

Bangladesh

Bangladesh Atomic Energy Commission (BAEC)

Address: 4 Kazi Nazrul Islam Avenue, P.O. Box No. 158, Dhaka 1000, Bangladesh. **Phone:** (+880 2) 502600; **Telex:** 632203 BATOM BJ; **Fax:** (+880 2) 863051.

Director/Head: M.A. Mannan.

Number of Research Scientists: 499; **Number of Staff:** 1054.

Scientific Fields of Interest: Agriculture; Biology; Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/Technology; Earth Sciences; Environment; Medical Sciences; Physics/Astronomy.

Main Lines of Research and Training Activities: *Bioscience:* food preservation, control of pests, medical kit sterilization, tissue banking, nuclear medicine (diagnosis and treatment). *Physical science:* analytical and nuclear chemistry, health physics and radiation protection, non-destructive testing, reactor and neutron physics, vulcanization of rubber latex, wood-plastic composites, plasma physics, fusion and radioisotope production. *Engineering:* reactor operation and maintenance, heat transfer. *Training activities:* medical post graduate courses; courses on different non-destructive testing techniques; courses on electronics for students of different polytechnic institutes; courses on computer science; conduct research leading to MSc, MPhil and PhD degree for university students.

Major Scientific Results or Products: Preservation of food and sterilization of medical products using radiation techniques; radiation techniques to improve quality of wood, fibre and rubber latex; development and adaptation of computer software; production of radioisotopes on limited scale; development of electronic controlling system; development of high yield varieties of rice, paddy, bean; development of radiation shielding material "Polyboron".

Main Research Facilities Available: 3MW Triga research reactor; IBM4341 mainframe computer and personal computers; 50,000 curie Cobalt-60 radiation source; proton induced X-ray emission (PIXE) system; X-ray fluorescence (XRF) system; tripleaxis spectrometer; Van De Graaff accelerator; neutron generator; gamma camera; library.

Future Development Plans: Neutron radiography facility with reactor; UV source for cross-linking, surface coating; acquisition of nuclear power with front and back end of fuel fabrication; expansion of nuclear medical centres; batch production of electronics equipment.

Cooperation Arrangements with Developing Countries: Bilateral agreement with China; cooperation under RCA (Thailand, Malaysia, Indonesia, Philippines, SE countries); cooperation within SARC countries; cooperation among member countries of Commonwealth.

Other International Cooperation Arrangements: Bilateral agreement with Japan, Uppsala University (Sweden), EEC. Member of the International Atomic Energy Agency (IAEA).

Brazil

Instituto Nacional de Pesquisas Espaciais (INPE)

Address: Caixa Postal 515, 12201-970 São José dos Campos, SP, Brazil. **Phone:** (+55 123) 418977; **Telex:** 1233530 INPE BR; **Fax:** (+55 123) 218743.

Director/Head: Marcio Nogueira Barbosa.

Number of Research Scientists: 200; **Number of Staff:** 1,300.

Scientific Fields of Interest: Agriculture; Energy; Materials; Chemistry; Engineering/Technology; Geological/Earth Sciences; Environment; Marine; Mathematics; Physics/Astronomy; Space Sciences.

Main Lines of Research and Training Activities: *Space sciences:* Geophysics, astrophysics, aeronomy. Space applications: remote sensing, meteorology, oceanography, geodesy and navigation. *Space technology:* Satellites, payloads and ground stations. *Weather forecast and climate studies:* Sensors and materials, applied computation and mathematics, geoprocessing, image processing,

combustion and propulsion, plasma. *Training activities:* Postgraduate courses; meteorology (MSc and PhD), remote sensing (MSc), applied computation (MSc and PhD) and space sciences (MSc and PhD).

Major Scientific Results or Products: Fundamental and applied research in all areas described above; Development of space technology, involving satellite, payloads and ground stations; development of methodologies for utilization of meteorological and remote sensing satellite data for applications in agriculture, cartography, geology, geography, forestry, fishing; operational numerical weather and climate forecast.

Main Research Facilities Available: Facilities for reception, processing and dissemination of meteorological and remote sensing satellite data such as LANDSAT, SPOT, TIROS, ERS-1, METEOSAT, GOES; laboratories of plasma, combustion and propulsion, sensors and materials, satellite tracking and control centre; laboratory of sat. integration and tests; balloon launching facility; supercomputing facility.

Future Development Plans: Improve technological capacity in all fields of interest, especially in utilization of data from international satellites with microwaves sensors, such ERS, JERS, RADARSAT; development of small telecommunications satellites, and of technological and scientific satellites; intensification of international cooperation for research and technological activities, for example, development of new missions in meteorology, remote sensing and oceanography; establishment of integrated centre of satellite data connected with international communication networks and incorporating data from earth observation satellites; conclusion of satellite missions: MECB-Brazil and CBERS cooperation with China; participation in international programmes of Earth Observing and Global Change, e.g. EOS, RADARSAT, GCRP, IGBP, WCRP.

Chile

Universidad de Chile — Facultad de Ciencias

Address: Casilla 653, Santiago, Chile. **Phone:** (+56 2) 678 7201; **Fax:** (+56 2) 239 2755; **E-mail:** facideca@abello.dic.uchile.cl.

Director/Head: Camilo Quezada B.

Number of Research Scientists: 110; **Number of Staff:** 105.

Scientific Fields of Interest: Biology; Biochemistry/Biophysics; Chemistry; Environment; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: *Department of Biology:* cell and developmental biology, biochemistry and molecular biology, cell physiology and membrane biophysics, structure and function of cell membranes, neurobiology, experimental epistemology, immunology, plant physiology, ecology of reproduction, ecology and systematics. *Department of Ecology:* botany, animal ecophysiology, land ecology, genetics, hydrobiology, limnology, vertebrate zoology, ecological chemistry. *Department of Physics:* nuclear physics, atomic and molecular physics, plasma physics, physics of condensed matter, relativity and field theory, history and philosophy of sciences. *Department of Mathematics:* algebra (groups and finite geometries, groups representations), analysis and differential equations, dynamic systems, number theory (arithmetic theory of quadratic forms, arithmetic theory of elliptical curves, algebra and analytical number theory). *Department of Chemistry:* Analytical chemistry (spectroscopy, analysis of continuous systems, instrumental analysis). Organic Chemistry (natural products, medical chemistry, synthesis, biochemistry), Inorganic chemistry (inorganic materials, organometallics, solid state, crystallography, biophysical chemistry), Physical chemistry (polymers, photochemistry, organometallics, solid state, crystallography, biophysical chemistry), physical chemistry (polymers, photochemistry, atmospheric chemistry, statistical thermodynamics, vibrational and NMR spectroscopy, luminescence), theoretical chemistry.

Major Scientific Results or Products: Projects funded by National Research Fund (Fondecyt) 65; other national and international institutions 60. 220 scientific articles in journals indexed by ISI or book chapters in 1996 (biology 90, ecological sciences 36, physics 21, mathematics 13, chemistry 55). Total University of Chile approx. 600 articles. Total national approx. 1,400 articles. 30 BSc, 14 MSc, and 16 PhD graduated in 1996.

Main Research Facilities Available: 40 laboratories, 1 particle accelerator, 1 X and gamma spectrophotometer, 1 data acquisition system Canberra 40, 1 complex impedance spectrophotometer,

absorption UV-vis spectrophotometer Perkin Elmer Lambda 11, 2 vibrational spectrophotometers, 1 supercomputer silicon graphics, 2 NMR spectrometers, 2 transmission electron microscopes, 1 confocal microscope, 1 flux cytometer (FACscan), electrophysiological equipment, refrigerated centrifuges and ultracentrifuges, B and Y counters, UV-vis spectrophotometers, liquid chromatographers, thermocyclers, cold rooms, animal facilities, greenhouses, about 150 computers and 3 work stations, connected with Internet, library; 1 limnological station.

Future Development Plans: Continue developing undergraduate and postgraduate programmes in areas of physics, mathematics, cell biology, biotechnology, ecology and chemistry; build more laboratories and obtain equipment to further develop following research areas: plant biotechnology, molecular biology, cell and developmental biology, solid state physics (low temperatures), nuclear physics, environmental chemistry and material science.

Cooperation Arrangements with Developing Countries: Argentina-Chile: via CONICET-CONICYT; Fundacion Andes-Fundacion Antorcha). Brazil-Chile: via CNPq-CONICYT; Chile-Mexico: via CONICYT-CONACYT.

