

VISHNU GANESH BHIDE

(08 August 1925 - 25 June 2006)

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Chandra



VISHNU GANESH BHIDE

(1925 - 2006)

Elected Fellow 1968

FAMILY BACKGROUND AND EARLY EDUCATION

VISHNU GANESH BHIDE was born on August 8, 1925 at Daryapur in the family of Mrs Shantabai and Shri Ganesh Tryambak Bhide. His father was a brilliant lawyer and a Sanskrit scholar who after completing his education from Ferguson College, Pune, started his own practice in the court of laws at Daryapur, a small town in Amaravati district of Maharashtra. Subsequently, the family shifted to Nagpur in search of better opportunities. As his family had grown with the arrival of two sons and four daughters over the years, they started feeling crunch of resources. Shantabai, Vishnu's mother was an innovative lady and started teaching young children using Montessori method of teaching in a school, then started by Bhagini Mandal, an NGO, to supplement the family income. Still there would always be dearth of resources at home and young Vishnu would solve numerical examples on the floor of their house using chalk to economize on notebooks. Later during his college education he would offer tuitions to students to pay for his college fees. These circumstances however left a deep impression on his personality. He always kept his personal needs to a bare minimum and led a very disciplined life all through. Till his last days he used to wear the same wristwatch, which he had purchased, way back, in 1952. His behaviour always reflected dignity of labour and he would like to do all small personal jobs himself, even when he was at the helm of the affairs. He matriculated from Sule High School and joined Nagpur University in 1942.

He did his BSc and MSc in Physics standing first in Order of Merit in the year 1945 and 1947, respectively. He was a very keen and hard working student. He was awarded the prestigious KEM Scholarship in 1945 for his scholastic ability. His score at M.Sc. examination remained unmatched for decades and kept inspiring young scholars of the college for generations.

Besides studies, he was a great lover of sports and particularly enjoyed playing cricket and badminton. Soon after MSc, he joined the staff College of Science, Nagpur and started his research work in the field of electrical discharges. He studied the effect of strong magnetic field on the initiation and maintenance of electrical discharges through gases. For this work he was awarded the degree of Doctorate in Physics from Nagpur University in the year 1953 under the supervision of Professor



Thatte working on gas discharge phenomenon "Joshi Effect". He formed his research team with friends and colleagues MR Bhiday and GV Asolkar. Working at Science College with very primitive facilities, he published his scientific findings in journals like *Nature* (168, 1006-07, 1951; 169, 542-3, 1952) apart from other national scientific journals like *Current Science*, *Proc of Ind Sci Congress*, etc. During this period he married Prabhavati (nee Mandakini Deshpande) who hailed from a well-known Deshpande's family of Jalgaon. She had completed her post graduation in Home-science from the famous Lady Irwin College, Delhi, but preferred to become a full-time home-maker. She had always been a great support and strength for his endeavours, and with her extremely pleasant, graceful and quiet disposition, she would easily command respect and affection from all who came in contact with them. They were blessed with two lovely children Annant and Vidula. Their son Annant, after graduating from IIT, Delhi in flying colors, joined Phillips Analytical, overlooking an opportunity to join IIM, Ahmedabad for MBA. Presently he is General Manager at PANalytical Asia Pacific and lives in Singapore, with his wife Vandana and two children Alok and Anita. Dr Bhide's daughter Vidula, a focused scholar, after completing her MBBS from Lady Hardinge Medical College, Delhi went on to complete her post graduation at London and is currently a practicing anaesthesiologist. Her husband Dr Madan Kapre MBBS, MD, FRCS is an accomplished ENT surgeon and they have established a well-known 'Neeti Clinic' at Nagpur. Both her daughters Gauri and Neeti are medical students.

