

**Research  
at**

**BITS, Pilani, Goa-Campus**

**Annual Report - 2007**



**by**

**Research, Consultancy and Education Development Unit**

**BITS, Pilani, Goa-Campus**

**Zuarinagar- 403 726, Goa, India**

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## **1. About BITS, Pilani, Goa-Campus:**

At Goa-Campus, the Institute, in its fourth year, offers eleven first degree programmes in engineering, science and humanities. Recognizing capability of young, qualified faculty, the Institute has encouraged participation by members of faculty in developing proposals for obtaining sponsorship from national and international agencies. Also, conscious efforts have been made to equip new lab set ups, required for training and education of the first degree students, with the modern, state-of-the art equipments, etc. The educational system of the university offers several opportunities to students of first degree programmes to participate in the ongoing research activities, as a part of their respective academic programmes. The facilities so created will be useful for starting new higher degree programmes leading to degrees of M. Phil, M. E. and Ph. D. in respective disciplines.

## **2. Thrust Areas of Research**

The identified thrust areas aim at goals of sustainable development and University- Industry linkage. Broadly, the thrust areas include:

- New Technology Assessment and Development
- Modeling and Simulation
- e – governance
- Communication and Information Technology
- Advanced Materials and Applications
- Green Technology Development

## **3. Infrastructural Support for R&D**

The Institute through its intense faculty recruitment drive has been constantly adding manpower at the senior level to provide leadership for R&D and at junior level to provide research work force. As a result of this effort, during this year, a number of faculty members at both these levels have joined.

Number of faculty members in engineering as well as science disciplines, are engaged in research in various areas including biotechnology, flexible manufacturing systems, advance separation techniques, energy and environmental management, data mining, fiber optics, computer aided analysis and design, digital electronics, VLSI and embedded systems, robotics and intelligent systems, image processing,

power electronics, nanotechnology materials science, etc. All laboratories are equipped with test and measuring facilities and software-aided systems useful for research, consultancy and education.

### ***Laboratory Development***

The laboratory development has been guided by the need to strengthen academic and research facilities. The academic and research activities are well supported in various laboratories by existing facilities in the labs for engineering, science and humanities disciplines. All laboratories are fully equipped with advanced equipments / instruments, computational facilities and internet connection. **Annexure I** give discipline wise existing laboratory facilities at BITS-Goa.

### ***BITS Connect***

A campus wide local area network (LAN) has been commissioned under the BITS Connect project, having an outlay of about Rs. 7 crores (\$1.5 million). The project was jointly led by BITS alumni and BITS Pilani. The project has provided a state-of-the-art campus-wide network. This has resulted in a Gigabit backbone, broadband access, telephones and video conferencing capability (IP telephony). The network access is available in library, all hostel rooms, class-rooms, lecture theatres, staff quarters and guest house. The LAN has facilitated online access to several e-journals in various disciplines.

### ***Center for Software Development***

The center for software development is set up to introduce and enhance the use of computers in the administration, research computing, etc. The Center has also been responsible to develop the softwares and minimize manual work. One Lab with a capacity of 24 workstations is used for the Center for Software Development. Presently, the faculty and staff members have developed several softwares.

## **4. Promotion of Research**

The BITS education system offers several opportunities to members of faculty to pursue research and/or involve senior students of first-degree integrated programmes through short-duration specialized projects, in the chosen research area. The members of faculty are encouraged to develop proposals for sponsored research, as a part their Ph.D. programmes, under the supervision of senior faculty members. Many projects have been funded by national and international agencies. Faculty members with relevant experience, are encouraged to develop research programmes for involving students on a competitive basis, as reported in the following:

### **Promotional Efforts for Research at Doctoral Level**

#### ***Faculty Development Scheme:***

The faculty members, recruited as Assistant Lecturers, possessing post graduate degrees, such as M.E., M.Tech., M.Phil. degrees are offered opportunities for pursuing their Ph.D. degree programmes, on qualifying the Ph.D. Qualifying Examination (PHQE), conducted by Research and Consultancy Division, BITS, Pilani. The qualified candidates are required to submit research proposal for approval of the research board. Faculty members are encouraged to pursue to Ph.D. programme while participating in the teaching activity. The participation in research is suitably rewarded by the Institute. For example, the faculty member is awarded the grade of lecturer, soon after his/her Ph.D. proposal is approved by the Research Board. Also, the scholarship to cover tuition fee etc. is awarded to qualified faculty members. Each faculty members can avail Institute's annual contingency grant for covering professional expenses. Presently, there are 14 faculty members, who are pursuing Ph.D. programmes in respective disciplines. Details of faculty members, their research topic and supervisor are given in **Annexure II**

