	To participate in bilateral workshop between SJTU and IIT Bhubaneswar	IIT Bhubaneswar/ Shanghai Jiao Tong University
2	Dr. A. Mandal	Shanghai Jiao Tong University, Shanghai, China	2016-02-22	2016-02-26	To participate in bilateral workshop between SJTU and IIT Bhubaneswar	IIT Bhubaneswar Shanghai Jiao Tong University

Book Chapters

- Thermochemical Hydrogen Generation, R Singh and D Saran, CRC Press, 2016
- Inference of hidden structures in complex physical systems by multi-scale clustering, Zohar Nussinov, Peter Ronhovde, Dandan Hu, S Chakrabarty, Bo Sun, Nicholas A Mauro, Kisor K Sahu, Springer International Publishing, Switzerland, 2016

Paper published in Peer-reviewed SCI-Journals

- Effect of isovalent non-magnetic Fe-site doping on the electronic structure and spontaneous polarization of BiFeO3, P Singh, A Roy, A Garg, R Prasad, Journal of Applied Physics, 2015, 117, 184104.
- Prediction of Compressive Strength of Biodegradable MgZn/HA Composite via Response Surface Methodology and Its Biodegradation, Loy Liang Soon, HussainZuhailawati, Ismail Suhaina, Brij Kumar Dhindaw, Acta Metall. Sin. (Engl. Lett.) , doi: 10.1007/s40195-016-0410-5, published on line 7 April 2016.
- Dry wear behavior of cooling-slope-cast hypoeutectic aluminum alloy, Nguyen Van Thuonga, HussainZuhailawati, Abu SemanAnasyida, Tran DucHuyb, Brij Kumar Dhindaw, Int. J. Mater. Res. (formerly Z. Metallkd.) , 2016, 107E, 1-8.
- Mechanical Properties of Friction Stir Processed 1100 Aluminum Reinforced with Rice Husk Ash Silica at Different Rotational Speeds, Hussain Zuhailawati, Mohd Noor Halmy, Indra Putra Almanar, Anasyida Abu Seman and Brij Kumar Dhindaw, Int J Metall Mater Eng, 2016, 2: 120 http://dx.doi.org/10.15344/2455-2372/2016/120.
- Solvent extraction of plutonium(IV) in monoamide - Ammonium ionic liquid mixture, A. Rout, K. Chatterjee, K.A. Venkatesan, K.K. Sahu, M.P. Antony, P. R. Vasudeva Rao, Separation and Purification Technology, 2016, 159, 43-49.
- Erosion response of Thixoformed A356-5TiB2 in-situ composite using Taguchis Experimental Design, S. Deepak Kumar, Pandu R. Vundavilli, A. Mandal, S. Mantry, M. Chakraborty, Tribology Transactions, 2016, (doi: 10.1080/10402004.2016.1145775).
- Effect of Strontium and Misch metal on Al-14Si-3Mg alloy, A. Mandal, Mihira Acharya, Transaction of the Indian Institute of Metals, 2015, 68, 1181-1185.
- Coarsening kinetics of semi-solid A356-5wt%TiB2 in-situ composite, S. Deepak Kumar, Mihira Acharya, A. Mandal, M. Chakraborty, Transaction of the Indian Institute of Metals, 2015, 68, 1075-1080.
- Effect of cooling slope angle on microstructure of Al-7Si alloy, Mihira Acharya, S. Deepak Kumar, A. Mandal, Transaction of the Indian Institute of Metals, 2015, 68, 1095-1099.
- Mechanical alloying and properties of immiscible Cu-20 wt.% Mo alloy, A. Kumar, K. Jayasankar, M. Debata, A. Mandal, Journal of Alloys and Compound, 2015, 647, 1040-1047.
- On the age hardening behavior of thixoformed A356-5TiB2 in-situ composite, S. Deepak Kumar, A. Mandal, M. Chakraborty, Materials Science and Engineering A, 2015, 636, 254-262
- Optimization of Process Parameters during Machining of Thixoformed A356-5TiB2 in-situ Composite using Design of Experiments, S. Deepak Kumar, Pandu R. Vundavilli, A. Mandal, M. Chakraborty, IEEE Xplore, 2015, 1-6.
- Effect of Thixoforming on the microstructure and tensile properties of A356 alloy and A356-5TiB2 in-situ Composite, S. Deepak Kumar, A. Mandal, M. Chakraborty,

Transaction of the Indian Institute of Metals, 2015, 68, 123-130.

- Low cost porous alumina with tailored gas permeability and mechanical properties prepared using rice husk and sucrose for filter applications, Ajay Kumar, K. Mohanta, D. Kumar and Om Parkash, Microporous and Mesoporous Materials, 2015, 213, 48-58.

Invited Lectures/Presentation by Faculty Members

- Material Science in Space, B. K. Dhindaw, National Workshop on Material Science and Technology organized by Kalpana Chawla Centre for Space and Nano Sciences, Department of Physics, Maulana Azad College, Kolkata, December 10-12, 2015
- Processing of tungsten resources in India - An Introspection, N.P.H. Padmanabhan, International Seminar on Mineral Processing Technology (MPT-2016), Pune, January 5-7, 2016
- Mineral Engineering education in India with special reference to mineral rich state of Odisha and opportunities, N.P.H. Padmanabhan, International Seminar on Mineral Processing Technology (MPT-2016), Pune, January 5-7, 2016
- Effect of Strontium and Misch metal on Al-14Si-3Mg alloy, A. Mandal, M. Acharya, International Conference on Solidification Science and Processing (ICSSP-VI), Hyderabad, November 24-27, 2015
- Membranes for Green Processing of Metals , Soobhankar Pati, Bhabha Atomic Research Centre, May 2015
- Can unpredictability benefit an inefficient firm?, Varun Pandit, Brahma Deo, Praveen Kulshreshtha, 13th International Scientific Conference on Economic and Social Development, Barcelona, April 14-16, 2016

Seminars/Conferences/Workshops organized

- One day workshop on Innovative and Sustainable Energy Technologies, December 30, 2015

Patents

S.N.	Title	Name	Role	Patent Details			
				Country	No	Year of Application	Year of Grants
1	Mixed metal oxides based fixed-bed reactor concept for hybrid thermochemical fuel production.	R. Singh, A. Anand, K.K. Sahu, S.Pati	Principal Inventors	India	1343/ KOL/2014	2015	
2	Conductor of high electrical current at high temperature in oxygen and liquid metal environment	S. Pati	Principal Inventors	US	9234288	2012	2016
3	Liquid anodes and fuels for production of metals from their oxides by molten salt electrolysis with a solid electrolyte	S. Pati	Principal Inventors	US	9206516	2011	2015
4	Apparatus and method for condensing metal vapor	S. Pati	Principal Inventors	US	8926727	2013	2015
5	A Process for Sintering of Aluminium Powder Compacts in Ambient Atmospheric Air Furnace And Products Obtained Thereof	A. Pattanayak, K. Muthumaniyan, K. Mohanta	Inventors	India	201631002550	2016	

Industrial Visit

1. The UG and PG students of SMMME visited the Uranium Corporation of India mines and the uranium ore processing mill facilities on April 8-9, 2016. It included a visit to the Jaduguda/Narwapahar mines and processing plants at Jaduguda or Turamdih.
2. The UG students visited Jindal Stainless Limited (JSL), Kalinganagar, Odisha on February 13, 2016. They had a firsthand experience of stainless steel making in the plant.