PROFESSIONAL CAREER AND SCIENTIFIC CONTRIBUTIONS

Dr Bhide started his career as a Lecturer in Physics at College of Sciences, Nagpur after completing his M.Sc. (1947-1956). He was always looking forward to work in upcoming frontier areas of modern solid state physics. With the discovery of transistor in 1948, he shifted his research interest to solid state physics and studied semiconducting properties of binary compounds such as PbS. He was one of the early researchers to show the effect of mechanical pressure on the rectification properties and the transistor effect in treated PbS samples. In recognition of the importance of his research work, the Government of India and the then Government of Madhya Pradesh awarded him a foreign scholarship for further studies in solid-state physics. The subject of crystal growth and structure was receiving worldwide attention amongst leading physicists of that time. Dr Bhide joined the research group of Professor Samuel Tolansky, London University, UK who had made pioneering contributions with his techniques of multiple beam interferometry to the field of crystal growth. Using multiple beam interferometry, X-ray diffraction and electron microscopy, Dr Bhide provided answers to some of the problems of crystal growth and polytypism in crystals. For this work, Dr Bhide was awarded a Ph.D. degree of London University and in recognition of the importance of his studies, his thesis was selected for reproduction on microfilm by M/s Micro Films Ltd., London.



On his return from abroad, Dr Bhide was appointed Professor of Physics & Head; Physics Department at the Institute of Science, Bombay (1956-1966). At the Institute, he gathered round him a very enthusiastic band of young research workers. During the early years in Bombay, he along with his students investigated the phenomena of ferroelectricity in crystals and developed a new method for studying the domain structure in ferroelectric crystals. This method is now being widely used at various laboratories. His pioneering work on proving the existence of temperature dependent soft mode as responsible for ferroelectric transition has been hailed by workers in ferroelectricity all over the world. This work on ferroelectrics has been widely quoted and has found a place in many books on ferroelectrics.

During the course of this work, he was attracted by the fundamental discovery of Mössbauer Effect made in 1959, for which Professor R. Mössbauer of Germany was awarded the Nobel Prize in 1961. Dr Bhide along with his group designed and fabricated indigenously a Mössbauer Spectrometer and made some very pioneering contributions to the subject. His work, particularly regarding the Mössbauer Effect in ferroelectric titanates, NiO, CoO, has attracted world wide attention and acclaim. Using this very novel and accurate technique, he made very valuable contributions to ferroelectricity, ferromagnetism, non-equilibrium charge states in oxidic semiconductors etc. He was invited to preside over International Conference on the Applications of Mössbauer effect held at Alma Ata in the then Soviet Union. He is a founder member of the International Commission on Mössbauer Effect as well as a member of the editorial board of the *Journal Mössbauer Data Index*. His paper on *Mössbauer Effect in Ferroelectric BaTiO₃* was adjudged as one of the best 25 papers out of several thousand papers published on Mössbauer effect. He had also written a book entitled *Mössbauer Effect and its Applications* that received worldwide acclaim.

Professor Bhide designed, developed and fabricated a bent crystal X-ray spectrometer and using this indigenously developed spectrometer which elucidated the chemical bonding in a large number of inorganic, organic and biological samples. His work was rated so high that a renowned American journal "Journal of Chemical Physics" while advertising their journal said persons like Professor Bhide publish their papers in this journal. An accomplished scientist and an academician, immensely interested in research, his love for teaching continued. Endowed with imaginative mind, passion for simple innovative experiments and flair for solving equations, he was a complete researcher. Also equipped with clarity of ideas, photographic memory and natural communication skills, he was a sought after teacher. He would talk about the laws of physics as if he was narrating a story. Even in a large class he would know every student by name. Himself being very hardworking, he was a hard taskmaster and a great inspirer.

Subsequently, Dr Bhide was invited to join National Physical Laboratory, Delhi as Deputy Director (1966-1982). At NPL, he worked in many areas of material



science, condensed matter physics, cryogenics, liquid crystals, solar energy etc. Liquid crystals attracted the attention of Dr Bhide both from the standpoint of their interesting physical properties as-well-as a large number of technological applications in the field of electronic displays. He and his students studied phase transitions in liquid crystals using positron annihilation, Raman Spectroscopy, Electron Spin Resonance, X-ray diffraction and other techniques. He and his students reported a new type of domain structure called the Bubble Domain structure in a very dilute solution of cholesterics in nematics.

In addition to the above studies, his group developed a complete technology for making liquid crystal displays for wrist watches, calculators and hand-held digital instruments. Indeed, the related know-how was passed on to couple of firms for commercial utilization.