Other International Cooperation Arrangements: Continue maintaining and developing agreements of international cooperation and joint research projects with Research Councils in Europe (CNRS, France; CNR, Italy; CSIC, Spain) and Latin America (CONICIT, Venezuela; CONICET, Argentina; CONACYT, Mexico; CNPq, Brazil; NSF, USA) and with international organizations (Organization of American States, European Union).

China

Chinese Academy of Sciences (CAS) — Institute of Remote Sensing Applications

Address: P.O. Box 9718, Datun Road, Bei Sha Tan, Beijing 100101, China. **Phone:** (+86 1) 64919458; **Fax:** (+86 1) 64915035; **E-mail:** guohd@sun.ihep.ac.cn.

Director/Head: Huadong Guo.

Number of Research Scientists: 84; **Number of Staff:** 208.

Scientific Fields of Interest: Agriculture; Biology; Engineering/Technology; Earth Sciences; Environment; Marine Sciences; Mathematics; Physics/Astronomy; Computer electronics.

Main Lines of Research and Training Activities: Basic research of remote sensing (RS), including: RS radiant characteristics, RS spacial characteristics, high spectral resolution RS, radar RS science and global change RS. Technical research of RS (including RS data acquisition techniques, digital image processing and geographic information system (GIS). Applied research including renewable resources and ecological environment RS, nonrenewable resources and engineering environment RS. Training activities include: (1) to bring up postgraduates and doctoral students for IRSA; (2) to hold GIS training classes for other related units in China and developing countries.

Major Scientific Results or Products: Since establishment in 1980, IRSA has made 70 achievements (30 won awards); major scientific results or products include final research reports; technical system relating with RS; software on RS and GIS; industrial products.

Main Research Facilities Available: 2 Cessna Citation S/II aircrafts and equipment for data acquisition, processing and analysis of remote sensing (airborne GPS, meteorological satellite ground station), workstation and large-scale network and RS-GIS software, static colour plotter, large-scale digitizing scanner; IRSA library.

Future Development Plans: Enhance technical strength by attracting more postgraduates and doctoral students and absorbing advanced techniques on RS in other countries; gain more projects (national, provincial or ministerial); further develop cooperation at local and international levels.

Cooperation Arrangements with Developing Countries: With Eritrea in Africa in RS field.

Other International Cooperation Arrangements: Oil-gas resources in Tarimu in Xinjiang between Japan and China; RS testing in Tarimu in Xinjiang; AGIP of Italy and Texaco of America; close contacts with over 20 countries.

Cuba

Instituto de Cibernética, Matemática y Física (ICIMAF)

Address: Calle 15 No. 551, entre C y D, Vedado, La Habana, Cuba. **Phone:** (+53 7) 32 7764, 32 8007;

Fax: (+53 7) 333373; **E-mail:** postmaster@cidet.icmf.edu.cu.

Director/Head: Raimundo Franco Parellada.

Number of Research Scientists: 199; **Number of Staff:** 35.

Scientific Fields of Interest: Materials; Engineering/Technology; Environment; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: ICIMAF is divided in five centres of research and development: 1. Center of Mathematics and Theoretical Physics: (CEMAFIT) Algebra (commutative algebra and algebraic geometry), Differential equations (solubility of partial differential equations, neural networks), Numerical Analysis (advanced techniques for problems in physics and engineering), Finite Temperature Quantum Field applications), Statistics (multivariate analysis). 2. Research and Development Center for Teleinformatics (CIDET): Computer Networks, client-server systems, Tele-education, WAN management, application software. 3. Center for Ultrasonics: Piezoelectricity, Acoustics. 4. Center for Automatic control: Data Acquisition, Identification and Digital Control System. 5. Center for Artificial Intelligence: Emergent computational models and systems, evolutionary algorithms and adaptation; image and data analysis.

Major Scientific Results or Products: Scientific papers on subjects mentioned above: application of mathematical methods to medicine and biology; design and development of national WAN for science and technology; preparation and characterization of piezoelectric materials; ultrasonic devices for industry and medicine; design and development of digital control system.

Main Research Facilities Available: 50 PC; 3 laser printers; laboratory for ceramic preparation and evaluation; electro-acoustic workshop, library (limited, lack of most recent books and journals).

Future Development Plans: Integrate network of scientific institutions in Caribbean area; consolidate PhD and postdoctoral programme; enhance exchange with high qualified centres and scientists in South and North.

Cooperation Arrangements with Developing Countries: UNAM, CINVESTAV, IPN, Mexico; Universidad Central de Colombia (Medellin), Colombia; Universidad de Los Andes, Merida, Venezuela.

Egypt

National Research Centre

Address: El-Tahrir Street, El-Dokki, Cairo, Egypt. **Phone:** (+20 2) 701010, 701728; **Telex:** 94022 NAREC UN; **Fax:** (+20 2) 700931.

Director/Head: Nabil A.M. Saleh.

Number of Research Scientists: 1,200; **Number of Staff:** 2,000.

Scientific Fields of Interest: Agriculture; Biology; Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/ Technology; Geological/Earth Sciences; Environment; Veterinary; Medical Sciences; Physics.

Main Lines of Research and Training Activities: Research and development in different areas of science and technology to serve national economy; provide services and consultations to end users on national level and private sectors; train university graduates and young researchers in various scientific disciplines.

Major Scientific Results or Products: Demonstration projects in agricultural rural development, child health care and biogas; developmental research in areas of chemical industries, textile industries, pharmaceutical industries and environment.

Main Research Facilities Available: Projectors, overheads and computers.

Future Development Plans: Update existing equipment and introduce new disciplines for training.

Cooperation Arrangements with Developing Countries: Bilateral agreements with Tunisia, Jordan, Turkey and India.

Other International Cooperation Arrangements: Cooperation agreements with Italy, Germany, England, France, Canada, Belgium, Austria and USA.

University of Alexandria — Institute of Graduate Studies and Research

Address: UNARC, P.O. Box 832, 163 Horreya Road, Alexandria, Egypt. **Phone:** (+20 3) 4215792; **Fax:** (+20 3) 4215792.

Director/Head: M. El-Raey.

Number of Research Scientists: 50 ; **Number of Staff:** 250.

Scientific Fields of Interest: Energy; Environment; Materials; Engineering/Technology; Geological/Earth Sciences; Information Technology and Biotechnology.

Main Lines of Research and Training Activities: Environmental monitoring and analysis; environmental information systems; materials (polymer science); biotechnology; information technology.

Major Scientific Results or Products: MSc and PhD programmes; diplomas in energy conservation, environment and information technology.

Main Research Facilities Available: Laboratories in remote sensing, air pollution, marine pollution, environmental radioactivity, biotechnology, solar cells and materials testing.

Future Development Plans: Local area network, computer workstation for GIS and image processing, air pollution monitoring station.

International Cooperation Arrangements: Ford Foundation, Overseas Development Administration (ODA), MED POL, Third World Academy of Sciences, Food and Agriculture Organization (FAO), Islamic Educational, Scientific and Cultural Organization (ISESCO).

India

Indian Institute of Science (IISc), Bangalore

Address: Bangalore 560 012, India. **Phone:** (+91 80) 3341690; **Telex:** 0845-8349 BG; **Fax:** (+91 80) 3341683.

Director/Head: G. Padmanaban.

Number of Research Scientists: 526; **Number of Staff:** 1,960.

Scientific Fields of Interest: Agriculture; Biology; Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/Technology; Geological/Earth Sciences; Environment; Medical Sciences; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Train students for award of ME, MSc (Eng.), PhD degrees in various fields of science and engineering; research conducted in large number of areas: biology, reproductive biology and molecular endocrinology, genetic engineering, microbiology, cell biology, molecular biophysics, ecology, developmental biology and genetics; inorganic and physical chemistry, solid state and structural chemistry, materials; electrical- and electrical communication engineering, electronics design and technology, computer science and automation, high voltage engineering; civil-, mechanical-, aerospace and chemical engineering, atmospheric sciences and management; mathematics, physics, astronomy and astrophysics, cryogenics, theoretical studies.

Major Scientific Results or Products: In 1991-1992, published 1276 papers (271 in chemistry, 207 in biology, 263 in mathematics and physics, 377 in mechanical sciences, 147 in electrical sciences and 11 in miscellaneous fields).

Main Research Facilities Available: Comprise large number of departments and centres; well-equipped with instrumentation and computers.

Future Development Plans: Prepared detailed document, "Vision for the Future," which spells out research projects that will be consolidated and expanded.

Cooperation Arrangements with Developing Countries: Research cooperation with institutes in China, Islamic Republic of Iran, Korea Rep. Nigeria, Philippines, Syria, Thailand, Vietnam, and other countries in Africa, Asia and Latin America.