Visiting Experts to the School

Sl. No.	Name of the Visitor	Name of the Institute	Designation	Date of visit
1	Dr. Ankur Goswami	University of Alberta, Canada	Post Doctoral Researcher	22.04.2015
2	Dr. Suresh Neelakantan	University of Cambridge, UK	Post Doctoral Researcher	19.06.2015
3	Prof. K.K. Ray	IIT Kharagpur	Professor	16.10.2015
4	Prof. Tapan Kumar Pal	Jadavpur University, Kolkata	Professor	02.12.2015
5	Dr. Shashi Bhushan Singh	Naval Material Research Laboratory, DRDO	Director	30.12.2015
6	Dr. Shibayan Roy	IIT Kharagpur	Assistant Professor	28.01.2016
7	Dr. A. K. Sarangi	UCIL, Jaduguda	General Manager (Corporate Planning)	29.01.2016
8	Shri Rajan Kumar	NMDC R&D Centre, Hyderabad	Jt. General	03.02.2016
9	Prof. Bhanu Sankara Rao	University of Hyderabad	Professor	30.03.2016

Central Library

Introduction:

The mission of the Central Library is to provide quality information resources in all forms to the academic and research community of IIT Bhubaneswar. With a commitment to excel, the Library plays a vital role starting from acquiring to disseminating all types of information resources by timely and innovative services to support the academic and research need of the user community. The range and quality of services offered by the Central Library are comparable to any modern libraries in India of International standard. In 2016, Central Library has extended its services at Argul campus i.e. the permanent campus of Institute. Further, it has also extended the Library timing up to 11 pm at permanent campus w.e.f. March 2016.

In a nut shell, currently it is having over 14760+ volumes of books, 40+ full text as well as bibliographical database subscriptions, and other resources like popular magazines/print journals, theses, and reports in Engineering, Science & Technology, Management, Humanities and Social Sciences. Apart from the procurement on print books, the Central Library achieved phenomenal progress in the subscription of e-resources which includes more than 8500 e-journals to its digital collection making "24 x 7 Library" in real sense on institute-wide network and off-campus access to e-resources through ezproxy.

Library Collection:

The total collection of library as on March 2015 stands as follows:

- Printed Books: 14760 Nos.
- Journals & Magazines: 24 Nos.
- Daily Newspapers: 12 Nos.
- E-resources: 8500+ e-journals

  (Technology: 3122+; Science: 3079+ & Humanity & Social Sc.: 2299+ e-journals)
  - Full text online databases: 36 Nos.
  - Bibliographical databases: 04 Nos.
  - CD/Multi-media databases: 02 Nos.
  - Patent Database: 01 No.
  - E-Book Database: 01 No.
- Web tools: 02 Nos.

Library Services & Facilities:

- ✓ Reader's Assistance
- ✓ Membership and Borrowing Facilities
- ✓ Photocopying Facility
- ✓ Hindi Collection (Rajbhasa Collection)
- ✓ Leadership Corner
- ✓ Non-Book Materials
- ✓ Reserved Collection in reading area
- ✓ Special Collection for Scheduled Castes & Scheduled Tribes
- ✓ Display of Scholarship and fellowship information
- ✓ Display of Forthcoming conferences, other events, employment opportunities, and prospectus of foreign universities
- ✓ Orientation Programmes

Online Subscriptions:

There are 45 Electronic Resources including e-journals, online databases, bibliographic databases, data sets, software tools, e-Books etc. are being subscribed and renewed annually in collaboration with eSS (e-ShodhSindhu: A nationwide initiative by Ministry of HRD for Higher Education e-esources).

Full Text Online Databases:

1) AAAS (Science)
2) ABI INFORM Complete – New
3) ACM Digital Library
4) American Chemical Society
5) American Institute of Physics
6) American Mathematical Society (AMS 4 titles)
7) American Meteorological Society
8) American Physical Society
9) American Society of Civil Engineers (ASCE)
10) American Society of Mechanical Engineers (ASME)
11) Annual Reviews Journals – New
12) ASTM International Standards and Engineering DL
13) Begell House Engineering Research Collection - New
14) Cambridge Journals - 2nos.
15) ECS Digital library Online
16) Economic & Political Weekly New
17) Emerald Journals – New
18) Geo Science World
19) ICE+ Thomas Telford
20) IEEE Xplore Digital Library
21) IOP Science Extra
22) ISID – New
23) JSTOR
24) NATURE - 13 Titles
25) Optical Society of America
26) Oxford University Press – New
27) Project Muse
28) Proquest Dissertation & Theses
29) Royal Society of Chemistry
30) Sage (2 Journals) – New
31) Science Direct Option-1 (5 Sub- Phy, Chm, Mat, Eng, & Mt.Sc)
32) Earth & Planetary Sc. - Elsevier (Science Direct Additional)
33) SIAM Journals
34) Springer Journals
35) Taylor & Francis Online (Sc. & Tech, Business & Mgmt. & Ecos)
36) Wiley Online - 48 titles

Bibliographical E-DATABASES:

1) SCIFINDER Scholar (web enabled version)
2) MATHSCINET
3) SCOPUS
4) Web of Science (SCIE) (back files since 1965)

Patent Database

1) WIPS Global Advanced

Web tools

1) Turnitin Anti-Plagiarism Tool
2) Ezproxy (for remote access of all subscribed e-resources)

E-Book

1) McGraw-Hill Access Engineering Library

CD/ Multi-media Databases:

1) Cambridge Structural Database System (Researcher License)
2) BIS Civil Engineering Code (CED) - 2-5 users (DVD leased)

Computing Infrastructure and Services:

The Library has its own sub-LAN, which is connected to the Campus LAN. It has more than 20 PCs dedicated for the user to access electronic resources (e-journals, e-databses, etc), SUN Fire Server and IBM Blade Server. The Central Library has a comprehensive Home Page as a part of the Institute's web site. The Library Home page serves as an integrated interface for all services available from the Central Library. The interface, available at http://library.iitbbs.ac.in/ and offers the following web-based services:

- Recent Additions to the IIT Library (http://library.iitbbs.ac.in/)
- New Arrival Display & Alert Services (both physical & online)
- Electronic Resources subscribed (http://library.iitbbs.ac.in/online-e-resources.php)
- Web-based Library OPAC (http://libcat.iitbbs.ac.in:8180/opac/)
- Web Access to Journals subscribed in Print.
- Off Campus Remote Access to all e-Resources through EZProxy (http://ezproxy.iitbbs.ac.in:2048/login)

Library Automation using KOHA:

Open source Library Management Software (KOHA) has been installed and the day-to-day housekeeping activities are being done through this system at Argul Library. The complete roll-out of the software is already tested and to be implemented soon in both the Libraries.

Implementation of Institutional Repository using Dspace:

Central Library has successfully implemented an IR (Institutional Repository) using the open source software DSpace in accordance with the National Digital Library (NDL), IIT Khargpur mandate.

Out-reach Programs:

Central Library has conducted one day "Academic Integrity Seminar: How to Circumvent Plagiarism in Academic Environment". Apart from this Central Library has also conducted following orientation programmes:

- IEEE explore Digital Library: Delivering Research Better Than Ever
- Demonstration session on patent database (WIPS Global)

Career Development Cell

Key highlights of placements of 2015-16:

1. Undergraduate placement is about 95% till now.
2. Highest salary paid 16 Lakhs. Higher than the previous years.
3. Highest number of job offers from core industries as compared to service/IT industries.
4. Total 108 students got placed and total job offers 116. This means that 8 students got double job offers.
5. No. of companies visited are 30 so far.
6. PSU's like Coal India Limited, RITES, HPCL participated for the first time with an average annual CTC of 10 Lakhs plus.
7. Career Development Cell (CDC) conducted a workshop on Recent Recruitment Trends by Industries at IITs on April 1, 2016. Directors, Vice-Chancellors of the premier Institutes/Universities in and around Bhubaneswar and heads of the placement cell of IITs participated in the workshop.
8. All IIT Placement Committee members met at our Institute to discuss the issues of common interest such as co-ordination among IITs, suggestions to improve placements, etc. During the meeting, various issues have been discussed such as: common pre-assessment test, encouraging PSUs to visit campus, student's issues related to the companies, etc. In addition, AIPC members chalked out future plans for enhancing the placements.