Recognizing his leadership quality in science, he was appointed as Scientific Advisor to the Cabinet Secretariat, Govt. of India (1973-1975). The research, development and production in the field of solar energy in the country is largely attributed to Professor Bhide. In the wake of energy crisis, Govt. of India appointed a committee under the chairmanship of Professor Bhide to assess the status of solar energy utilization, research etc., in India and in the world and to recommend to Govt. of India ways and means to harness solar energy in the country, so that it can become a viable energy source. Professor Bhide's report entitled "Solar Energy Hope and Promise" became the basis of all developments in this field. As recommended in the report, a Commission on Alternate Sources of Energy (CASE) and the Department of New Energy Sources were established. The latter has now become Ministry of New Energy Sources (MNES). The report also provided a blue print for research and development in the country. The first major solar thermal system was set up by his group at Hotel Mourya in 1977. Subsequently, using novel techniques, a system was set up at BHEL factory, Hardwar to provide space heating to workers during winter months.

Dr Bhide moved from NPL to University of Pune in 1982 as Professor and Chairman of School of Energy Studies. After coming to Pune, Professor Bhide founded the flourishing School of Energy Studies. He developed the concept of structured selective coating and Integrated Energy System for rural villages which dealt with transformation of the available energy resources in the villages such as wind energy, solar energy, agricultural and animal waste etc. into usable energy sources that can be used for a variety of purposes such as for lighting, cooking, pumping and entertainment. The first integrated energy system were set up in a small village near Delhi and at Shirkoli, a village some 35 km away from Pune.

Professor Bhide and his colleagues notably Professor Takwale developed solar drying systems to dry chemicals, vegetables, fruits etc. The first major solar drying system in the country was set up by his group at M/s Weikfield for drying edible



starch. Similarly a 3 ton/year solar drying systems for converting grapes into raisins was set up at Nasik. All the industries in Maharashtra producing solar energy devices and systems have their origin at the School of Energy Studies, University of Pune. In consultation with the school, M/s Machinocraft established the biggest solar hot water system in the world at Hindustan Spinning and Weaving Mills at Bombay. The system supplies 100,000 litres of water at 80°C per day for a variety of uses in the mill. A solar boiler was designed to supply 100 kg per hr of steam of 6 Kg/cm² pressure. The boiler is being installed at a Sugar Factory at Akluj.

Professor Bhide along with Professor Barua and Professor Chopra were responsible for initiating Research, Development and Production of Amorphous Silicon Solar Cells in the country. Professor Bhide was Chairman of the UNESCO sponsored Asian Network on Solar Energy. He was Director, International Solar Energy Society. He was a Member of Technical panel on Solar Energy held at Nairobi. He has been a Member of the expert panel of UNIDO, WHO, UNU and other international agencies.

He was founder of Present Maharashtra Solar Energy Consortium. He was invited to give a keynote address at the International Solar Energy Conference held at Perth, Australia in 1983. Professor Bhide is also responsible for various developments in the field of cryogenics. His report to Govt. of India Cryogenics: Survey and Outlook has been the basis for various developments in this important field.

Dr Bhide became the Vice-Chancellor of University of Pune and adored the position from 1984-1989. As Vice-Chancellor, he formulated the programme of collaborative teaching of Physics by TIFR scientists and faculty of the university, teaching of M.Sc. Chemistry by scientists from NCL and the teaching faculty of the University and teaching of Geology by NGRI and the Geology Department Faculty. This initiative was lauded all over the country. He made very significant contributions towards improving education at the universities. Professor Bhide was responsible for persuading Govt. of India agencies to set up some of their major national research facilities on the campus of the University. As a consequence, four major national facilities are now established on the campus. These are (1) National Centre for Radio Astronomy NCRA, (2) Inter University Centre for Astronomy and Astrophysics, IUCAA (3) Centre Advanced Computation, CDAC and (4) National Animal and Cell Tissue Culture facility. These institutions were provided land on the campus with the only condition that scientists from these organizations would teach in the University and the students and the teaching faculty would have an easy access to the unique facilities in these institutions. NCRA has set up the largest radio telescope in the world. C-DAC has developed a very powerful super-computer.