Other International Cooperation Arrangements: Research cooperation with institutes in Bulgaria, Czech Republic, Hungary, Poland and Slovak Republic.

Indian Institute of Technology, Bombay (IITB)

Address: Powai, P.O. I.I.T. Mumbai (formerly Bombay) 400 076, India. **Phone:** (+91 22) 5783488; **Telex:** 011-72313 IITB IN; **Fax:** (+91 22) 5783546 (P); 5783480 (G); **E-mail:** bn@cc.iitb.ernet.in.

Director/Head: S.P. Sukhatme.

Number of Research Scientists: 384; **Number of Staff:** 2,094.

Scientific Fields of Interest: Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/Technology; Geological/Earth Sciences; Environment; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Facilities for conducting research; offer undergraduate and postgraduate programmes in all conventional engineering disciplines from aerospace engineering to metallurgical engineering and MSc programmes in sciences departments; additional postgraduate facilities available in interdisciplinary areas such as biomedical engineering, environmental science and engineering, corrosion science and engineering, energy systems engineering, industrial engineering and operations research, industrial management, materials science and reliability engineering.

Major Scientific Results or Products: Mainly educational institute; provide facilities for manpower training; participate in national and international sponsored and consultancy projects in areas cited above.

Main Research Facilities Available: Research laboratories in all departments; facilities under Regional Sophisticated Instrumentation Centre, Centre for Studies in Resources Engineering, Advanced Centre for Research in Electronics Computer Aided Design Centre, Centre for Technology Alternatives for Rural Areas and Industrial Design Centre; mainframe computer centre with Cyber 180/840; computing facilities across Institute.

Future Development Plans: More emphasis on postgraduate programmes; closer links with industry to become financially self supporting; initiated mission-oriented projects in three specific areas: food process engineering, integrated design and competitive manufacturing and energy efficient technologies.

Cooperation Arrangements with Developing Countries: Play major role in providing training facilities for students from developing countries and help establish similar institutes in those countries.

Other International Cooperation Arrangements: Participate in SPAARC programmes.

Indian Institute of Technology, Delhi (IITD)

Address: Hauz Khas, New Delhi 110016, India. **Phone:** (+91 11) 6867541; **Telex:** 031-73087 IIT IN; **Fax:** (+91 11) 6862037; **E-mail:** director@netearth.ernet.in.

Director/Head: V.S. Raju.

Number of Research Scientists: 516; **Number of Staff:** 1,927.

Scientific Fields of Interest: Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/Technology; Environment; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: *Training:* 4-year BTech programmes in civil, chemical, electrical, mechanical engineering, textile technology, computer science and eng., manufacturing science and engg.; 5-year integrated Master's programme in biochemical engg. and biotechnology, and computer applications. 1.5-year MTech programmes in several areas (31). *Research:* PhD programmes in applied mechanics, civil eng., electrical eng., computer science and eng., mechanical eng., textile technology, chemistry, physics, mathematics, management studies, humanities and social sciences, biochemical engineering and biotechnology, atmospheric sciences, electronics, instrument design and development, energy studies, material science and technology, industrial tribology, machine dynamics and maintenance eng., rural development and technology, educational technology and bio-medical engineering.

Major Scientific Results or Products: Since Institute's establishment in 1961, number of graduates at various levels are: BTech 6383; MS 216; MSc 1050; PG Diploma 565; MTech 5864; PhD 1788.

Patent/know how transfers: 28; sponsored research (about 45 per year); industrial consultancy projects (about 300 per year); continuing education programmes for industry; quality improvement programmes for teachers from other institutes; degree awarded to such teachers PhD 192, MTech 197).

Main Research Facilities Available: Computer service centre (ICL 2980 with sun workstations and PCATs), instrument design and development centre; central workshops; central library, NMR, SAM/ESCA, SEM, TEM, ICPE, GC/MS, liquid nitrogen, educational technology facility, gas blowing facility.

Future Development Plans: Interdisciplinary MTech programmes in industrial design, instrument technology and atmospheric sciences; collaboration with industry and other academic and research institutions in India and abroad; preparation of multi-media instructional resource material.

Cooperation Arrangements with Developing Countries: Exchange programmes with Tribhuvan University, Nepal; student sponsorship from developing countries by Asian Development Bank, Japan. Memoranda of Understanding (MOU) with Benha Higher Institute of Technology, Egypt, University of Aden, Yemen and Tarbiat Modarress University, Iran, for scientific cooperation.

Other International Cooperation Arrangements: Faculty exchange and R&D programmes with several universities in UK; student exchange programme with INSA, Lyon, France, University of Massachusetts, USA and MOU with New Jersey Institute of Tech. USA, (NJIT) for facility and student exchange; MOU with M/s Motorola Inc. Illinois, USA for Data Book/Component Grant, MOUs with Concordia University, Montreal, Canada, Ohio State University, USA, Tokyo Institute of Technology, Japan and University Pierre ET Marie Curie, Paris, France for scientific cooperation; collaboration programme with Royal Institute of Technology, Stockholm, Sweden, planned; several collaborative programmes with institutes in Japan, UK, Norway, France, Austria, Germany, Italy, USA, Belgium, Netherlands in progress or planned.

Indian Institute of Technology, Kanpur (IITK)

Address: Kanpur 208 016 (U.P.), India. **Phone:** (+91 512) 590151; **Telex:** 0325-296 IITK IN; **Fax:** (+91 512) 590260.

Director/Head: R.C. Malhotra.

Number of Research Scientists: ~ 400; **Number of Staff:** ~ 2,000.

Scientific Fields of Interest: Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/Technology; Geological/Earth Sciences; Environment; Mathematics; Physics/Astronomy; Management Science and Social Sciences.

Main Lines of Research and Training Activities: BTech Programme: aerospace eng., computer science and eng., chemical eng., civil eng., electrical eng., mechanical eng., materials and metallurgical eng.; MSc Programme in: physics, chemistry, mathematics and statistics; MTech Programme: aerospace eng., computer science and eng., chemical eng., electrical eng., mechanical eng., materials and metallurgical eng., industrial management, laser technology, nuclear eng., and technology, materials science; PhD Programme: all branches of eng., physics, chemistry, mathematics, humanities and social sciences; Advanced Centre for Electronic System, Centre for Robotics, Centre for Laser Technology, Centre for Materials.

Major Scientific Results or Products: On average each year: 250 BTech; 50 MSc; 250 MTech; 50 PhD; 30 continuing education programmes for industry and academic institutions; 350 research papers in national and international journals; 200 sponsored research (funded) projects; 100 consultancy projects; technology development and software development.

Main Research Facilities Available: *Equipment:* all major equipment in area of research (200 research laboratories); Computers: Minisuper (Convex), cluster of super mini (HP) on 256 nodes, workstation (HP, SUN), etc. PC (486/386/XT) all networked; *Library:* extensive facility, 1500 journal subscriptions, 350,000 books, reference services.

Future Development Plans: *New Areas:* Environmental engineering, organizational design and development, technology management, products design/prototyping. *Development and consultancy:* interface organization for small and medium size industries, educational planning and programmes for developing countries.

Cooperation Arrangements with Developing Countries: *Existing:* AIT, Bangkok (Thailand); Don State University, Rustov on Don (Russia); Aden University, Aden (Yemen). *Planned:* Middle East University (Turkey) and other developing countries.

Indian Institute of Technology, Kharagpur (IITKG)

Address: Kharagpur 721 302, India. **Phone:** (+91 3222) 55221-3; **Telex:** 06401 201 IITKG IN; **Fax:** (+91 3222) 55303 or 55239; **E-mail:** director@iitkgp.emet.in.

Director/Head: Amitabha Ghosh.

Number of Research Scientists: 460; **Number of Staff:** 2,079.

Scientific Fields of Interest: Agriculture; Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/Technology; Geological/Earth Sciences; Environment; Marine; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Graduate, postgraduate, doctoral and postdoctoral programmes in fields cited above. *Departments:* aerospace eng.; agricultural and food eng.; architecture and regional planning; chemical eng.; chemistry; civil eng.; computer science and eng.; electrical eng.; electronics and communication eng.; geology and geophysics; humanities and social sciences; industrial eng. and management; mathematics; mechanical eng.; metallurgical and materials eng.; mining eng.; ocean eng. and naval architecture; physics and meteorology. *Centres:* Cryogenic eng.; materials science; reliability eng.; rubber technology; rural development; post harvest technology centre; computer centre; micro-electronics centre; biotechnology centre; educational technology.