Executive Director of Vedanta handing over the offer letter to student

Recruiter team from Grofers along with selected student

Director is addressing all IIT Placement Heads and Delegates during workshop on Recent Trends of Recruitments in IITs

ACADEMIC INFORMATION FOR 2015-16

Programmes Offered:

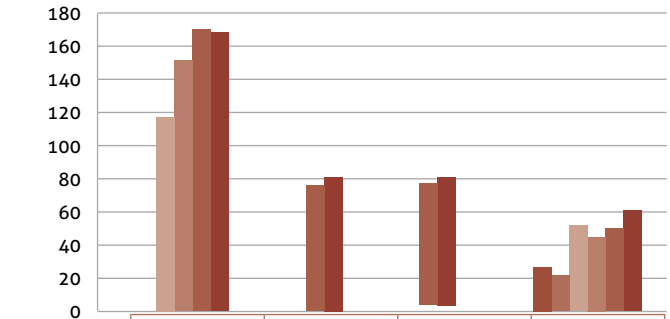
B.Tech. Programme	Civil Engineering, Electrical Engineering, Mechanical Engineering, Computer Science & Engineering, Metallurgical and Materials Engineering
M. Tech. Programme	Climate Science and Technology, Electronics and Communication Engineering, Transportation Engineering, Structural Engineering, Material Science and Engineering, Mechanical Systems Design, Thermal Science and Engineering, Power System Engineering
Joint M.Sc.-Ph.D. Programme	Physics, Chemistry, Mathematics, Geology, Atmosphere and Ocean Sciences
Ph.D. Programme	School of Basic Sciences, School of Earth, Ocean & Climate Sciences, School of Electrical Sciences, School of Humanities & Social Sciences, School of Infrastructure, School of Mechanical Sciences, School of Minerals, Metallurgical & Materials Engineering

Programme Offering by Schools:

• School of Basic Sciences	Joint M.Sc. – Ph.D. in Physics, Joint M.Sc. – Ph.D. in Chemistry, Joint M.Sc. – Ph.D. in Mathematics and Ph.D. Programmes
• School of Earth, Ocean and Climate Sciences	Joint M.Sc. – Ph.D. in Geology, Joint M.Sc. – Ph.D. in Atmosphere and Ocean Sciences, M. Tech. in Climate Science & Technology and Ph.D. Programmes
• School of Electrical Sciences	B.Tech. in Electrical Engineering, B.Tech. in Computer Science & Engineering, M. Tech. in Electronics & Communication Engineering, M.Tech. in Power System Engineering and Ph.D. Programmes
• School of Infrastructure	B.Tech. in Civil Engineering, M. Tech. in Transportation Engineering, M.Tech. in Structural Engineering and Ph.D. Programmes
• School of Mechanical Sciences	B.Tech. in Mechanical Engineering, M. Tech. in Mechanical System Design, M.Tech. in Thermal Science and Engineering and Ph.D. Programmes
• School of Minerals, Metallurgical and Materials Engineering	B.Tech. in Metallurgical and Materials Engineering, M. Tech. in Materials Science and Engineering and Ph.D. Programmes
• School of Humanities, Social Sciences and Management	Ph.D. Programme

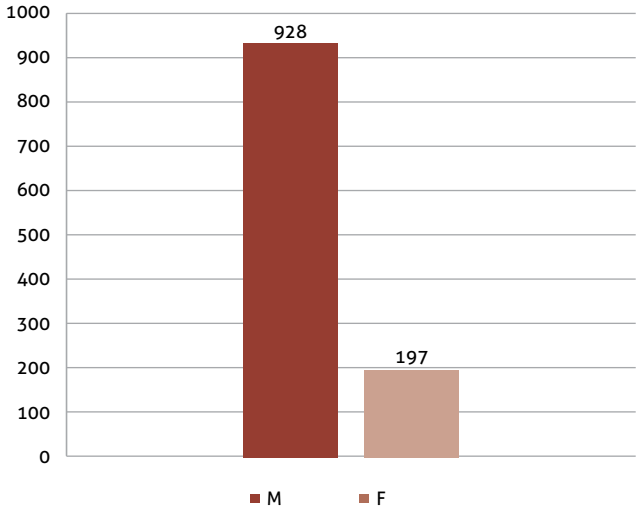
Graphical Representation of different Academic Programmes up to 2015-16
(Based on admission records)

Yearwise Admitted strength of the exisitng batch of students in various Academic Programmes



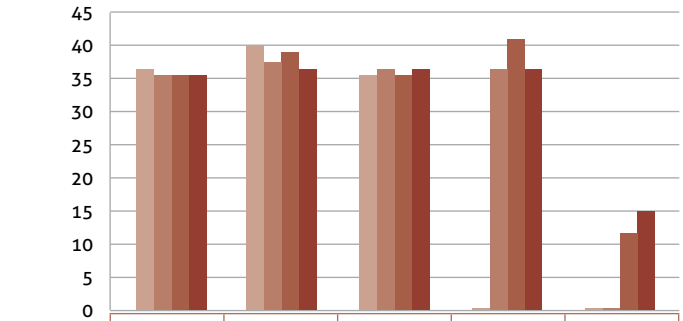
	B.Tech.	M.Sc.	M.Tech.	Ph.D.
2010-11				25
2011-12				21
2012-13	113			50
2013-14	148			44
2014-15	164	71	71	48
2015-16	162	76	74	58

Genderwise Student Strength of IIT Bhubaneswar



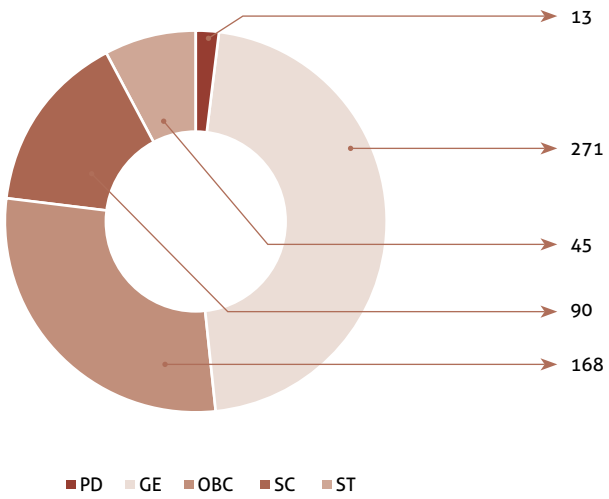
B.Tech. Programme

Student Admitted in B. Tech. Programme (Yearwise)