He became the Founder Director of Inter University Consortium for Department of Atomic Energy Facilities (1991-1994). Subsequently he became Emeritus Scientist



and Coordinator UGC-CSIR Interaction Programme (1991-1994) He was Emeritus Professor Physics Department, University of Pune till the end.

CONTRIBUTIONS IN THE FIELD OF EDUCATION

Professor Bhide was one of those who under the leadership of Professor Kithara were responsible for the initiation and conduction Science Talent Search Examination in the country. He has been a regular member of paper setters for paper on Physics right up to 1981.

In order to nurture and nourish talent, Professor Bhide conducted Summer Institutes for Talented students under the auspices of NCERT. Professor Bhide was also the Chairman of the Study Group appointed by NCERT to prepare 'Physics Text' for Standards XI and XII. He also pioneered the preparation of Laboratory Manual, in which experimental approach to learning Physics is advocated.

While at Bombay, he realized the anomalous situation in which Post-graduate students in Physics at Bombay University were taught by inadequately qualified staff and an inadequately equipped Laboratory, whereas there were a large number of very eminent Physicists in TIFR, DAE, IIT, Bombay who had unique experimental facilities. He introduced the system for the first time in the country where the Eminent Physicists from these institutions would teach in the University and the students from the University could carry out their experimental work in these well-equipped laboratories. In this programme, Dr Iyengar, Professor Singh, Professor Thosar, Professor Udgaonkar and several others participated.

Similarly, he organized the Physics Teaching Community in Bombay. They would meet once a month by rotation in different colleges for one day and discuss (a) The syllabi, (b) the question papers set at the previous examination, and (c) How a basic concept in Physics could be introduced. These discussions were responsible for upgrading Physics Teaching in the University.

Professor Bhide started research students annual seminar where research students would present their research work. This served as a training ground. He also started Academic Forum where Professors from various departments could present latest developments and emerging trends in their respective fields. He introduced several innovations in teaching and evaluation methods. He was the first to indicate the power of electronic media in the field of education and introduced Media Mediated Education.

Professor Bhide made strenuous efforts in bringing universities in National mainstream. He was responsible in carrying out a detailed survey of Industrial Infrastructure in and around Pune. This brought out the gaps in the industrial infrastructure, the employment potential and the factors inhibiting the growth of small-scale sector. Professor Bhide along with Maratha Chamber of Commerce and



Industries launched a movement called "Know Your University and Own Your University". This helped in establishing a rapport between Industry and University and helped in making Industry aware of the competence and experience available in the university and exposed the university faculty to the problems faced by the Industry. These efforts culminated in the establishment of Science and Technology Park on the campus of the University.

Inter University Consortium

Professor Bhide advocated the need for strong academic links between National Laboratories and the Universities. He advocated various measures to bring university system in National mainstream. He argued that separation of Research from Teaching as was practiced in India could be a temporary strategy but cannot be a permanent policy. As a consequence, he advocated the free use of major facilities set up in BARC and various establishment of DAE such as Accelerators, Reactors, Synchrotron sources etc. by the students and faculty of the Universities in India. As a result of these sustained efforts an arrangement was reached between UGC and DAE. This led to the establishment of Inter University Consortium for DAE facilities whose headquarters are at Indore with branches at Bombay and Calcutta. He has been the architect and the founder Director of this Inter University Consortium.

UGC-CSIR Interaction Programme

Following the philosophy underlying the establishment of Inter University Consortium, he was responsible for evolving an interaction programme between UGC and CSIR. He has been the Coordinator of this UGC-CSIR interaction Programme since its inception.

Social Concern and New Initiatives

After retirement from Inter University Consortium, Professor Bhide devoted all his time and energy for the improvement of science education in Schools and Colleges for rural development, for social service and for launching young entrepreneurs.

Professor Bhide analyzed in detail the health of research and development in the country and the causes for the unsatisfactory health of the R&D system. He brought out that in spite of considerable large outlay on S&T, second largest scientific manpower and almost total support to science by Govt., our contributions to basic science is to say the least marginal and to innovation of technology practically none at all.