Major Scientific Results or Products: Training of engineers and scientists in large number of disciplines; research in these and other interdisciplinary areas; consultancy and sponsored research projects.

Main Research Facilities Available: Laboratories and computing facilities in all departments and centres; central research facility; central library; computer centre.

Future Development Plans: Development of teaching and research in biotechnology, environmental engineering, information technology, industrial design.

Cooperation Arrangements with Developing Countries: Memorandum of Understanding (MOU) signed with Tianjin University, China; International Rice Research Institute, Philippines; Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) for Training of TWC technical persons.

Other International Cooperation Arrangements: Indo-Canadian Project on Fluidized Bed Combustion; Individual level projects with two universities in USA; Indo-German Programme on Cryogenic Engineering.

Indian Institute of Technology, Madras (IITM)

Address: IIT P.O. Chennai (formerly Madras) 600 036, India. **Phone:** (+91 44) 2351365 (20 lines); **Telex:** 041 8926 IITM IN; **Fax:** (+91 44) 2350509.

Director/Head: N.V.C. Swamy.

Number of Research Scientists: Faculty: 396; **Number of Staff:** 1,363.

Scientific Fields of Interest: Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/Technology; Environment; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Facilities for conducting advanced research and offering under- and postgraduate programmes in departments of aerospace, chemical, civil, computer science, electrical, mechanical, metallurgical, ocean eng. and postgraduate programmes in applied mechanics, chemistry, humanities, mathematics and physics; Research programmes leading to Master and Doctoral degrees offered in various specialization numbering approx. 37; major research projects also undertaken in areas of ocean eng., material science, energy systems, environmental eng., manufacturing eng., CAD/CAM, and communication systems.

Major Scientific Results or Products: Higher technological educational institution imparting training and research to students/scholars; undertakes large number of sponsored projects at national and international levels in leading research areas in different disciplines of engineering and science; interaction with industries established through consultancy projects with several private, public sector industries and government agencies.

Main Research Facilities Available: In addition to computer facilities available in various departments and laboratories, there is central computing facility for the students and research scholars available at computer centre.

Future Development Plans: Initiated mission-oriented major research projects in energy efficiency systems, natural hazards mitigation and new materials; plan more Industry-Institute cooperation in technology development and utilization by user industries; envisage collaborative international programmes in leading research areas.

Cooperation Arrangements with Developing Countries: Entered into number of Memoranda of Understanding (MOU) with educational institutions in countries such as Malaysia and International Ocean Institute, Malta, for providing training to students from those countries.

Other International Cooperation Arrangements: Indo-German project for strengthening of 6 major areas, Indo-German Academic Exchange, Indo-US projects under PL/480, India-Netherlands, India-European Economic Community (EEC) projects; international consultancy projects.

Jawaharlal Nehru Centre for Advanced Scientific Research

Address: Jakkur P.O. Bangalore 560 064, India. **Phone:** (+91 80) 8462750-57, 8462762, 3345491, 3340580; **Fax:** (+91 80) 8462766; **E-mail:** cnrao@sscu.isc.ernet.in, cnrao@jncasr.ac.in.

Director/Head: C.N.R. Rao.

Number of Research Scientists: 44; **Number of Staff:** 91.

Scientific Fields of Interest: Biology; Materials; Chemistry; Engineering/Technology; Earth Sciences; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Animal behaviour, biodiversity, chemistry and physics of materials, chemical biology, condensed matter theory, education technology, fluid dynamics, genetics, geodynamics, molecular parasitology, gene targeting and gene therapy, theoretical sciences, molecular design and synthesis.

Major Scientific Results or Products: Research in areas of circadian consequence of social organization in insects in animal behaviour; changes in entrainment characteristics in jets with addition of heat in fluid dynamics; augmentation of library and other facilities to suit requirements of fellowship programmes; fabrication of noncontact nebulized spray pyrolysis apparatus for reducing production costs; theoretical condensed matter physics.

Main Research Facilities Available: Equipment: High-resolution transmission electron microscope (300 kV, JEOL 3010), scanning electron microscope with EDAX (Cambridge); scanning tunnelling and atomic force microscope (STM/AFM) operating in air; high-resolution electron spectrometer with ultra high vacuum (having ESCA, VEELS UVPS, LEED and STM/AFM attachments); magnetometer (VSM) and Faraday balance; Mössbauer spectrometer; thermal characterization up to 1250K with a Mettler instrument; catalyst characterization with gas chromatography and surface area apparatus; single crystal X-ray diffractometer (Siemens) with CCD facility, Brillouin spectrometer. Routine culture and cloning; sophisticated instruments like ultracentrifuge, gel doc system, liquid scintillation counter and fluorescence microscope; computers; field stations; library: silicon graphics power challenge computer with 4 R10000 processors with total shared memory of 45 gigabyte and disk space of 45 gigabytes; established microwave link between Jakkur campus and world via VSAT; library has collection of about 2000 volumes and 59 research journals.

Future Development Plans: Establish advanced technology materials laboratory with facilities for low temperature measurements, high magnetic fields, optical measurements, crystal growth; research and development work on insect sociology in animal behaviour; study of complex systems in theoretical sciences, properties of soft condensed matter and interfaces, synthesis and characterisation of advanced material, semi conductor super lattices; increase number of postdoctoral fellows and visiting fellowships at national and international levels; conduct workshops on education technology and use of multimedia.

Cooperation Arrangements with Developing Countries: Associate regional centre of ICTP, Associateship Programme (jointly with Indian Institute of Science) offers opportunities for scientists from Bangladesh China, India, Nepal, Pakistan and Sri Lanka and enhances scientific cooperation in these countries; JNCASR-COSTED International Fellowships intended for scientists in developing countries in Asia, Africa, and Latin America to visit chosen institutions in India for up to 3 months for collaboration and advanced training; coordinated programme with Department of Science and Technology, government of India, National Academy of Sciences, Kazakhstan and Uzbekistan offering three-month placements in chosen Indian institutions to work under guidance of scientists/faculty of institution.

Other International Cooperation Arrangements: Present: ICTP-JNCASR-IISc International Fellowships; COSTED-JNCASR Fellowships; JNCASR-DST Coordinated Programme with National Academy of Sciences, Kazakhstan and Uzbekistan. Planned: Special International Fellowships Programme to support young scientists from Third World countries (Central Asia, Africa, Arab, Latin America).

Tata Institute of Fundamental Research (TIFR)

Address: Homi Bhabha Road, Mumbai, 400 005, India. **Phone:** (+91 22) 2152971; **Telex:** (011) 83009 TIFR IN; **Fax:** (+91 22) 215-2110; **E-mail:** postmaster@tifrvax.bitnet.

Director/Head: Virendra Singh.

Number of Research Scientists: 404; **Number of Staff:** 1,494.

Scientific Fields of Interest: Biology; Biochemistry/Biophysics; Chemistry; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: *Mathematics:* algebra; algebraic geometry; differential geometry and topology; algebraic groups; Lie groups and Lie algebras; number theory; combinatorics; analysis and differential equations; dynamical systems. *Theoretical Physics:* particle, condensed matter, statistical, nuclear and astrophysics. *Experimental Physics:* gravitation, radioastronomy, and astronomy in the X-ray, gamma ray and infrared, cosmic wave bands; space physics; high-energy, nuclear and atomic physics; condensed matter physics; molecular biology; semiconductor and solid state electronics; computer science and speech research. Dental research, oral cancer and pre-cancerous lesions.

Major Scientific Results or Products: Sandpile models of self-organized criticality; metastable multiplying charged molecular ions by means of ion translational energy spectrometer techniques; unprecedented sensitivity in the new composition dependent forces using a torsion balance. Results on nature of dark matter in the universe; superconducting mechanisms in bulk and film forms (123 superconducting films using hollow cathode magnetron developed); cosmic sources of ultra-high energy gamma rays.

Main Research Facilities Available: 14 million volt terminal pelletron accelerator facility; 500 MHz FT NMR national facility; national image processing facility for astronomy; balloon facility at Hyderabad; radio astronomy centre at Ootacamund and Bangalore; cosmic ray field stations at Ootacamund, Kolar and Pachmarhi; gravitation station at Gauribidnur. Library; workshop; glass shop and precision instrument section; cryogenic facility; electron microscope and X-ray units; irradiation facility; laboratory for chemistry involving radioactive materials; lecture and conference facilities; general photography; engineering services; cyber and satellite computer systems. Giant metrewave radio telescope (GMRT), being set up at Pune, has been completed. Centre for fundamental research in biological sciences also being set up at Bangalore, as are several field stations.

