Evaluative Report of Institute of Physics (National Institute of Science Education and Research)

1. **Name of the CI**

   Institute of Physics (National Institute of Science Education and Research), IoP(NISER)

2. **Year of establishment**

   Please see para 6 of the 'Profile'.

3. **Is the CI part of the University**

   IoP (NISER) is functioning as a project in IoP and is situated within the campus of IoP.

4. **Names of programmes offered**

   Integrated M.Sc. and Ph.D. in physical sciences, chemical sciences, life sciences and mathematics. Please also see Appendix 1 of the profile.

5. **Interdisciplinary programmes**

   Subject of research leading to Ph.D. is inter-disciplinary in many cases.

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

   In addition to arrangement of collaboration through MoUs signed by HBNI as given in para 2.4.10 of the 'Criteria-wise Inputs' IOP (NISER) has signed MoU with the Indian Institute of Technology, Bhubaneswar for collaboration in research in the field of experimental High Energy Physics.

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

   Nil

8. **Examination System**

   Semester system

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

CIs of HBNI have no rigid boundaries. Faculties/ students of IoP(NISER) occasionally attend courses offered by other CIs of HBNI.

10. Number of teaching posts sanctioned, filled and actual (Professors/Associate Professors/Asst. Professors/others)

Please see para 24 of the Profile.

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

Please see Appendix 1

12. List of senior Visiting Fellows, adjunct faculty, emeritus professors :

Adjunct = 2, visiting = 6.

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

NIL

14. Programme-wise Student Teacher Ratio

1:6 for delivering lectures in M.Sc. and Ph. D courses. UGC guidelines with regard to maximum number of students, a teacher can guide are strictly followed.

15. Number of academic support staff (technical) and administrative staff: sanctioned, filled and actual

Please see para 24 of the 'Profile'.

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

IoP(NISER), established by the Department of Atomic Energy, strives to become a citadel for basic sciences and allied subjects in terms of teaching and research. Its vision includes imparting high-quality science education in a vibrant academic ambiance to the bright, motivated students, by a faculty of distinguished scientists and

teachers. The curriculum is amply supported by a strong visitor's programme by accomplished scientists from India and abroad.

As a project of IoP, NISER offers a 5 year integrated M.Sc. programme in Biological, Chemical, Mathematical and Physical sciences. At present, IoP(NISER) functions from the beautiful campus of Institute of Physics, Bhubaneswar, which includes an excellent library.

The Following areas form at present thrust areas of the respective schools, which go in line with those of funding agencies.

School of Biological Sciences: Physiology/, Cancer Biology, Molecular Genetics, Molecular Biology, Neurobiology, Immunology, Structural Biology, and Structure based Drug Design.

School of Chemical Sciences : Bio-Inorganic Chemistry-Expanded porphyrin Chemistry, Methodology development in NMR, Computational Studies of Materials, Bio-organic and Organic Synthesis Porous Magnetic Materials, Fluorescence Spectroscopy, Supramolecular Chemistry and Photochemistry, Synthetic Organic Chemistry and Asymmetric Catalysis, Organometallic Chemistry and Low oxidation state metal chemistry

School of Mathematical Sciences: Harmonic Analysis, Representations of Geometries, Number Theory, Probability Theory, Topology and Analysis of PDE , computational and financial mathemtics.

In the School of Physical Sciences the Major research areas are High Energy Heavy-ion Collisions, Experimental HEP: LHC Physics, Statistical Mechanics and Modeling of Soft Matter, Ultra Cold Atoms and Bose-Einstein Condensation, String Theory, Theoretical CMP and Quantum Information, Nano fabrication and Ion/Photon matter interaction, Fibre Optics, Non-linear Optics, Lasers and Magnetism of nano particle, thin films, Multiferroics.

17. Number of faculty with ongoing projects from a) national b) international funding agencies and c) Total grants received. Give the names of the funding agencies, project title and grants received project-wise.

Full funding is received from the Department of Atomic Energy and all the faculties are involved in one or more projects. Details of ongoing

projects and grants for IoP(NISER) put together are given in Appendix 2.

18. Inter-institutional collaborative projects and associated grants received

Please see Appendix 2

19. Projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, AICTE, etc.; total grants received.

Please see Appendix 2.

20. Research facility / centre with

- **state recognition**
- **national recognition**
- **international recognition**

IoP(NISER) has no formal recognition from any agency.

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

HBNI is essentially a research university and all research laboratories in IOP(NISER) are sponsored by the Government.

22. Publications:

Please see para 3.3 of the 'Criteria-wise inputs'.

23. Details of patents

NIL

24. Areas of consultancy and income generated

Not Applicable.