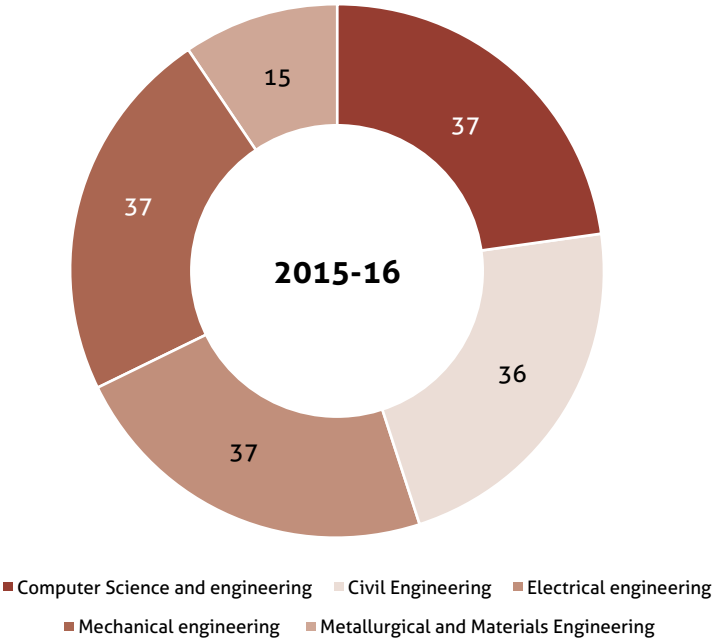


	CE	EE	ME	CSE	MMME
2012-13	37	40	36	0	0
2013-14	36	38	37	37	0
2014-15	36	39	36	41	12
2015-16	36	37	37	37	15

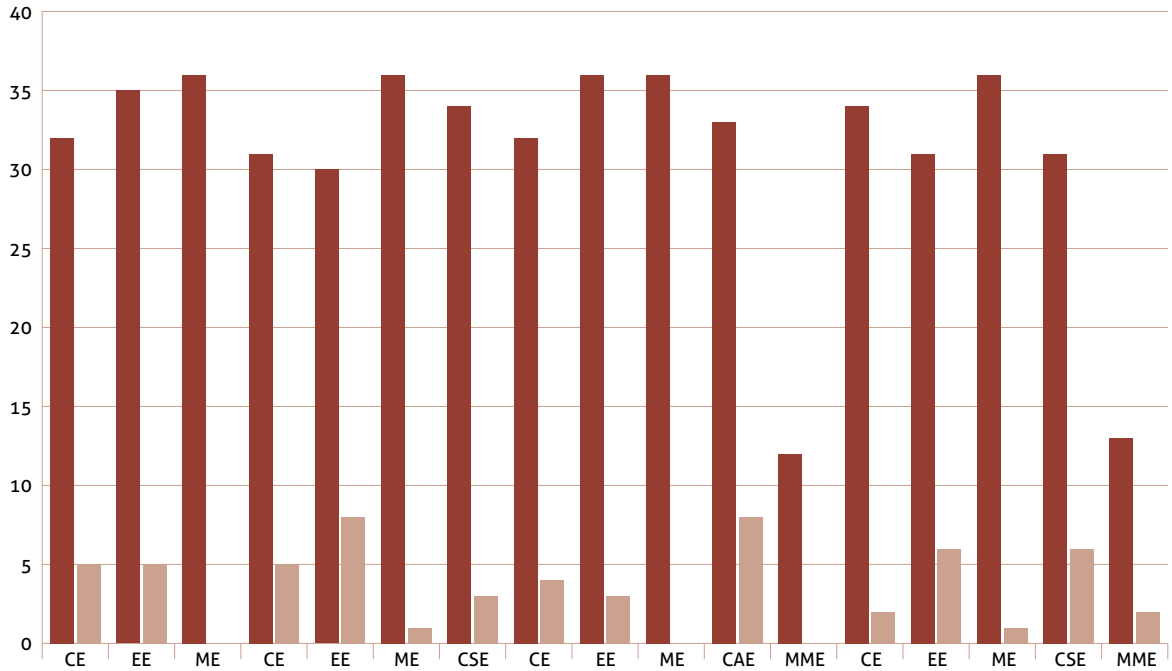
Distribution of the students in different categories in B. Tech. Programme



Student Admitted in B. Tech. Programme: 2015-16

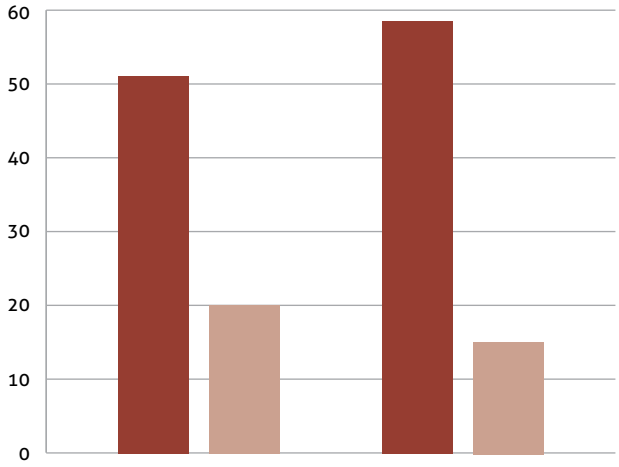


Gender Statistics of Students in B.Tech. Programme



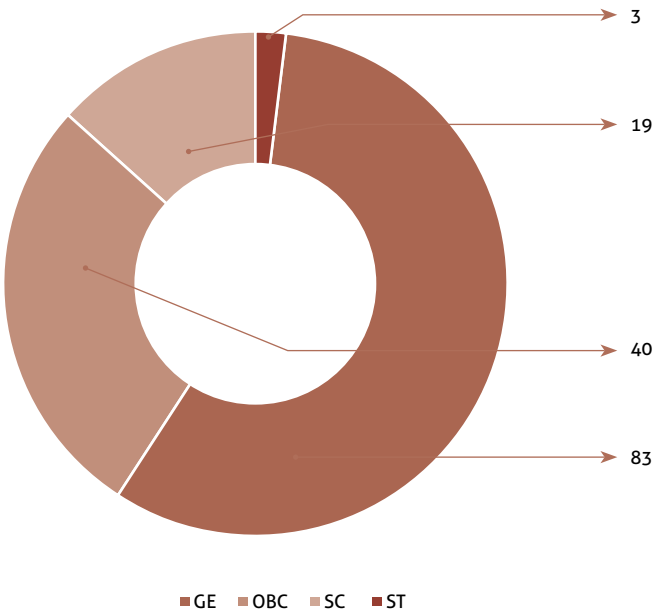
M	32	35	36	31	30	36	34	32	36	36	33	12	34	31	36	31	13
F	5	5	0	5	8	1	3	4	3	0	8	0	2	6	1	6	2

M.Tech. Programme

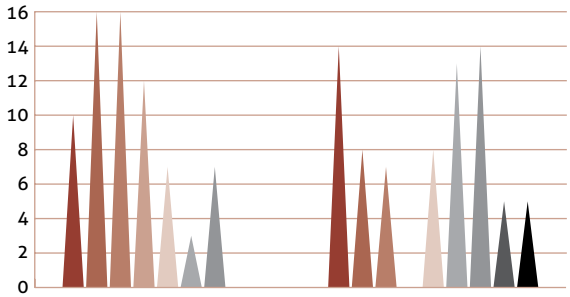


	2014-15	2015-16
M	37	0
F	36	0

Representation of M.Tech. students in different categories

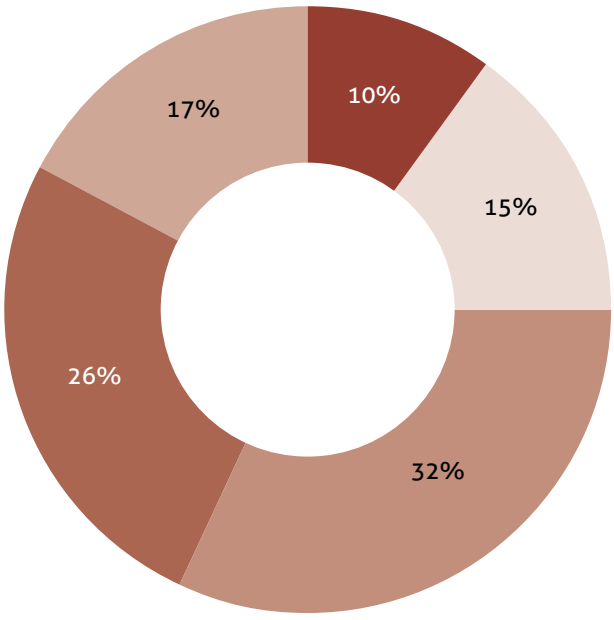


Admission Status of Mt.Tech. Programme (in Different Disciplines)



	2014-15	2015-16
Material Science and Engineering	10	14
Electronic and Communication Engineering	16	8
Power System Engineering	16	7
Civil Engineering	12	
Climate Science and Technology	7	8
Mechanical System Design	3	13
Thermal Science and Engineering	7	14
Structural Engineering		5
Transportation Engineering		5

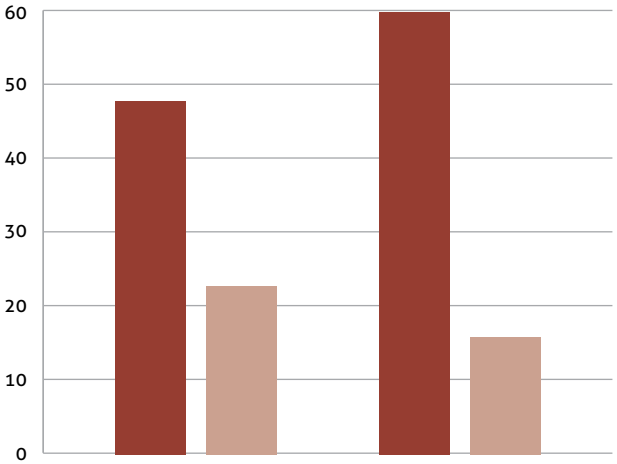
Schoolwise Representation of M.Tech. Students



School of Earth, Ocean and Climate Sciences
School of Infrastructure
School of Electrical Sciences
School of Mechanical Sciences
School of Mineral, Metallurgical and Material Engg.