Scientific vitality of a nation is determined by the time lag between a major scientific discovery or introduction of a new concept or technique, or innovation of a new technology anywhere in the world and its reproduction in the country. Longer the time lag, lazier is the nation. Analyzing the state of science and technology he showed that if a curve is plotted in which the output in basic research reckoned by



number of papers published in referred journals, number of patents in applied research or economic growth in the case of industrial research is plotted along y-axis and the time with $t=0$ marking the discovery or innovation of new technology along the x-axis, he showed that all major advanced countries record their output right from $t=0$. This output reaches maximum 4-6 years later and then it declines because a new field has emerged on the horizon. If, however, on the same curve, we plot India's performance, it appears that we get into the field, whether of basic research or industrial research 7-10 years, later register a small pip and go on beating the dead horse indefinitely. These curves known as Bhide's curves further bring out that what is important is not the actual time lag but the effective time lag which is the actual time lag divided by the time of obsolescence. When this effective time lag is plotted against time in decade say 1920's 30's, 40's etc. One finds that since 20's the effective time lag has been increasing exponentially. This is one reason that while India has been able to contribute to the store of human knowledge through the work of Raman, Saha, Bose and other in the 20's and 30's but not in recent times.

This unfortunate state of health of S & T was further analyzed in order to determine the major causes thereof. It is the unanimous opinion of every senior scientist in the country that there is much to be desired in our method of teaching sciences at the school and college level.

Science is an endless quest and unceasing exploration. Science must be participated in and not mugged by heart. Unfortunately, however, today experimentation and demonstration have almost totally disappeared from our schools and colleges. Science is taught as prose or poetry without any excitement. Similarly, curiosity in children is snubbed at every moment. They are dissuaded from asking questions arising out of curiosity. In fact, asking a question is an expression of a desire to know and is the first step in the process of acquisition of knowledge. If we dissuade our children from asking trivial question, how they can even ask a fundamental question whose answer may lead to a basic discovery. In the absence of this dialogue between a child and a teacher, the children have to accept whatever the teachers say whether they comprehend or not. The load of non-comprehension is so crushing that it totally destroys the personality of a student. Similarly, there is no scope for our children to work with their hands. There is no room for innovativeness and creativity. All these result in our children emerging from schools totally devoid of curiosity, submissive, lacking confidence, unable to think for themselves, lacking innovativeness and creativity, and frightful of their future.

In order to change this situation, Professor Bhide established a unique institution called EXPLORATORY. This is an institution where children can explore the laws of nature. Exploratory is so designed that the curiosity of children is sustained, they are communicated the excitement of doing science.



innovativeness and creativity are nurtured. Several thousand students have enjoyed the exploratory way of learning. This novel experiment in education has been lauded all over the country. Exploratory, through very sustained and well designed programme nurtures and nourishes talent, orients school teachers, publishes informative and educative books.

During the last four years, Exploratory has made a visible impact on education in our schools. The response of children, teachers and parents to exploratory way of learning science has been highly encouraging. Two students from Exploratory won International award. In the previous, International Mathematics Olympiad at Argentina, two students, Satyen Kale and Chetan Balwe won the Bronze and the Silver Medals. This year, another student Dillis Thomas has been selected to represent India at the International Physics Olympiad at England.

Professor Bhide introduced a talent search examinations at the First Year B.Sc. level. Several hundred students from local colleges take this test. Based on this test and prolonged discussions only 10-12 students are selected for a special programme designed by Professor Bhide to nurture and nourish their talent. For these highly talented students, special lectures are organized. Each one is made a part of a well-known research group work in NCRA, IUCAA, NCL, ARI, NIV and the University. The performance of the students who have gone through this programme has been outstanding.

SOCIAL SERVICE WORK

Professor Bhide was a trustee of Hind Swaraj Trust, an organization formed to complement the efforts of the state committee appointed by the Govt. of Maharashtra for the ideal Village Programme of Shri Annasaheb Hazare. The board of Trustees comprises of (1) Shri Annasaheb Hazare, (2) Shri NK Firodia, (3) Shri Balasaheb Bharade, and (4) Shri Munot, besides Professor Bhide. The trust has initiated the programme of integrated rural development in 50 villages.