#### ***Pre-Ph. D. course work***

Faculty members, staff members and research staff under projects, with qualification as M.Sc., MBA, B. E. with sufficient professional experience, are recommended for undertaking pre-Ph. D. course work. On successfully completing the prescribed course work, under the supervision of designated mentor, the candidate becomes eligible to write Ph.D. qualifying examination. Presently, there are three candidates who are pursuing their pre-Ph. D. course work.

#### ***Ph.D. Qualifying Examination October 2007***

During the year 2007, Ph.D. qualifying examination was conducted at BITS-Goa during 25-27 October 2007. About, ten candidates, including members of faculty and research staff have qualified the examination. Details of qualified candidates are given in **Annexure III**. The proposals for Ph.D. programmes are to be submitted by February, 2008. The candidates are encouraged to choose thrust areas for sponsored research.

#### **Research at First Degree Levels**

Every semester, the students of first-degree programmes opt for project type courses, as elective courses, under the supervision of faculty Instructor. These courses aim at developing skills and capability for undertaking Lab Oriented experimental work, Computer Oriented software based application development and testing, advance study pertaining to research problems at hand. These courses aim at exposure to and developing manpower capability for advanced research. About 250 students opt for these courses every semester, in various disciplines.

#### ***Students Contribution***

The students of first degree programmes also opt the industry oriented internship programmes, called Practice School-I and Practice School-II. Practice School-I is offered to students after completing first two years of their programmes and is of about two months duration. The Practice School-II is offered to students in their final year and is of five and half months. During the tenure of these courses, the students carry out industry related work assignments in respective industries, under the supervision of

faculty Instructor. Often, these assignments lead to consultancy assignments. Thus students also participate in consultancy oriented work at Practice School Centers. Students are encouraged to present results of their work in Conferences, Seminars, Symposia and Training Programmers, organized on campus as well as elsewhere. Students as well as faculty members are encouraged to organize these events on campus. Every year, a techno-fest is organized by students, wherein the students exhibit remarkable and ingenious models on the basis of latest advances in science and technology.

## 5. Expertise of Faculty

The details of expertise of faculty members engaged in research and consultancy activities are provided in **Annexure IV**.

## 6. Sponsored Research Projects

Faculty members are encouraged to submit research proposals to various funding agencies for sponsored research projects. The research for the sponsored projects is carried out by recruiting special purpose staff, as provided under the project, and faculty members who are pursuing research. Till date, many faculty members have obtained research funds from various research agencies including Deptt of Science and Technology, DRDO, CSIR, Ministry of Chemicals and Fertilizers, Govt. of India, Swedish Research Council, etc. The ongoing projects include eighteen sponsored research projects, in different research areas viz Bio-Nano Technology, Environmental Bio-technology, Graph Theory, Radio Astronomy, Biosensors & Bioanalysis, Membrane separations, Semiconductor Physics and Materials, Mining & Mineral Egg etc. The details of sponsored research project are given in **Annexure V**.

## 6. Proposed Research Projects

Faculty members have submitted no of research projects to various funding agencies. The details of research project proposals which are under review / consideration are given in **Annexure VI**

## 7. Appointment of Senior Research Fellows (SRF's) and Junior Research Fellows (JRF's)

Appointment of SRF's and JRF's in various sponsored research projects was done by a committee appointed by the Director and a nominee from respective funding agency. Following candidates are appointed as SRF's and JRF's in various projects

Name	Group	Position	Sponsoring Agency
Ms. Prita Pant	Chemistry	SRF	DRDO
Ms. Zubeda Bi Aga	Physics	JRF	DRDO
Mr. Bhanudas R. Naik	Chemistry	JRF	DST
Mr. Vilas Desai	Biology	JRF	DST

Mr. Sivaramakrishna	Biology	SRF	DBT
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## 8. Consultancy Projects and Services

The Faculty members of the institute are involved in National / International consultancy projects and services. The details of consultancy work completed / undertaken are given in **Annexure VII**.