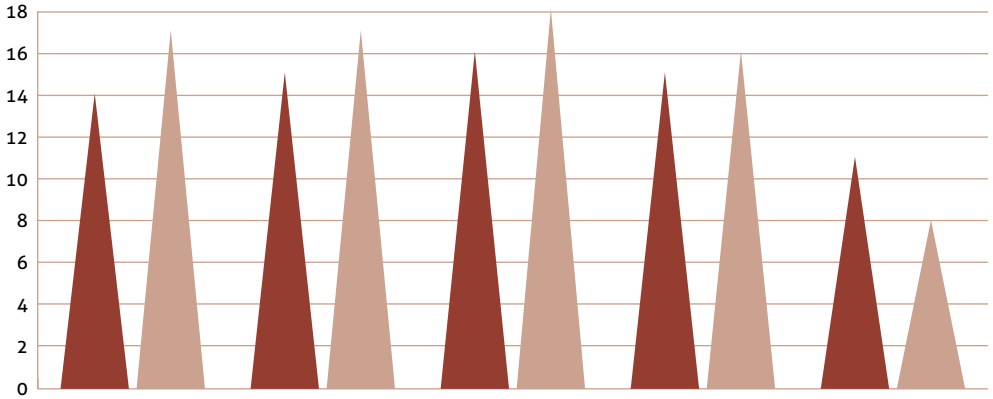
Joint M.Sc. – Ph.D. Programme

Joint M.Sc. - Ph.D. Programme - Gender Statistics



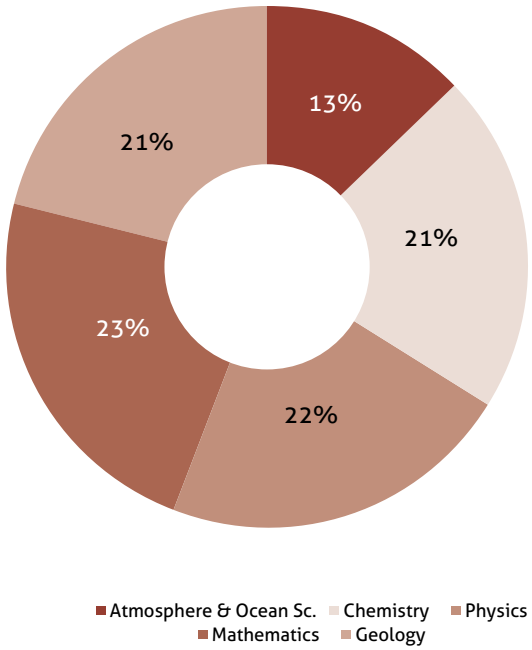
	2014-15	2015-16
M	48	60
F	23	16

Admission Status of Joint M.Sc.- Ph.D. Programme
(in Different Disciplines)

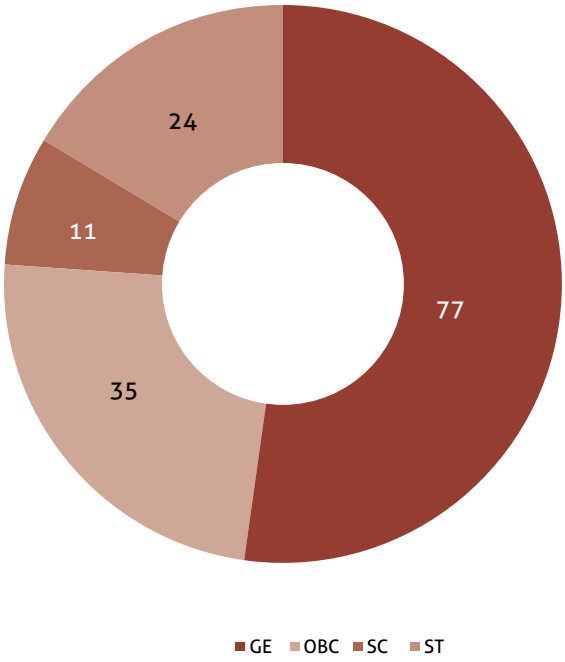


	Chemistry	Physics	Mathematics	Geology	Atmoshphere and Ocean Sc.
2014-15	14	15	16	15	11
2015-16	17	17	18	16	8

Representation Chart of M.Sc. students
(in different schools)