Future Development Plans: *Molecular biology group:* plans for developmental neurobiology, cell biology and cognitive neuroscience. *Biochemistry and biophysics group:* entered new programme on biomolecular electronics. *Astronomy group:* group will continue to observe more celestial objects to see if they emit very high energy gamma rays, and widen its thrust into area of non-accelerator particle physics, with emphasis on spectroscopic and other optical experiments on fundamental systems (atoms, photons). Group also plans to upgrade present detector used to study electron-position annihilation.

Cooperation Arrangements with Developing Countries: Biochemistry and biophysics/chemistry group: TIFR is member of UN Educational, Scientific and Cultural Organization (UNESCO) sponsored by Molecular and Cellular Biology Network (MCBN) which helps in collaborative arrangements with developing countries. Physics and astronomy group: participating in international collaboration with other developing countries; outside European countries and USA, only China, Korea and Taiwan, China involved.

Other International Cooperation Arrangements: *Molecular biology group:* plans to solicit support for research on development from Rockefeller Foundation and Human Frontier Science Programme, funded by Human Frontier Science Programme Organization. Physics and astronomy group: engaged in research on Indo-USA projects on supernova and collapsed objects, radio jets and GONG (Global Oscillation Network Group) to study solar oscillation and internal structure.

Jordan

Royal Scientific Society (RSS)

Address: P.O. Box 925819, Amman, Jordan. **Phone:** (+962 6) 844701; **Telex:** 21276 RAMAH JO; **Fax:** (+962 6) 844806.

Director/Head: H. Mulki.

Number of Research Scientists: 234; **Number of Staff:** 318.

Scientific Fields of Interest: Energy; Materials; Chemistry; Engineering/Technology; Environment.

Main Lines of Research and Training Activities: 1. Renewable Energy; 2. Environment; 3. Building; 4. Mechanical Design and Technology; 5. Industrial Chemistry; 6. Electronics; 7. Industrial Economy; 8. Information and Computer Software.

Major Scientific Results or Products: Resulted in development of various products such as building system for low-income people, traffic light controllers, electronic training units.

Main Research Facilities Available: Four laboratories and technical units in various fields; field stations for renewable energy applications (solar and wind); advanced computer units; library.

Cooperation Arrangements with Developing Countries: Agreements with similar institutions in various developing countries for cooperation in fields of renewable energy, construction, technical training.

Other International Cooperation Arrangements: German Institute for Technical Cooperation (GTZ), European Community (EC), International Development Research Centre of Canada (IDRC).

Kuwait

Kuwait Institute for Scientific Research (KISR)

Address: P.O. Box 24885, Safat 13109, Kuwait. **Phone:** (+965) 4817302; **Fax:** (+965) 4836637.

Director/Head: Adnan H. Al-Aqeel.

Number of Research Scientists: 77; **Number of Staff:** 401.

Scientific Fields of Interest: Agriculture; Biology; Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/Technology; Geological/Earth Sciences; Environment; Marine; Veterinary.

Main Lines of Research and Training Activities: *Research:* Food and biological resources programme (arid land agriculture, biotechnology, food technology, mariculture and fisheries); water resources programme (desalination, hydrology, waste-water treatment and utilization, water management); petroleum, petrochemical and materials programme (crude and products; catalysis, corrosion, oil production); environmental sciences programme (terrestrial and atmospheric environment, coastal and marine environment, environmental risk assessment); energy, building and engineering programme (systems and control, energy, civil and building); techno-economics programme (economics, operations research). *Training:* Scientific; management and administrative; computer.

Major Scientific Results or Products: 15 patents on degradable mulch films, superplasticizing agents for concrete admixtures, mud drilling additives and for paper and textile industry, methods for improving mechanical properties of soils, superplasticizers additive to hydraulically settable cementitious materials, checking pollution problems of melamine manufacturing plants.

Main Research Facilities Available: Central analytical laboratory (CAL); national scientific and technical information centre (NSTIC); computer centre; pilot plants; hydraulics laboratory; DOHA reverse osmosis plant; research vessel (BAHITH).

Future Development Plans: Rebuilding scientific structures and equipment and preparing strategic research programme for 1995-2000.

Cooperation Arrangements with Developing Countries: Cultural arrangements with Cuba, Islamic Republic of Iran, Morocco, Korea, China, India and Sultanate of Oman; cooperative arrangements/relationships with Saudi Arabia National Center of Science and Technology; University of

Petroleum and Minerals Research Center, Saudi Arabia, and King Abdulaziz City of Science and Technology (KACST), Saudi Arabia, and Ministry of Scientific Research in Egypt.

Other International Cooperation Arrangements: Cooperation arrangements with UN Educational, Scientific and Cultural Organization (UNESCO), Food and Agriculture Organization (FAO), UN Development Programme (UNDP), UN Industrial Development Organization (UNIDO), UN Environment Programme (UNEP); cultural arrangements with Czechoslovakia, Hungary, Italy, Poland and Russia; cooperative arrangements/relationships with Academy of Sciences of Russia; GKSS Research Institute, Germany; France; US Geological Survey, USA; and Hohenheim University, Germany; Ministry of International Trade (MIT); Japan National Oil Company (JNOC); Petroleum Engineering Company (PEC); as well as Romanian National Oil Corporation (Petrom), Romania.

Malaysia

University of Malaya — Institute of Postgraduate Studies and Research

Address: 50603 Kuala Lumpur, Malaysia. **Phone:** (+60 3) 7570322; **Fax:** (+60 3) 7568940; **E-mail:** hlipsp@cc.um.edu.my.

Director/Head: T.K. Mukherjee.

Number of Research Scientists: 24; **Number of Staff:** 67.

Main Lines of Research and Training Activities: Natural resources and environmental studies; biotechnology; technology and industrial development; health sciences; human development; land use studies.

Major Scientific Results or Products: Development of lasers and optoelectronic equipments; new breed of dairy goats suitable for tropics; oxygen generator based on absorption technology.

Main Research Facilities Available: 45 laboratories; library with about 14,500 titles; 5-hectare research farm; mechanical workshop mainly for fabrication, repair and maintenance of research equipment.

Future Development Plans: Multidisciplinary research projects with Malaysian government and international funders.

Cooperation Arrangements with Developing Countries: Australian Council of Agriculture Research Funding, fish genetics research between Malaysia and Fiji; European Southeast Asian University Network on industrial wastewater treatment systems.

Other International Cooperation Arrangements: Australian Centre for International Agriculture Research, Fish genetics (Australia, Malaysia, Fiji); EU funds for running workshops in Engineering Education Research (Netherlands, UK, Germany, Italy, Malaysia, Singapore, Vietnam).

Morocco

Centre National de Coordination et Planification de la Recherche Scientifique et Technique

Address: B.P. 1346 R.P. Rabat, Morocco. **Phone:** (+212 7) 77 86 77; **Telex:** CNR 36452 M; **Fax:** (+212 7) 77 12 88.

Director/Head: Saïd Belcadi (ad interim).

Number of Research Scientists: 43; **Number of Staff:** 80.

Scientific Fields of Interest: Biology; Biochemistry/Biophysics; Chemistry; Engineering/Technology; Geological/Earth Sciences; Marine; Mathematics; Physics/Astronomy; Computer Science.

Main Lines of Research and Training Activities: Earthquake seismology; remote sensing and application to environmental and energy problems; astrophysics; instrumentation, microelectronics and technologies; basic Sciences research, mathematics, physics, chemistry and biology.

Major Scientific Results or Products: Seismic monitoring and seismic hazard assessment on regional level; publication of monthly and half-yearly bulletins of seismic observations; global seismic hazard assessment programme (GSHAP) regional centre, covering western Mediterranean region; coordination and planning of scientific research on national level; remote sensing and digital image processing; follow-up on solar activity-IRIS.

Main Research Facilities Available: VAX 750 workstations, 25 PCs (286, 386, 486 and Macintoshes), several printers, telemetered seismic network (32 stations), portable seismic network (19 stations), strong motion network (18 stations), broad-band seismic station, solar-astronomical observatory, computer aided design of electronic circuit boards, integration of hybrid circuit thick films, image processing PC scope camera CDD with hard PCSCOPE interface MATROX.

Future Development Plans: Hosting regional Center for International Decade of Natural Disasters Reduction.

Cooperation Arrangements with Developing Countries: Data exchange with international centres for seismological observations; scientific visitors exchange with institutions from North African countries.

Other International Cooperation Arrangements: Scientific visitors exchange with institutions in France, Italy, USA and Russia.