## 9. Conferences / workshops

Various groups organized National / International conferences / workshops. Following are details of organized events:

- An International Workshop entitled “The 8<sup>th</sup> workshop on biosensors and bioanalytical micro-techniques in environmental and clinical analysis” was organized during October 3-6, 2007 in collaboration with IAEAC Switzerland, by Dr Sunil Bhand, Co-Chairman of the workshop together with Prof. TC Goel (Director, BITS, Pilani -Goa Campus) as Chairman of the workshop and Dr NN Ghosh as Convener. A funding of about 7.5 lakhs was generated with 2.65 lakhs (5000Euro) contribution from IAEAC Switzerland. In this workshop 79 scientific papers were presented as both oral and posters. In all 24 International scientists from 18 countries participated in the workshop.
- Biological Sciences group, in collaboration with the Board of Research in Nuclear Science (BRNS), Bhabha Atomic Research Centre (BARC), Mumbai, organized The BRNS-IANCAS National Workshop on Radiochemistry and Application of Radio-isotopes in science, from 20<sup>th</sup> to 28<sup>th</sup> January ,2007, at BITS–Pilani, Goa Campus. It was a hands-on training programme that was inaugurated by Prof L K Maheshwari Vice- Chancellor, BITS-Pilani and the welcome address was delivered by Prof T C Goel , Director, BITS-Pilani, Goa Campus. The coordinator of the academic collaboration was Prof S K Ray from BITS- Goa-campus.
- CS and IS group conducted IBM Rational Training program on 9<sup>th</sup> & 10<sup>th</sup> March, 2007, in which about 12 faculty & 30 students had participated. The topics covered were as follows:
  - Rational Unified Process.
  - IBM Rational Enterprise Suite. (all Components).
  - Software Development Lifecycle (SDLC).
  - Graphical Object Oriented Analysis and Design (OOAD)
  - Unified Modeling Language (UML).
- CS and IS group conducted a workshop in collaboration with IBM on 29/09/07 & 30/09/07. The theme of the workshop was to highlight the issues regarding open and free softwares. Mr. Sriram, IBM Technical Manager, Chennai, gave hands on experience to participants (approx. 180) on Eclipse, DB2 and Websphere.
- CS and IS group conducted 2<sup>nd</sup> workshop in collaboration with IBM on 22/11/07. The theme of the workshop was "SOA and DB2 9.0 for Next Generation Database Applications". Mr. Rav Ahuja, IBM Product Manager, Toronto Lab, trained the participants (approx. 100) in software and technologies available for creating next generation database applications.

- The Physics Group organized the Fifth meeting on Field Theory and Gravity, during 18-23 December 2006.

## 10. Awards and Recognition

Following Faculty members have been awarded for their valuable contribution in administration, academics and research.

Faculty Name	Award / Recognition
Prof. T.C. Goel	Director on the board of Directors, Goa Ship Yard Limited (GSL), Goa
Dr. Navneet Gupta	DST Young Scientist Award (Fast track Scheme) in Physical Sciences, 2007
Dr. Prasanna Kumar N.	SERC Fast Track Young Scientist Project Award, Ministry of Science and Technology, DST, Govt. of India, 2007

## 11. Publications

Faculty members from various disciplines have published several research papers in reputed national, international journals and various conferences, as mentioned below:

Sl. No.	Journal / conferences / Books	No. of papers published
1.	Paper published Journals	35 (28Int + 14 nat)
2.	Paper Conferences	18 (9+9)
3	Participation in Conferences	19
4	Books	01

The details of publications are given in **Annexure VIII**

## 12. Course Material Development:

The faculty members are encouraged to undertake publishing books, and other literature. Faculty members at BITS-Goa developed course materials and laboratory manuals for following mentioned courses.

Course No	Notes Title
TA GC 211	MT I Biology
BIO GC 241	Lab Manual for Microbiology
ME GC 342	Production Technique
EEE GC 391.	Digital Electronics and computer organization
TA GC112	Workshop Practice Manual
TA GC 222	M.T.-2 Laboratory Manual
TA GC 211	MT I Physics
ME GC 331	Transport Phenomena
ME GC 332	Prime movers & fluid machines