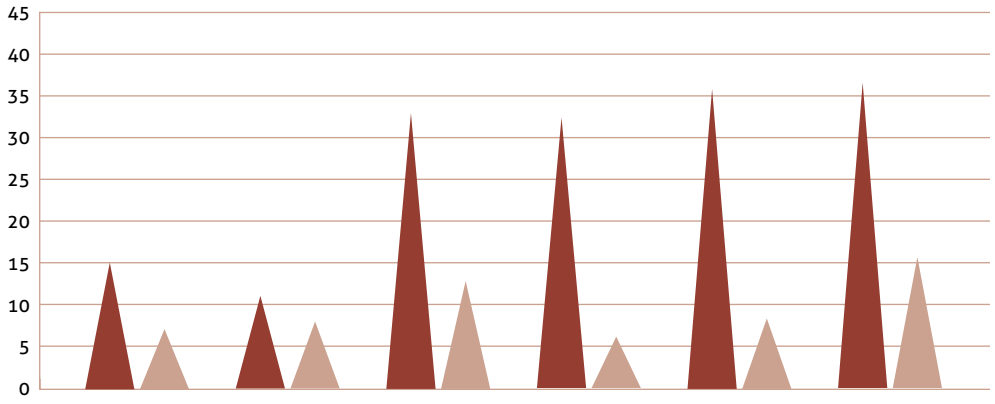


Representation Chart of M.Sc. students under different catagories



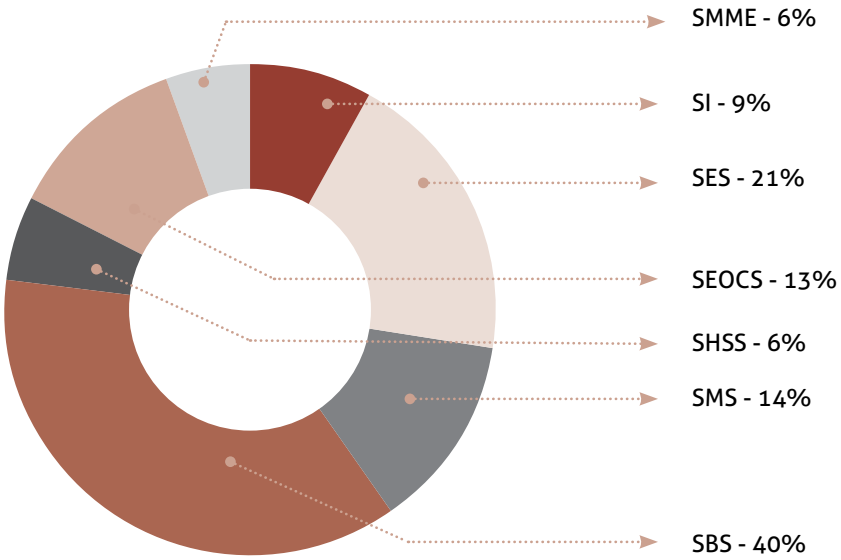
Ph.D. Programme

Gender Distribution of Ph.D. Scholars



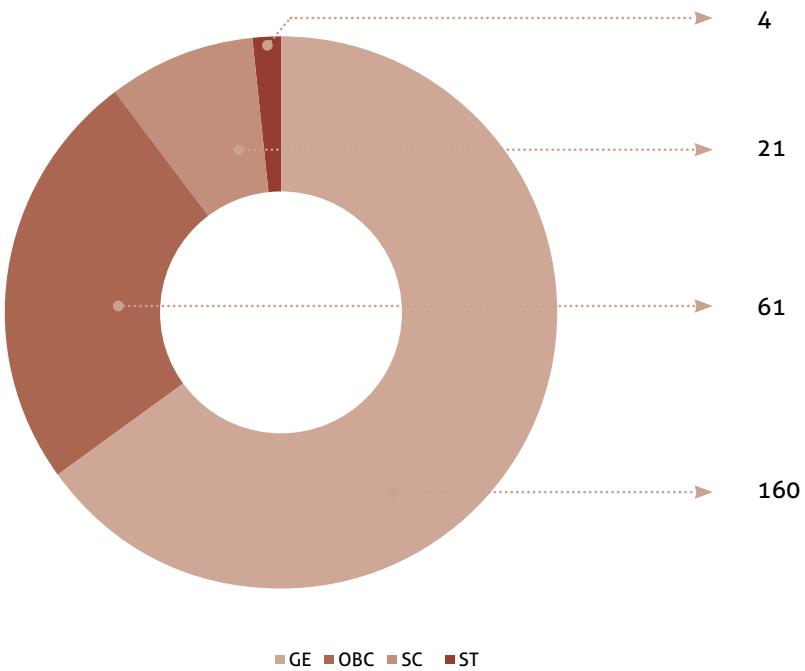
	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
M	17	12	36	37	30	41
F	8	9	14	7	9	17

Representation Chart of Ph.D. Scholars in different Schools



SI: School of Infrastructure, **SOECS:** School of Earth, Ocean and Climate Sciences,
SMS: School of Mechanical Sciences, **SMMME:** School of Minerals, Metallurgical and Materials Engineering,
SES: School of Electrical Sciences, **SHSS & M:** School of Humanities, Social Sciences and Management
SBS: School of Basic Sciences

Representation of the Ph.D. Schoolar in different categories



GRADUATION DATA
(Last 3 Years)

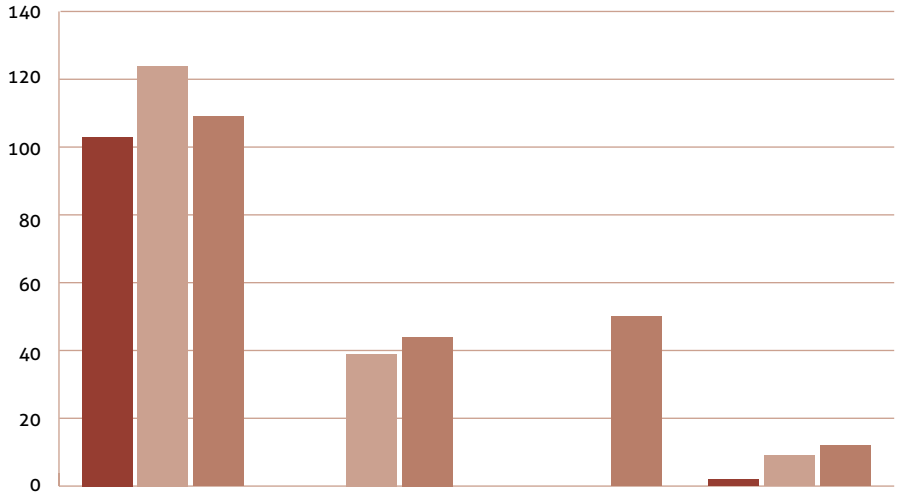
GRADUATION DATA 2013

Disciplines	Ph.D.	B. Tech.
Civil Engineering	-	28
Electrical Engineering	2	39
Mechanical Engineering	-	36
Total :	**2**	**103**

GRADUATION DATA 2014

Disciplines	Ph.D.	M.Tech.	B. Tech.
Civil Engineering	2	2	38
Electrical Engineering	3	-	45
Electronics & Com. Engineering	-	12	-
Mechanical Engineering	2	13	41
Material Science & Engineering	-	6	-
Basic Sciences	1	-	-
Climate Science & Technology	-	6	-
Humanities & Social Sciences & Management	1	-	-
Total :	**9**	**39**	**124**

Graphical representation of students Graduated in last three years



	B.Tech.	M.Tech.	M.Sc.	Ph.D.
2013	103	0	0	2
2014	124	39	0	9
2015	109	44	50	12

GRADUATION DATA 2015

Disciplines	Ph.D.	M. Tech.	M.Sc.	B. Tech.
Civil Engineering	1	9	-	33
Electrical Engineering	1	-	-	36
Electronics & Com. Engineering	-	11	-	-
Mechanical Engineering	5	8	-	40
Material Science & Engineering	-	11	-	-
Basic Sciences	2	-	-	-
Climate Science & Technology	-	5	-	-
Humanities & Social Sciences & Management	3	-	-	-
Chemistry	-	-	7	-
Geology	-	-	12	-
Mathematics	-	-	16	-
Physics	-	-	15	-
Total :	**12**	**44**	**50**	**109**

Scholarships

Programme	Name of Scholarship	2015 (Batch)	2014 (Batch)	2013 (Batch)	2012 (Batch)
B. Tech.	MCM Scholarship 2015-16	39	41	37	28
	Free Studentship 2015-16	16	7	12	9
	PD Scholarship	1	1	1	---
Joint M.Sc. – Ph.D.	INSPIRE & Other Scholarship	12	11	---	---

Participation in Conference, Awards & Medals

Programme	National Conference	International Conference	Awards & Medals
B. Tech.	0	0	9
M. Tech.	13	0	6
Joint M. Sc. – Ph.D.	1	0	6
Ph.D.	19	15	2

Special Events in 2015-16

Programme	Date
Senate Meetings	15.05.2015, 03.09.2015 18.12.2015, 23.03.2016
Convocation	12.09.2015 Chief Guest Smt. Smriti Zubin Irani, Hon'ble Minister of Human Resource Development and Chairman, IIT Council
National Science Day	28.02.2016 Chief Guest Prof. Pulin B. Nayak, Professor and Former Director, Delhi School of Economics

RAJBHASHA EKAK

On Going Activities

Translation of Institute Annual Report, Annual Accounts, Audit Report and various other documents which comes under Section 3(3) of Official Language Act 1963. In addition various other letters and correspondence, replies etc are either translated or prepared in Hindi. The Ekak also try to ensure the effective implementation of Official Language policy of Govt. of India at Institute. The Ekak ensures the bilingual display and use of different nameplates, notice boards, rubber stamps, routine type forms and also help in preparing bilingual Degrees certificate awarded by the Institute during Convocation.

Hindi Training

Time to time Rajbhasha Ekak impart Hindi training to all Institute employees who has no working knowledge in Hindi on Roster. The Ekak nominates the employees for the Pragya and Praveen course under Hindi Teaching Scheme, Dept. Official Language, MHA, GoI. The Hindi classes for Pragya and Praveen are arranged in the Institute. After the successful completion of the training, the employees were nominated for the examination conducted by Hindi Teaching Scheme in city. So far, 13 employees of the Institute have acquired the working knowledge of Hindi.

In addition Rajbhasha Ekak also nominated the employees of the Institute for Hindi Typing Training Programme, under Hindi Teaching Scheme. So far, 03 employees of the Institute had successfully passed the Hindi Typing examination.

Hindi Workshops:-

To accelerate the pace of official language progressive use, the Rajbhasha Ekak organized various workshops for the employees of the Institute in every quarter. In the report year, the following workshops were organized:-

1) During 18th September 2015, a Hindi Workshop on "Karyalin Hindi ka Vyavharik Gyan Evam Rajbhasha Niti ka karyanvyan" was organized for the employees. Shri R.N.Chand, Hindi Officer, Office of the Principal Audit General, local chapter, Bhubaneswar called as an expert, who delivered the lectures to the participants.