Nepal

International Centre for Integrated Mountain Development (ICIMOD)

Address: P.O. Box 3226, Kathmandu, Nepal. **Phone:** (+977 1) 525-313; **Fax:** (+977 1) 524-509; 536-747; **E-mail:** dits@icimod.org.np.

Director/Head: Egbert Pelinck.

Number of Research Scientists: 30; **Number of Staff:** 103.

Scientific Fields of Interest: Agriculture; Biology; Energy; Engineering/Technology; Earth Sciences; Environment; Physics/Astronomy; Hydrology; Economics.

Main Lines of Research and Training Activities: Subjects/sectors of critical relevance to sustainable mountain development, namely: Sustainable agriculture; Institutional strengthening; Gender balanced development; Conservation and sustainable use of natural resources - land, water, forests; Preservation of biodiversity; Management of pastures/rangelands; Management of natural hazards; Enterprise development and investments; Access, energy and urban planning; Capacity building for decentralized planning.

Major Scientific Results or Products: Mountain perspective framework, appropriate technologies for soil conserving farming systems; mountain risk engineering principles and application; sustainable renewable energy techniques; rehabilitation approaches for degraded lands; participatory management of natural resources; preservation of specific resources; protection of the Himalayan honeybee.

Main Research Facilities Available: Library with 16,000 volumes and CD-ROMs facilities; 300 publications and mailing list of 4,000; 16 field demonstration sites; GIS application centre; audio visual collection of slides, photographs, video films and CD-ROMs.

Future Development Plans: Regional collaborative programme for sustainable development in mountain areas focusing on common concerns in poverty, environment and gender issues in relation to mountain farming, mountain natural resources and enterprises and infrastructure development.

Cooperation Arrangements with Developing Countries: Within overall framework for cooperation with regional member countries, enter into long-term partnership agreements with academic and research institutions, government development programmes, NGOs and international organizations with mandate or concern in sustainable mountain development; work as facilitator; use decentralized approach to ensure continuing exchange of information; offer staff internships to junior professionals and in some cases supply equipment.

Other International Cooperation Arrangements: Governed by board of governors comprised of 15 members (8 nominated by governments and regional member countries; 7 nominated by ICIMOD support group that consists of representatives of all RMC governments and other donor organizations providing substantial support to ICIMOD).

Peru

Universidad Nacional de Ingeniería — Facultad de Ciencias

Address: Av. Tupac Amaru s/n, Apartado 31-139, Lima, Peru. **Phone:** (+51 14) 810824; **Fax:** (+51 14) 810824.

Director/Head: Oger Valqui.

Number of Research Scientists: 26; **Number of Staff:** 12.

Scientific Fields of Interest: Energy; Materials; Chemistry; Mathematics; Physics/Astronomy; Statistics.

Main Lines of Research and Training Activities: PHYSICS — Theoretical Physics: General physics of non-linear models; General relativity and gravitation; Particles and field theory; Nuclear physics; Fission. Applied Physics: Development; Solar energy (photothermic and photovoltaic conversion); Solar drying, water and air solar collectors; Semiconducting devices and solar cells; Materials science; Electrochromic coating, thin films; Spectrometry; Visible, Mössbauer, lasers, ESR, NMR, gamma; Transmission electronic microscope (TEM); Datation; Datation of geological and archaeological materials by ESR, TI and FT; Instrumentation; Interfaces. MATHEMATICS: Dynamic systems and applications; Non-convex optimization; Linear and non-linear models and applications. CHEMISTRY: Analytical chemistry; Organic chemistry; Chemical physics; Natural alkaloids, terpenes, polysaccharides, organic and inorganic synthesis, organometallics, electrochemistry, air pollution, catalysis, phosphorous chemistry. STATISTIC: Multivariate analysis; Sampling theory and survey sampling; Quality control.

Major Scientific Results or Products: Twenty-six publications in international scientific journals.

Main Research Facilities Available: Equipment: Mössbauer spectrometer ELSCINT; CEMS equipment (home made); Equipment for Ellipsometry (home made); ESR spectrometer, X band, VARIAN, model V-3603; Equipment for thermal conductivity measurements (home made); Spectrometer for photoacoustic and photocurrent measurements (home made). - Informatic Laboratory: LAN with several PCs for faculty and students; graphic monitor, scanner for library. Library contains 15,000 books, 10 journals.

Future Development Plans: The faculty will continue the lines of research which are presently being developed..

Cooperation Arrangements with Developing Countries: With Universidad Estadual de Campinas, Brazil (electrochemical coatings and thin films); Universidad Nacional Autonoma de Mexico, Mexico D.F. (transmission electronic microscopy).

Other International Cooperation Arrangements: Université Joseph Fourier, Grenoble, Institut Dolomieu, France; Chalmers University, Goteborg, Sweden (electrochromical coatings and thin films); Universidad Complutense, Madrid, Spain (solar drying); Universität Stuttgart, Germany (photovoltaic conversion); University of Uppsala, Sweden (economic support by IPPS); and the Technical University of Berlin (instrumentation - interfaces - photoacoustic spectroscopy).

Saudi Arabia

King Abdulaziz City for Science and Technology (KACST)

Address: P.O. Box 6086, Riyadh 11442, Saudi Arabia. **Phone:** (+966 1) 4883555; **Telex:** 404017; **Fax:** (+966 1) 4883756.

Director/Head: Saleh Abdulrahman Al-Athel.

Number of Research Scientists: 75; **Number of Staff:** 400.

Scientific Fields of Interest: Agriculture; Energy; Chemistry; Earth Sciences; Environment; Physics/Astronomy.

Main Lines of Research and Training Activities: KACST sponsors research conducted by universities and research centres, as well as conducts research through its seven research institutes. These national centres address basic issues that are vital to the welfare of the country. Examples are harnessing solar and other types of renewable energy, management of the scarce water resources and

optimal utilization of petrochemicals. Training is indirectly undertaken within research activities, since provision of training through research is considered as one of the criteria for selecting projects.

Major Scientific Results or Products: Number of publications now fill about 8 volumes; either authored, edited or translated books of renowned merit or books and reports that help disseminate results of research conducted or sponsored by KACST; publish quarterly magazine, *Science and Technology*, that seeks to popularize findings and work.

Main Research Facilities Available: Mainframe hosts Gulfnet (network designed to serve Gulf States and act as link node with other international networks—for example, BITNET and Internet); library has 16,220 volumes and 475 periodicals and growing at rate of more than 600 books annually; access to world renowned databases through on-line search; all seven research institutes equipped with suitable labs, computer connections and pertinent facilities; houses Saudi station of remote sensing and research stations for solar energy, fish culture, seismic measurements, high-powered telescopes and agricultural farms.

Future Development Plans: Number of other research centres being studied and will be put in place when needed.

Cooperation Arrangements with Developing Countries: Involved with number of developing countries in cooperative arrangements, including Egypt, Korea and Syria and Gulf States; intend to continue cooperation with developing Arab and Islamic countries, with particular emphasis on Gulf States.

Other International Cooperation Arrangements: International cooperation considered with USA, Germany, Australia, Canada and China; donations are neither received nor expected from these countries.

King Fahd University of Petroleum and Minerals Research Institute (KFUPM-RI)

Address: Dhahran 31261, Saudi Arabia. **Phone:** (+966 3) 8603319; **Fax:** (+966 3) 8603361.

Director/Head: Abdallah E. Dabbagh.

Number of Research Scientists: 150; **Number of Staff:** 200.

Scientific Fields of Interest: Energy; Materials; Chemistry; Engineering/Technology; Earth Sciences; Environment; Marine Sciences; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: The Institute has seven technical divisions. The Petroleum and Gas Technology Division working in petroleum engineering, petroleum refining and petrochemicals, process engineering and desalination, pilot plant laboratories, and polymers and plastics development. The Energy Resources Division incorporates laser research, energy systems, basic and applied physics, and energy research. The Geology and Minerals Division covers sand research, applied geology, and remote sensing. The Water Resources and Environment Division works in environment protection, water resources development, oceanography and waste treatment. The Metrology, Standards and Materials Division covers materials analysis and characterization; metrology and standards corrosion, materials, and pavement; materials and corrosion research; electrical power engineering; and electronic support. The Division of Economic and Industrial Research includes energy economics, industrial management, and quality management. The Development and Manufacturing Center has three interacting sections: modelling and simulation; design and development; and computer, electronics, and communications. The institute has regular clients in government and industry and has expanded its work for private companies and chambers of commerce. The major emphasis in research continues to be in the areas associated with the oil industry and associated derivatives, energy concerns, marine science, water resources, and environmental protection. New projects have been initiated in computer modelling, and economic and industrial research. Contact with the industrial sector continues to be emphasized. The RI has hosted three international workshops on Recent Advances in Liquid Chromatography, Use of Recycled Water in Desert Greening, and Resid and Heavy Oil Processing.