Professor Bhide was also a Member of the Trust entitled 'Gandhi Memorial Society' which is housed at Agakhan Palace and is responsible for Samadhis of Late Kasturba Gandhi, and Mahadeobhai Desai, for promotion of *khadi* and Gandhiji's preachings. Professor Bhide suggested that the society should in pursuance of Mahatma Gandhi's suggestion and as a fulfillment of his dream that Kasturba's samadhi should become a place of pilgrimage, established a National Centre for Women Development. He formulated a scheme for National Training Institute for women as a part of the overall National Centre for women development, essentially aimed at empowering women from rural and semi-urban areas. This proposal has been accepted and soon a National Training Centre for Women will become reality.



INTERACTION WITH INDUSTRY

As a President of Maharashtra Association for Cultivation of Science, Professor Bhide constituted under his chairmanship Techno Economic Services Group. This Group consists of about 25 members, each of whom is an eminent scientist, technologist, industrialist or economist who has now superannuated but has a desire to give benefit of his/her expertise and experience to the society, industry etc.

This group under his leadership has analyzed the causes of the sickness of small scale industries and in cooperation with banks and other financial institutions is attempting to restore health to some of the small scale units. The Group provides free consultancy on technical, managerial and financial matters to small-scale units and helps prospective entrepreneurs for project formulation and the banks in project appraisal. He was compiling a directory of NRI's from PUNE and enlisting their cooperation in initiating some development work in Pune.

As a result of his analysis of the present R and D infrastructure, he found that since there is no agency which even attempts to bridge the gap between developments of technology at laboratory level in the universities to the level of the related industrial technology ready for commercial exploitation, 90% of research of applied nature goes a waste. Through the kind donation from Shri NK Firodia, he recently established Firodia Institute of Technology Development (FITD). FITD aims at providing financial, technical, infrastructure assistance and guidance to young research students to upgrade their laboratory technology to the level of industrial technology and assist them to set up their own units. In a way FITD nurtures and nourishes as well as launches young entrepreneurs.

FITD has solemnized the coupling between two eminent doctors from Bombay who had developed ventilators and an industry at PUNE with the objective of commercially producing various kind of ventilators in the country.

AWARDS AND HONOURS**Academic Honours**

Fellow Royal Astronomical Society (FRAS)	1956
Fellow Indian National Science Academy (FNA)	1968
Secretary, INSA	1973-77
Member, Council of INSA	1977-78
Treasurer, INSA	1980-84
Fellow, Indian Academy of Sciences (FASc.)	1978
Fellow, National Academy of Sciences (FNASc.)	1982
Founder Fellow, Maharashtra Academy of Sciences	1972
President, Maharashtra Academy of Sciences	1986-96
President, Agharkar Research Institute	1992-96
Founder Fellow, Indian Cryogenic Council	1980



President, Physics Section, Indian Science Congress	1971
President, Physical Sciences Section, National Academy of Sciences	1989

Awards

Sir CV Raman Memorial Award	
UGC MN Saha Memorial Award	
President, Marathi Vidnyan Parishad, Baroda	1981
USSR Academy of Sciences Award at Alma Ata	1983
Several Endowment Lectures	
Physical Society Rangadham Rao Memorial Lecture, INSA	1985
Honoured by Bombay Municipal Corporation	1985
Padma Shree, Rashtrapati, India	1992
Vyas Award	1998
Godawari Award	1998
DS Kulkarni Energy Award Institute of Engineering	1999

Editorial Responsibilities

Member, Editorial Board

Journal of Physics Education
Journal of Physical Science, INSA
Journal Instrument Society of India
Pramana
Indian Journal of Physics
Journal Scientific & Industrial Research

Membership of Academic and Research Bodies & Committees

Member of Board of Studies in Physics of several universities.
Member of Senate, IIT Kanpur
Member of Governing Council, IIT Bombay
Member of Selection Committees of various universities
National Laboratories and Govt. Agencies
Member, Review Committee appointed by Govt. of India to review the working of NCERT
Member of UGC Review Committee to review Post-Graduate Teaching in Indian Universities
Member of Selection Committees to select Director and other Senior Officers of DRDO, CSIR, MNES, DST etc.
Member, High Power Committee appointed by Govt. of Maharashtra to look into Modernisation of Police Force in Maharashtra
Member, C-MET of DoE, Chairman of Technical Committee C-MET-PUNE
Member, Materials Committee of DoE, DST etc.
Chairman, DST Committee on Library & Reference Facilities in India etc.
Member, Management Committee Sardar Swaran Singh National Institute for Renewable Energy