2) During 28-29 December, 2015, a target oriented Hindi Workshop on "Rajbhasha Niti ka Karyanvyan, Vyavharik Prayog aur Prashikshan" was organized for the Officer's/ Staff and Personal Secretaries. Dr. Rajeev Kumar Rawat, Hindi Officer, IIT Kharagpur was invited as an resource person who delivered lectures on Official Language Policy, techniques for doing day to day to work in Hindi among the Officers'/ Staff and Personal Secretaries of the Institute.

3) During 17-18 March 2016, a Hindi Workshop on "Rajbhasha ke Vyavharik Prashikshan" was organized for the employees of the Institute. Dr. D. Gunasekaran, Registrar, IIT Bhubaneswar and Dr. Raj K. Singh, PIC Rajbhasha addressed the participants on both day followed by technical deliberation by Sri Nitin Jain on practical use and implementation of Hindi in their official work.

Hindi Pakhwada Ceremony

During 07-21 September, 2015 Rajbhasha Ekak organized "Hindi Pakhwada" in the Institute. Several Programme and competition in Hindi were organized for employees and students of the Institute. The highlights of the pakhwada were essay competition, debate competition & awaaz dil ki for the students and Hindi typing and extempore competition in Hindi for the employees of the institute. The dramatic society of institute presents Hindi drama "Maut ka Khat"as a part of Hindi Pakhwara celebration.

On 14th September, 2015 Hindi Diwas was celebrated in the Institute under the chairmanship of our director Prof. R.V.Rajakumar. Prof. Smarapriya Mishra, Dean & HOS, Ravenshaw University was Chief Guest of the function. Kavya Sarita (Kavi Sammelan) was also organized on that day.

Publications:

Rajbhasha Ekak publishes a bi-monthly newsletter "E-Samachar" in Hindi, covering all the academic, cultural, extra-curricular activities of the Institute followed by "Hindi Sahitya Manch" column.

In addition, Rajbhasa Ekak has also published a handbook on routine types noting in Hindi to for use of authority in their daily official use.

Purchase of Hindi Books

Rajbhasha Ekak with the help of the Central Library has created a "Rajbhasha Section" in Institute Central Library. Every year Rajbhasha Ekak prepare a list of several fictions, novels, prose, play, stories, engineering books for the Institute library.

Bilingual Website

As per the Official Language policy, Govt. of India, Rajbhasha Ekak maintains bilingual updations in our Institute website. Further, Rajbhasha Ekak links added in our institute website which contains various useful information related to effective use of Official Language Policy.

Committees

Official Language Implementation Committee

The Institute has Official Language Implementation Committee to look after the implementation of Official Language policies of Govt. of India and to review the progressive use of Hindi in Institute. Four quarterly meetings of the committee hold last year under the chairman ship of the Director. In the meeting discussion were made to accelerate the progressive use of Hindi in the Institute.

Town Official Language Implementation Committee

In addition of this, Rajbhasha Ekak plays a vital role in coordinating the implementation the Official Language policy in the city and adjoining area. Rajbhasha Vibhag, Ministry of Home Affairs, Govt. Of India has selected our Institute Director as Chairman, TOLIC (C). All the Heads of Central government offices of the city and its adjoining areas are the ex-officio members of TOLIC. The 58th meeting of the TOLIC was organized on 29.01.2016 under the chairmanship of our director Prof. R.V.Rajakumar. At present, there are nearly 120 offices in the committee.

STUDENT ACTIVITIES

The Students' Gymkhana IIT Bhubaneswar has been playing a crucial role in students' all round development and providing a wider scope for students to excel in various aspects. Students' Gymkhana, IIT Bhubaneswar has been active since its establishment in 2010. The major councils under Students' Gymkhana are Social & Cultural, Science & Technology and Sports & Games. The activities and achievements by various societies during the year 2015-16 are presented below.

Student Activity – Social and Cultural

Throughout the year, the Council puts up a variety of cultural events and workshops, spanning myriad genres of culture and helps the students to train themselves in different forms of art. The students are also provided with opportunities to test and improve themselves through inter – collegiate competitions by participating in their college festivals.

- A Nukkad Natak was performed on 15th August 2015 with a purpose to aware the students regarding various social evils of society.
- On the occasion of Hindi Pakhwada, the dramatic society performed a murder mystery play "Maut Ka Khat", written and directed by The Fourth wall.
- On the Foundation day of the Institute, dramatic society performed a stage play "Ek Aur Kahani"
- Music Society performed National Anthem and National Song on the occasion of Republic Day (26 January, 2016) with a classical duet performance by Aishwarya Chaturvedi on Tabla and Shobhit Datta on Guitar.
- Music Society presented "SARASWATI VANDANA" and National Anthem on the occasion of Foundation Day (12th Feb 2016) followed by performances in the cultural evening.
- Like every year, Panacea (Literary Society) published Wistaz, a newsletter highlighting significant events of the year.
- On the occasion of Teachers' Day, a group discussion was conducted by the literary society on the topic: was the expulsion of 73 freshers by IIT Roorkee justified?
- The literary society, first time in the history of IIT Bhubaneswar, successfully conducted an MUN with amazing participation from across the nation.
- Souls For Solace, the social welfare society along with the professors of UBA cell, visited Arugul village on 15th August, 2015 , to discuss with the villagers and school teachers to understand their requirement and appraise them about the technological interventions which can be adopted by the Institute.
- Souls for Solace has started a program called Nai Dishayen to teach children living nearby khosla campus.
- During Diwali, Souls for Solace distributed clothes and sweets to children whom they teach under NAI DISHAYEN.
- On 7th Feb 2016, Souls for Solace helped WE4U, an NGO in organizing UTSAV ,a children Fest for physically disabled children.
- Celebrated cultural week 2016 with the breath taking performance by Pandit Debashish Bhatacharya and Pandit Chandrasekhar Gandhi, who gave a feast to the ears with the divine tones of Sarod and Tabla.
- The members of Kalakriti, the fine arts society organized a two day long series of events (i.e. Rangoli Competition, Craft Exhibition, Illumination etc.) on the occasion of Diwali for the first time in Arugul Campus in spite of various difficulties.
- Many programmes were organized through SPIC MACAY on different occasions.

Student Activity – Science and Technology

As the name itself says this council looks after all the activities related to Science and Technology, this council is the most looked at – in IITs. With a budget of 3.5lakhs this council has participated outside in other colleges/institutes, participated in our own fests and conducted various workshops for our students to learn. This council is responsible for all the learning and knowledge (apart from academics) that the student gains during his stay at IIT.

- Neuromancers (The programming society, IIT Bhubaneswar) represented IIT Bhubaneswar in various technical fests of other IITs such as Ksitij, Techfest etc.
- Web and Design Society conducted workshops and extended to Poster designing and Android app (both internal and external in association with Google Developers Group, Bhubaneswar).

- Robotics Society represented IIT Bhubaneswar in various technical fests of other IITs such as Ksitij, Techfest etc.
- Clix, the Photography Society has covered all the events of the institute, such as 8th Institute day, Inauguration of Mahanadi Hall of Residence, Orientation programme'2016, Plantation programme etc.
- Clix has started 'Theme of fortnight' in which selected photos of participants will be uploaded in its official facebook page encouraging their interest towards photography.
- IIT Bhubaneswar participated in the in Inter IIT Tech Meet 2016 at IIT Mandi.
- Organized a quiz on 15th Sep 2015 on the occasion of Engineer's Day.

Student Activity – Sports and Games

"All study and no play makes Jack a dull boy" – The motive of this council is to keep students fit and healthy. This council organizes and promotes games and sports regularly and holds competitions periodically in which students from all departments and all levels participate together.

- The Cricket, football, volleyball, Table Tennis and other teams have participated in various college level competitions in Bhubaneswar last year.
- The cricket and football team also participated in PARAKRAM'16, the sports fest of ISM Dhanbad during 12th Feb to 14th Feb 2016.
- Team of 5 members went to IIT KANPUR in the month of October 2015 to participate in the annual sports fest UDGHOSH 2015.