25. Faculty selected nationally/ internationally to visit other laboratories/ institutions/ industries abroad

For visits abroad, please see Appendix 4.

26. Faculty serving in

a) National committees b) International committees c) Editorial Boards d) any other (please specify) 10 national Constituted Institutes

Please see Appendix 3 of the 'Criteria-wise Inputs.

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

IOP(NISER), Bhubaneswar encourages faculty to participate in and organise national and international workshop and conferences, go to universities abroad for post doctoral fellowships and short term research assignments, act as consultants for developing countries under programmes sponsored by IAEA, participate in collaborative projects with universities in India funded by NBHM, SERB & BRNS, participate in collaborative projects with laboratories abroad under various MOUs. All this helps to recharge the faculty.

28. Student projects :

- **percentage of students who have done in-house projects: 100%**
- **percentage of students doing projects in collaboration with other universities/ industries/ institute: 0%**

All M.Sc. /Ph.D students of IoP(NISER) are doing projects in IoP(NISER).

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

- **Faculty**

Dr. V Badireenath Konkimalla, SBS Innovative Young Biotechnologist Award (IYBA) 2012, Dept of Biotechnology (DBT), India.
Dr. C. Gunanathan, SCS, Ramanujan Fellowship 2011, DST, India
Dr. V. Krishnan, SCS, Ramanujan Fellowship 2011, DST, India
Dr. Prasenjit Mal, SCS, Visiting Professor at University of Jyvaskyla, Finland (2012)

- **Doctoral / Post doctoral fellows**
  Nil

- **Students**
  Nil

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

Please see Appendix 5.

31. Code of ethics for research followed by IoP(NISER)

In addition to excellence in Science and Engineering, a strict adherence to high ethical standards is a necessity. The core ethical policy of DAE and thus HBNI is to establish a tradition with highest ethical standards, ensuring a harmonious future for the entire humankind, where every individual can live with dignity and self-respect. In accordance with the guidelines of the DAE, adhering to highest ethical standards is one of the guiding values of IoP(NISER). Every complaint of malpractice or plagiarism received is investigated and appropriate action is taken.

IoP(NISER) is committed to using the public funds allocated to it to undertake and promote research that will benefit all the people of India. Right from its inception, IoP(NISER) is striving hard to achieve the excellence in all its academic programmes and to make IoP(NISER) one of the leading academic institutes of India and the world. Besides, IoP(NISER) is committed to a strict adherence to high ethical standards, is a necessity.

The teachers of IoP(NISER) shall respect human rights and dignity without any reservations, whatsoever. They are expected to respect all colleagues and students equally irrespective of race, religion, community, region, language, gender, age and rank. The faculty shall show utmost responsibility and accountability in spending the public funded research facilities. The faculty is expected to show utmost importance to the safety, health and welfare of the society and to the protection of the environment. The faculty shall be honest with utmost integrity while they make scientific reports. IoP(NISER) adheres to rules and guidelines when the faculty performs research experiments on animals. By adhering to the highest ethical standards, IoP(NISER) is committed to play a crucial role in building up a healthy nation.

32. Student profile programme-wise in IoP (NISER).

Please see para 15 and para 28 of the 'Profile.'

33. Diversity of students

Please see Para 2.1 of the 'Criteria-wise Inputs'.

34. How many students have cleared Civil Services and Defense Services examinations, NET, SET, GATE and other competitive examinations? Give details category-wise.

Please see para 1.1.3 of the 'Criteria-wise Inputs.

35. Student progression

Please see para 5.2 of the 'Criteria-wise Inputs.

36. Diversity of staff

Please see para 2.4.3 of the 'Criteria-wise Inputs.'

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

Nil

38. Present details of infrastructural facilities with regard to

a) Library: Library is the soul of the institute. In IOP(NISER), library has been developed as an integral part of the institute. It has been mainly focused on information/document acquisition, storage and dissemination. As IoP(NISER) grows rapidly likely its library also grows in pace with the institute to fulfill the need of its user. The collection of library is described in following heading:

Print books	: 15000 (approx)
Electronic books	: 8000 (approx)
Electronic Journals	: 2500 (approx)
Databases	: 06
CD/DVDs	: 250 (approx)

Books in different subjects such as biology, chemistry, humanities, mathematics, physics and interdisciplinary are collected.

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

Libsys integrated library management software is used for automation work, users can access online catalogue through intranet. Open source software is used to develop a repository for institute' scholarly literature.