Major Scientific Results or Products: Gulf oil spill and atmospheric pollution programme provides database for studying health of Gulf ecosystems; water resources development section working on improving water use and conservation through development of computerized irrigation water management systems; under current arrangements with NASA and Jet Propulsion Laboratory (JPL), shuttle imaging radar (SIR-C/X-SAR) data received during the two 1994 space shuttle Endeavour missions that will improve our understanding of geological, hydrological and desert processes in the Kingdom; laser research group that obtained its first patent in 1993 received the Prince Mohammed Bin Fahd Bin Abdulaziz Al-Saud Prize for Scientific Excellence; Organization of Arab Petroleum Exporting Countries (OAPPEC) awarded first prize for 1994 to project, Mitigation and Control of Pollution from the

Gulf War Oil-Spill and Oil-Well Fires; water resources development section received 1994 prize by the Council of Arab Ministers for Environment of the Arab League for research in field of water resources development and conservation.

Main Research Facilities Available: Laboratories for engineering, materials science, chemistry, accelerator, chemical and electrochemical nuclear-track etching system, environmental radiation monitoring stations, fast neutron activation analysis facility, tandetron RBS/PXE facility; energy economics information centre.

Future Development Plans: Expansion of Development and Manufacturing Center to strengthen technology transfer and provide important extra link between institute, industry and business community; exploration and formulation of research plan for period between now and end of century with largest client, Saudi Aramco; umbrella agreement with Saudi Basic Industries Corporation, SABIC, recently signed.

Cooperation Arrangements with Developing Countries: Member of several international forums of research institutes in developed and developing countries; involvement with national activities related to International Panel for Climate Change; during Gulf War, led efforts to assess extent of pollution due to oil and Kuwaiti oil fires in conjunction with European, US and UN groups.

Other International Cooperation Arrangements: Joint projects with research institutes from USA, such as Jet Propulsion Laboratory at California Institute of Technology, Stanford Research Institute and Battelle Memorial Institute; consortium of 10 top US universities has helped RI and university for number of years; consortium includes MIT, Stanford University, Texas A&M, Princeton and University of Colorado; cooperation with various national standards laboratories, such as National Physical Laboratory in UK and National Institute for Standards and Technology in USA; joint work with UMIST in UK.

Senegal

Ecole Supérieure Polytechnique (ESP)

Address: BP 5085, Dakar Fann, Senegal. **Phone:** (+221) 25 0879; **Fax:** (+221) 25 0879; **E-mail:** esp@ucad.sn.

Director/Head: Oumar Sock.

Number of Research Scientists: 13; **Number of Staff:** 14.

Scientific Fields of Interest: Biology; Energy; Chemistry; Engineering/Technology; Mathematics.

Main Lines of Research and Training Activities: Research activities: atmospheric physics; renewable energies; biotechnology; chemistry. Training activities: Electrical engineering; mechanical eng.; civil eng.; computer science eng.; chemical eng.

Major Scientific Results or Products: About 30 theses and many papers in international reviews.

Main Research Facilities Available: 7 numeric raingauges; acoustic radar, centimetric radar data acquisition system; 2 sun workstations, PC network.

Future Development Plans: Rainfall estimation and prediction; long-range forecasting of precipitation in Africa; thermal comfort and saving energy; waste water treatment.

Cooperation Arrangements with Developing Countries: Present: Niamey University; Yaoundé University; Conakry University; ACMAD; ENI Bamako, CPU Cotonou. Planned: Universities of Nairobi, Nouakchott, Fortaleza.

Other International Cooperation Arrangements: ORSTOM, Universities of Toulouse, Paris, Louvain; LMD (CNRS); ENS, CACHAN; IUT, CRETEIL.

Sri Lanka

Institute of Fundamental Studies (IFS)

Address: Hantana Road, Kandy, Sri Lanka. **Phone:** (+94 8) 232001; **Telex:** 21700 IFS CE; **Fax:** (+94 8) 232131; **E-mail:** tenna@ifs.ac.lk.

Director/Head: Kirthi Tennakone.

Number of Research Scientists: 68; **Number of Staff:** 130.

Scientific Fields of Interest: Biology; Biochemistry/Biophysics; Materials; Chemistry; Geological/Earth Sciences; Environment; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Mathematics and computer science; condensed matter physics; photochemistry; plant biotechnology; molecular biology, immunology and molecular vector biology; environmental biology and chemistry; earth and space sciences.

Major Scientific Results or Products: Development of dye-sensitized solid state photovoltaic cell; immunological studies related to malaria; antiviral agents in plants.

Main Research Facilities Available: Spectrophotometers (VTS, IR, fluorescence, Mass plasma), NMR, electron microprobe, X-ray diffraction.

Future Development Plans: Stronger emphasis on theoretical sciences, mathematics and computer science; molecular biology; synthetic organic chemistry.

Cooperation Arrangements with Developing Countries: Collaborative research programmes with institution in India.

Other International Cooperation Arrangements: EEC, WHO and SAREC grants for research.

University of Peradeniya — Faculty of Science

Address: Peradeniya, Sri Lanka. **Phone:** (+94 8) 388693; 388151; 388152; **Fax:** (+94 8) 388018; **E-mail:** rich@sci.pdn.ac.lk.

Director/Head: R.P. Gunawardane.

Number of Research Scientists: 101; **Number of Staff:** 125.

Scientific Fields of Interest: Biology; Biochemistry/Biophysics; Materials; Chemistry; Earth Sciences; Environment; Mathematics; Physics/Astronomy.

Main Lines of Research and Training Activities: Chemistry of natural products, industrial chemistry, photo-chemistry, solid-state ionics, ecology and conservation biology, post-harvest technology, mineral exploration, mosquito borne diseases.

Major Scientific Results or Products: Publish about 100-120 research papers in national and international journals each year.

Main Research Facilities Available: Research laboratories in organic, inorganic and physical chemistry, solid state ionics, botany, zoology, earth sciences; science library; computer and science education units.

Future Development Plans: Biochemistry and biotechnology units planned; postgraduate institute of science with supporting instrumentation centre proposed.

Cooperation Arrangements with Developing Countries: Research cooperation with universities in Thailand in operation; collaborative programmes with research institutions in SAARC countries initiated.

Other International Cooperation Arrangements: International cooperation arrangements established with institutions and organizations in countries such as UK, Sweden, Germany, USA, including IDRC, SAREC, ISP, IAEA, TWAS, EC, British Council.

Thailand

Chulabhorn Research Institute (CRI)

Address: Office of Scientific Affairs, Vipavadee Rangsit Highway-, Bangkok 10210, Thailand. **Phone:** (+66 2) 574 0615, 574 0622-33; **Fax:** (+66 2) 247 1222; 574 0616, 574 2027.

Director/Head: Princess Chulabhorn D. Mahidol.

Number of Research Scientists: 36; **Number of Staff:** 82.

Scientific Fields of Interest: Natural Products and Medicinal Chemistry, Environmental Toxicology, Biomedical Sciences and Biotechnology.

Main Lines of Research and Training Activities: Natural products, medicinal chemistry and organic synthesis; environmental toxicology; biomedical research and biotechnology; collaborative research programmes promote pooling of resource persons, facilities and funds among national and international institutes; organize training courses, seminars, workshops and conferences; international programme on environmental and industrial toxicology; regional programme for human resource development in environmental toxicology for Southeast Asian countries.

Major Scientific Results or Products: International training programme provides facilities for human resource development in environmental and industrial toxicology (ICEIT) for developing countries; in recognition of CRI's achievement in this area, the UN Environment Programme in 1990 designated ICEIT as "UNEP" Centre of Excellence in Environmental and Industrial Toxicology; publishes quarterly newsletter distributed free of charge to 4,765 subscribers in 121 countries.

Main Research Facilities Available: Specialized laboratories in natural products; medicinal chemistry; organic synthesis; biochemistry; biotechnology; chemical carcinogenesis; environmental toxicology; pharmacology; Immunology; pathobiology; all research laboratories equipped with modern scientific equipment; initiated two major research programmes (malaria and cancer studies) designed to link research activities undertaken at laboratories directly to problem solving.