Achievements and Prizes

- Dramatics society won second prize in Rangmanch, an event held at IIT Kharagpur during Spring Fest 2016.
- CineWave, the Cinematic Society won the first position in the ODISHA 'We Care Film Festival' for the second consecutive time for a movie we made on the perspective of a disabled man titled ' How I Feel ' .
- CineWave also participated in a 48 hour short filmmaking competition in one the biggest socio cultural fests in India Rendevouz IIT Delhi. Our society managed to achieve the impossible winning the first prize despite fierce competition. The short film which won us the first prize was titled 'Azaad Parindey'.
- IIT Bhubaneswar won the 3rd prize in quiz competition in the Inter IIT Tech mmet-2016 held at IIT Mandi.

Annual Fests

Three annuals fests were celebrated last year.

- The annual techno-management fest Wissenaire'16 was organized during 08-10 January 2016.
- The annual socio-cultural fest Alma Fiesta'16 was organized during 15-17 January 2016.
- The annual Entrepreneurship meet E-Summit'16 was organized during 23-25 January 2016.

FINANCIAL INFORMATION

RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31.03.2016

(Amount- Rs.)

Sl No.	RECEIPTS	CURRENT YEAR 2015-16	PREVIOUS YEAR 2014-15
I.	**Opening Balance**		
	a) Cash in Hand	-	
	b) Bank Balances		
	i) In Current accounts		
	ii In deposit accounts		
	iii) In Savings accounts	42,87,44,073.81	4,80,57,958.98
II.	**Grants Received**		
	a) From Govt. of India	66,32,00,000.00	1,46,00,00,000.00
	b) From State Government		
	c)From Other Sources(Details)		
	(Grants from Capital and Revenue expenses to be Shown Separately)		
III.	**Academic Receipts**	7,84,94,025.00	4,99,22,123.00
IV.	**Receipts against Earmarked/ Endowment Funds :**		
	a)Earmarked/ Endowment Fund	-	3,00,00,000.00
	c)Own Funds (other Investment)	-	23,546.83
V.	**Receipts against Sponsored Projects/ Schemes**	23,89,27,481.96	9,33,55,085.65
VI.	**Receipts against Sponsored Fellowships and Scholarships**	41,55,256.00	47,53,661.00
VII.	**Income on Investment**		
	a) Earmarked/ Endowment funds	3,81,302.21	36,68,006.24
	b) other Investments		
VIII.	**Intrest received on**		
	a) Bank deposits	9,25,276.00	25,15,205.00
	b) Loans and Advances	2,43,741.00	1,83,629.00
	c) Savings Bank Accounts	86,62,195.46	58,75,936.58
IX.	**Investments encashed**		
X.	**Term Deposits wih Scheduled Banks encashed**	46,17,64,675.53	1,75,16,72,655.72
XI.	**Other Income (including Prior Period Income)**	79,83,200.11	6008764.99
XII.	**Deposits and Advances**	33,82,04,930.00	1,18,27,264.02
XIII.	**Miscellaneous Receipts including Statutory Receipts**	22,88,19,382.45	12,40,15,885.52
XIV	**Any Other Receipts**		
	Hostel Income	1,33,66,491.63	2,02,45,103.39
	Receipt against Hostel Current Assets	1,20,18,420.00	1,39,49,684.00
	Accured Intrest	2,16,700.00	45,430.00
	TOTAL	**2,48,61,07,151.16**	**3,62,61,19,939.92**

(Amount- Rs.)

Sl No.	PAYMENTS	CURRENT YEAR 2015-16	PREVIOUS YEAR 2014-15
I.	**EXPENSES**		
	a) Establishment Expenses	17,06,88,254.00	16,28,24,029.00
	b) Academic Expenses	6,79,81,632.52	5,33,20,480.36
	c) Administrative Expenses	4,75,46,682.74	5,01,89,181.97
	d) Transportation Expenses	4,42,229.00	27,66,955.00
	e) Repairs & Maintenance	4,01,011.00	41,81,883.00
	f) Prior Period Expenses	5,77,052.54	13,509.27
II.	**Payment against Earmarked/ Endowment Funds**	6,73,169.00	4,85,644.00
III.	**Payment against Sponsored Projects/ Schemes**	23,35,48,788.00	7,97,18,454.00
IV.	**Payment against Sponsored Fellowships/ Scholarships**		35,55,808.00
V.	**Investments and Deposits made**		
	a) Out of Earmarked/ Endowment funds		
	b) Out of Own funds (Investments - other)		
VI.	**Term Deposits with Scheduled Banks**	66,30,52,300.00	1,38,44,96,841.62
VII.	**Expenditure on Fixed Assets and Capital Wrok-in-Progress**		
	a) Fixed Assets	4,37,60,381.85	10,05,81,311.92
	b) Capital Works-in-Progress	37,58,078.00	3,40,723.00
VIII.	**Other Payments including statutory payments**	34,93,99,400.93	39,42,16,727.97
IX.	**Refunds of Grants**		
X.	**Deposits and Advances**	61,68,09,324.79	93,32,43,965.00
	Hostel Avance		-
XI.	**Other Payments**		
	Hostel Payment	12,49,458.00	8,91,408.00
	Hostel Payment against Fixed Assets	13,12,545.00	4,10,035.00
	Hostel Payment against Current Liabilities	2,96,74,521.00	2,61,38,909.00
IX	**Closing Balances**		
	a) Cash in Hand		
	b) Bank Balances		
	i) In Current accounts		
	ii In deposit accounts		
	iii) In Savings accounts	25,52,32,322.79	42,87,44,073.81
	TOTAL	**2,48,61,07,151.16**	**3,62,61,19,939.92**

Registrar
IIT Bhubaneswar

Director
IIT Bhubaneswar

RESEARCH & DEVELOPMENT

RECEIPT & PAYMENTS A/C FOR THE FINANCIAL YEAR 2015-16

RECEIPT			In (Rs)
Opening Balance			**16,63,39,788.11**
Add: Receipt during the year			
Consultancy Project		68,46,428.00	17,81,49,496.00
Sponsored Research Project	15,78,47,227.00		
Less : Adjusted during the year	2,11,426.00		
Less : Refunded	18,93,144.00	15,57,42,657.00	
Seed Grant		51,47,493.00	
Sponsored Fellowship		1,04,12,918.00	
Institute Overheads			81,63,744.00
TDS			22,74,296.00
Service Tax			10,39,465.00
PDF Application Fee			14,250.00
Professional Tax			20,400.00
EMD			22,70,400.00
PBG			18,888.00
Other Current Liability			23,43,615.00
Sundry Creditors			3,74,38,590.00
Liquidated Damages			2,79,899.00
Bank Interest			6,36,349.96
Interest on TDR			34,17,305.00
Demmurage Charges			1,399.00
CSIR Travel Grant			24,887.00
Interest on TDR Accrued			27,08,088.00
Workshop			67,410.00
Tender fee			59,000.00
TOTAL RECEIPT			**40,52,67,270.07**

LESS: PAYMENT DURING THE YEAR	In (Rs)
FOR REVENUE EXPENSES	
Salary to JRF/SRF and project Assistant	1,34,98,399.00
Consumables	31,63,229.00
Contingencies	18,41,228.00
Recurring Expenses	30,92,954.00
Travel Expenses	24,44,080.00
Consultancy Fees & Honorarium	57,13,405.00
Meeting & Workshop Expenses	17,24,494.00
Analytical Charges & Data Collection Charges	62,330.00
Fellowship	1,46,49,276.00
Overhead Expnses	2,85,481.00
Duty & Taxes	32,82,392.00
Fee for Intelectual Assets	7,66,000.00
Sundry Creditors	3,98,86,610.00
Faculty Development Fund	2,31,192.00
Bank Interest	5,51,138.00
EMD	7,37,300.00
PBG	2,67,000.00
Liquidated Damages	3,15,436.00
Tender fee	1,000.00
Research Grant	2,47,005.00
TOTAL PAYMENT	**9,27,59,949.00**
CLOSING BALANCE	**31,25,07,321.07**

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