Library opens 365 days in a year. It has maintained an excellent environment for reading. Planning and monitoring work is managed through library committee. As a DAE institute it has access to DAE Elsevier consortium. Library staffs manage to provide excellent services to students, scholars and faculties of institute.

b) Extensive internet facilities are available to staff and students.

d) Total number of class rooms: 13 Lecture Halls. Class rooms with ICT facility are also available. ICT available consists of the hardware, software, networks and media for the collection, storage, processing, transmission and presentation of information as well as related services.

e) Students' laboratories Yes

f) Research laboratories Yes

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

Please see Appendix 6.

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

All the students of 5 yr Integrated M.Sc. are getting INSPIRE Scholarship from DST and Ph.D students are getting financial assistance from UGC/ CSIR /DST.

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

Please see para 1.1.2 of the 'Criteria-wise Inputs.

42. Does the department obtain feedback from

a. Faculty on curriculum as well as teaching-learning-evaluation?

If yes, how does the department utilize the feedback?

At the time of commencement of the courses, the teacher has to distinctly and clearly specify the method of the assessment of the course. He is expected to strictly follow it.
One week before the commencement of end-semester examination of every semester, course/faculty feedback is taken from the respective students. This report is undertaken very confidentially. Students are asked to write their experience with regard to both courses and the teacher. After the grading is done, these forms are shown to the concerned faculty to improve his performance. If the teacher gets all round appreciation from the students, the director sends an appreciation letter to the concerned faculty. The feed back plays an important role in the teacher's career promotion.

Presently the feedback is taken on hard copies in specified forms which have been designed by this institute. On completion of office automation the feedback shall be taken online from the students. On both the cases the confidentiality is maintained to the highest standard (student name is not disclosed in any manner).

b. Students on staff, curriculum and teaching-learning-evaluation and how does the department utilize the feedback?
No.

c. Alumni and employers on the programmes offered and how does the department utilize the feedback?
Obtaining feedback from faculty, alumni and employees is a continuous process. Feedback from students is obtained before completion of every semester. All feedbacks received is analyzed and fed to an apex committee for deliberation and decision. Introduction of new programmes and changes in syllabus are decided as needed by the high-level bodies called UGCS (Undergraduate committee of the school) and PGCS (Postgraduate committee of the school) and then after a brain-storming discussion in the institute bodies like UGCI and PGCI it is taken to Academic Council for approval.

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

Nil (This is a new institute).

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

We conduct many workshops/, seminars, to enrich the curriculum of

the students. Also, we conduct many workshops to engage them in activities other than class room teaching, like robot-training, sky watching and so on. The faculty and students extend their collaborative research transcending national boundaries during summer vacation. Many SERB schools, instructional schools sponsored by NBHM are conducted.

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

The course work involves lectures, tutorials, quiz and examinations. In several courses projects are part of teaching. Laboratory course consists of standard experiments to teach basic techniques of experimentation along with advanced experiments to expose the students to research level experiments.

46. How does IoP(NISER) ensure that programme objectives are constantly met and learning outcomes are monitored?

IoP(NISER) has a well-tested rigorous mechanism to assess a student both in M.Sc programs and Ph.D programme.

For M.Sc, IoP(NISER) has mid-term and end-sem examinations and many quizes. At the end of a course a letter grade is given depending on the performance of the student, following the "relative grading pattern". The SGPA (Semester Grade point Average) is calculated. At the end of each semester CGPA (cumulative grade point average) is calculated. If the student does not satisfy the requirements stipulated in the rules in terms of the minimum CGPA and maximum number of failures he will be sent out. Besides we enforce on minimum number of attendance for a student to write the examination.

Quality of theses produced by doctoral students is demonstrated by comprehensive research abilities acquired by students. Invariably number of publications in peer reviewed journals coming out of a thesis varies from one to several as can be seen from previous annual reports. Students after their completion of PhDs are generally selected for employment in national laboratories, universities or industry in India or abroad.

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

Every year, National Science Day is celebrated at IoP(NISER) on a suitable day, jointly with Institute of Physics. The program is typically attended by about 150 school students from Bhubaneswar (both English medium and Oriya medium schools). The program consists of 2-3 popular level talks given by eminent scientists on frontier science topics at IOP Auditorium. Following the popular talks, students visit Demonstration Experiments at IoP(NISER) Labs as well as IOP experimental facilities. A program of conducting Physics Open Discussions (POD) for school children as well as IoP(NISER) students is carried out at the Institute of Physics. The aim of the program is to help the students discover the true spirit of "creative thinking" and develop the culture of free discussions.

The Institute also regularly receives requests from various schools in Bhubaneswar and outside for visits to IoP(NISER). During the visits students are taken (in small batches) to different laboratories where faculty members, Research scholars, and Lab assistants join them for explanation of various facilities.