Future Development Plans: Opening postgraduate programme at Master's and PhD levels in environmental toxicology, technology and management; programme organized in collaboration with Asian Institute of Technology (AIT); curriculum has been designed by special committee of internationally renowned experts in environmental toxicology and management; within next 2 years, plan to open cancer centre for research and treatment.

Cooperation Arrangements with Developing Countries: Initiated cooperation programmes with number of institutes/universities in developing countries for exchange of experts and information.

Other International Cooperation Arrangements: Have signed memoranda of scientific agreements with many institutes in developed countries; activities supported by UN Development Programme (UNDP); formal linkages with German Cancer Research Center in Heidelberg, International Agency for Research on cancer, World Health Organization (WHO), International Programme on chemical safety, WHO (Switzerland) and many universities/research institutes in North America and Europe.

Tunisia

Institut National de Recherche Scientifique et Technique (INRST)

Address: Soliman B.P. 95, 2050 Hammam Lif, Tunisia. **Phone:** (+216 1) 430215, **Fax:** (+216 1) 430934.

Director/Head: Mohamed Ennabli.

Number of Research Scientists: 80; **Number of Staff:** 210.

Scientific Fields of Interest: Agriculture; Biology; Biochemistry/Biophysics; Energy; Chemistry; Engineering/Technology; Geological/Earth Sciences; Environment; Physics.

Main Lines of Research and Training Activities: *Biotechnology:* vitroculture, nitrogen fixation, lipids, gene bank; plant and soil molecular biology. *Solar Thermal Conversion:* electrical generation, testing benches (panels, solar heater), drying. *Desalination:* reverse osmosis, electrodialysis. *Microelectronic*

Systems: command, automation; modelling manufacturing systems; software systems. *Mineral Chemistry*: phosphate, clay, brines; chemistry analysis. *Geological and Earth Sciences*: cartography, metallogeny, mineralogy, stratigraphy, geochemistry; *Waste*: composting and valorization dumping ground. *Wastewater*: treatment and re-use. *Photovoltaics*: pilot plant 100 Kw peak capacity.

Major Scientific Results or Products: Production of photovoltaic panels (monocrystalline); production of vitroplants; prototypes of mobile desalination station and of family unit.

Main Research Facilities Available: Personal computers; pilot plant (photovoltaic, electro solar station, desalination; waste water, composting), chemical analysis equipments (ICP, RX, IR, UV, atomic absorption fluo-X.); scientific equipment; field stations: irrigation with salt water, sewage water; library.

Future Development Plans: Industrial and agriculture R&D; developing a global approach; emphasize interest on environmental problems.

Cooperation Arrangements with Developing Countries: Bilateral cooperation with Morocco (solar energy) and Egypt (desalination, composting and photovoltaic).

Other International Cooperation Arrangements: Bilateral cooperation with Italy (biotechnology), France (molecular biology), cooperation with European Economic Community (EEC).

Turkey

Scientific and Technical Council of Turkey (TÜBİTAK) — Marmara Research Center (MRC)

Address: P.K. 21, 41470 Gebze, Kocaeli, Turkey. **Phone**: (+90 262) 6412300; **Telex**: 34123 MAM TR; **Fax**: (+90 262) 6412309.

Director/Head: Ömer Kaymakçalan.

Number of Research Scientists: 382; **Number of Staff**: 365.

Scientific Fields of Interest: Biology; Biochemistry/Biophysics; Energy; Materials; Chemistry; Engineering/Technology; Geological/Earth Sciences; Environment; Mathematics; Physics/Astronomy; Artificial Intelligence; Remote Sensing; Metrology.

Main Lines of Research and Training Activities: *Informatics*: object-oriented software development methodologies; software engineering; software quality assurance; expert systems; factory automation; robotics; image processing. *Basic Sciences*: inverse scattering problems; biomechanics and composite materials; quantum field theory; statistical physics; seismology and seismotectonics; remote sensing; astrophysics and radioastronomy; atmospheric physics; synthesis and characterization of coordination component and of new organic compounds; phytochemical investigation of endemic Turkish plants.

Technological Research: pollution; solar energy; environmental impact assessment; nutrition; food processing and refrigeration technology; food microbiology. *Metrology*: physical measurements and calibrations on length, mass, force, pressure volume, density, flow, time, frequency, optics, acoustics, vibration, temperature and electrical quantities. *Genetic Engineering and Biotechnology*: molecular immunology and oncology; viral oncology; structural biology; plant molecular biology; bioinformatics.

Major Scientific Results or Products: Publications in international scientific journals and conference proceedings; patents; development of scientific results in pilot plants; industrial application of food and other research projects.

Main Research Facilities Available: Library; PC computers and workstations and related informatics equipment; software design tools; quality assurance tools; research microscope with photometer; seismic data processing software; NMR spectrometer and GC-MS, AA, IA, UV-VIS spectrophotometers; ion implanter; furnaces; plasma etcher; analytical equipment; several experimental setups (e.g. plasma enhanced chemical vapour deposition system, solar energy measurement, wind energy, gas chromatography systems, and many others); metrology equipment; centrifuges, DNA synthesizers; fermentor; CO₂ incubator.

Future Development Plans: Participation in new international projects; enhance activity in seismology; creation of national data centre for remote sensing and astrophysics and millimetric radiotelescope; new bioassay laboratory and new facility for synthesizing bioactive compounds; development in CMOS technology; parallel DSP systems; air quality modelling; ecological modelling of semi-enclosed seas; upgrading molecular biology and metrology institute; building technopark facility.

International Cooperation Arrangements: *Informatics:* University of Maribor (Slovenia) and Egyptian Research Institute on Optical Character Recognition Project. *Basic Sciences:* cooperation with Azerbaijan, Ukraine, Kazakhstan, Bulgaria, Israel, Egypt, Pakistan, Slovakia. *Technology Research:* cooperation in training in fruit and vegetable processing with least developed countries (sponsored by UN Industrial Development Organization (UNIDO) and Turkish government). *Metrology:* India, Korea, Egypt, Saudi Arabia and Pakistan. *Genetic Engineering and Biotechnology:* provide fellowships to qualified scientists from developing countries involved in collaborative research work. — European Economic Community (EEC), UN Development Programme (UNDP), North Atlantic Treaty Organization (NATO), UN Industrial Development Organization (UNIDO), Universities of Arkansas, Kentucky, Pennsylvania, Illinois, Boston, Texas, Arizona in USA; Tübingen, Berlin (Technical), Munich, Würzburg, Stuttgart in Germany; Essex, London (UK); and many other universities and research institutions in Europe and USA.

Zimbabwe

Scientific and Industrial Research and Development Centre (SIRDC)

Address: P.O. Box 6640, Harare, Zimbabwe. **Phone:** (+263 4) 860-321/20; **Fax:** (+263 4) 860-351.

Director/Head: C.J. Chetsanga.

Number of Research Scientists: 10 PhD; 22 MSc; **Number of Staff:** 21.

Scientific Fields of Interest: Agriculture; Energy; Materials; Engineering/Technology; Earth Sciences; Environment; Biotechnology; Electronics.

Main Lines of Research and Training Activities: Biotechnology (high-yielding plant varieties, drought tolerant plant varieties, pest resistant crops, food processing, vaccine production, diagnostic probes); Energy technology (solar energy, biogas, energy efficiency); Building technology (low-cost building materials, structural and geotechnical engineering, cement and concrete technology); Environment and remote sensing (cleaner production technology, land-use planning, resource management, climate change, environment impact assessment); Mechanical engineering (use of CAD in precision engineering, material science, fabrication of precision tools); Microelectronics/electronics (integrated circuit design, microprocessor-based control systems, simulation software, software engineering).

Major Scientific Results or Products: Regional training in remote sensing and geographic information system (GIS); developed GIS for Nyanga, Zimbabwe; Participating in climate change project; carrying out environmental impact assessment; micropropagation of crops; plant transformation; efficiency in manufacturing engineering; renewable energy; software engineering; electronics; information technology.

Main Research Facilities Available: Computers; photo-laboratory equipment (film-writing, development, enlargement and hard copy production); research laboratories include production engineering, electronics, materials science.

Future Development Plans: Developing and maintaining close link with industry to facilitate technology transfer to industry; forging mutually beneficial cooperation with similar regional and international institutions.

Cooperation Arrangements with Developing Countries: Memorandum of understanding with CSIR in India and CSIR in South Africa.

Other International Cooperation Arrangements: Council for Scientific and Industrial Research (South Africa); UNESCO; German Agency for Technical Cooperation (GTZ); APROTEC, Canada; Dutch government.