48. **Give details of "beyond syllabus scholarly activities".**

The faculty is continuously engaged in research necessary for meeting the mandate of the department. A significant percentage of this engagement is scholarly and results in good publications in peer reviewed journals. The students and faculty give lectures very frequently in various fora like national and international symposia, workshops, awareness programmes and colloquia. They interact on a regular basis with scientist and technologists of repute from the country and from abroad. They organize high level knowledge dissemination activities like organization of advanced schools under the aegis of BRNS/ DST and other similar bodies.

Besides we have several activities by student bodies, like out reach programs, sky-watching, open-house, sciences quiz competitions, robot-building exercises, origami to name a few.

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

No.

50. Briefly highlight the contributions of IoP(NISER) in generating new knowledge, basic or applied.

National Institute of Science Education and Research (NISER) was set

up by the Department of Atomic Energy (DAE), Government of India at Bhubaneswar, Orissa as part of IoP. The mandate of IoP(NISER) is to impart high quality science education in a vibrant academic ambience and to conduct cutting edge research in all branches of science. At present IoP(NISER) is functioning from the campus of Institute of Physics, a premier research Institute of India situated in Bhubaneswar.

IoP(NISER) has established schools in four basic sciences, namely biology, chemistry, mathematics and physics. At a later stage, activities in other branches of science, such as earth and planetary sciences, computer science and engineering sciences will be started. The main aim of IoP(NISER) is to train and nurture motivated world class researchers who will take up challenging research and teaching assignments in universities, research laboratories and industry. Besides training students at masters and PhD levels, IoP(NISER) intends to carry out cutting edge research in all branches of science.

The activities at IoP(NISER) started with commencement of integrated MSc programme. The integrated MSc programme is a five year programme. The PhD programme in IoP(NISER) has started from January 2010.

51. Detail five major Strengths, Weaknesses, Opportunities and Challenges (SWOC) of IoP(NISER)

Strengths

1. The quality of students is very high because of very rigorous selection process adopted. Since the students are recruited by a tough selection process, a very high level of research output is ensured. This is contrary to the general trend seen elsewhere where students not finding employment are taking up research.
2. After a tough selection, the initial training imparted to the scientists is of very high standard.
3. The quality of facilities available is very high.
4. The funding is very generous.
5. Besides the students, the faculty is also very strong, nationally and internationally known and there is very strong peer pressure on both the sides to do better.

Weaknesses:

1. Ensuring very high quality sometimes leads to very low number of

students in some of the disciplines.

2. The embargo on supply of some items has resulted in lack of some of the sophisticated analytical equipment. This results in delays in research as alternate equipment has to be developed or innovative techniques have to be used for getting results.

Opportunities

1. Opportunity to do high level research having immediate application in national programmes.
2. Opportunity to interact with scientist at national level and international level.
3. Opportunity to get various forms of national and international recognitions in the form of fellowships and awards.
4. Opportunity to develop various types of skills.
5. Opportunity to do interdisciplinary research.
6. Opportunity to pursue innovative methods in understanding the nature, which would eventually benefit the society.
7. Opportunity to acquire teaching skills which would be beneficial to impart the knowledge to build up a sound knowledge based society.

Challenges

1. To imbibe the virtues in the minds of the students and to cultivate the scientific temperament as a culture in the changed scenario of the world order.
2. To inculcate accountability for the scientific pursuits of the faculty.
3. To balance various types of responsibilities for the faculty
4. To sensitize the students and faculty in safeguarding the environmental, atmospheric degradation when they pursue science.
5. To ensure superiority in quality of research while doing doctoral research on large scale set ups.

52. Future plans of the IoP(NISER).

A new campus for NISER is under construction and once it moves to its new campus, it is proposed to start schools in Computer Science and Earth & Planetary Sciences, and integrated Ph.D. programme in all disciplines.

List of appendices (to be made available to the assessment team during their visit)

1. IoP(NISER): Appendix 1: Faculty profile referred to at para 11
2. IoP(NISER): Appendix 2: Ongoing projects referred to at para 17, Inter-institutional collaborative projects and associated grants received referred to at para 18 and Projects funded by DST-FIST; UGC-SAP/CAS, DPE; DBT, ICSSR, AICTE, etc.; total grants received referred to at para 19
3. IoP(NISER): Appendix 3: Not attached
4. IoP(NISER): Appendix 4: List of HBNI Faculties at HRI who have visited Universities/Institutes/Laboratories abroad during the period 2009 – 2013 referred to at para 25.
5. IoP(NISER): Appendix 5: Seminar/ Meetings/ Conferences/ Colloquia referred to at para 30
6. IoP(NISER): Appendix 6: List of doctoral students referred to at para 39.