Membership of Organizations

Member Board of Trustees "Hind Swaraj Trust"
 Member Board of Trustees "Gandhi Memorial Society"
 President, Maharashtra Association for Cultivation of Science
 President, Agharkar Research Institute
 Chairman, Surya Technical Consultants
 Chairman, Surya Protective Coatings
 Member Board of Directors, Bajaj Tempo
 Member Board of Directors Shirke Research Foundation
 Member, Management Council Yashwantrao Chavan Open University.
 Chairman, Techno Economic Services Group
 Executive Chairman EXPLORATORY
 Member, Board of Trustees FIRODIA TECHNOLOGY TRUST
 Chairman, Governing Council Firodia Institute of Technology Development
 Member, Scientific Advisory Committee Inter University Consortium
 Board of Trustees Ichalkaranji Trust
 Vice-Chairman, Centre for Advanced Strategic Studies
 Member, Board of Trustees, Gandhi Memorial National Society.

Teaching Experience & Research Publications

Teaching experience of over 40 years undergraduate and post-graduate courses.
 He made pioneering contributions to various fields such as
 (1) Crystal growth, (2) Electrical discharge through gases, (3) Ferroelectricity, (4) Mössbauer spectroscopy, (5) X-ray Spectroscopy, (6) Liquid Crystals, and (7) Solar Energy etc.
 He published over 200 research papers on various topics.
 He wrote over 20 review articles on various topics.
 He guided more than 50 research students for their Ph.D. degree.
 He had eight patents.

Other Publications

Professor Bhide had been a prolific writer and had written extensively on S & T in India, ancient philosophy and modern sciences. Some of his publications are:
 Science, Technology & Society and Science and Religion

Science, Religion and Everyday Life

Shri Aurobindo's Philosophy and Modern Science
 Ancient Upanishads and Modern Science
 Vishwaroop Darshan Vidnyanachya Adhyatma
 Report on 'National Calibration Service' submitted to GOI
 Solar Energy Hopes and Promise
 Cryogenics Survey and Outlook
 PHYSICS for Standards V, VI, VII and VIII NCERT
 PHYSICS for Standard XI and XII
 Chapters in three books



Mössbauer effect and its applications

Science & Technology in India

Life History of Stars

Fundamental Forces of Nature

Chapters in books on

a) Ferroelectricity

b) Mössbauer Effect

Some of his books have been published in Chinese and Spanish.

Travel Abroad

Professor Bhide travelled extensively all over the world delivering lectures and participating in international conferences.

- He was coordinator of multi-institutional research and development programme on Newer Fibre and Composites. In this connection he travelled extensively. This programme was lauded by Planning Commission and was highly successful.
- He was Consultant to Govt. of Jamaica on Renewable Sources of Energy. He was a Member of Govt. of India delegation for intergovernmental meetings between Australia and India. The delegation was led by Foreign Secretary.
- He visited the then Soviet Union eleven times for intergovernmental meetings, research conferences etc. He was President of International Conference on Mössbauer Effect and its applications at Alma Ata. He visited China as a Member of delegation sponsored by Indian National Science Academy.
- He delivered keynote address at the International Conference on Solar Energy held at Perth, Australia. He visited Germany, Switzerland, France, USA, the UK several times and delivered lectures and participated in conferences.

LAST DAYS

At the age of 80, Professor Bhide was a youngster. Walking fast, writing a lot, visiting people, giving talks, doing research, he always had a full agenda. He had no time to think of his age. He had endless dreams, dreams for the young, dreams for the nation. Dr Bhide was a simple family man; pleasant and energetic, he would easily mix with children and teach them science in day-to-day life in interesting fashion. His grandchildren Gauri, Niti, Anita and Alok always adored and freely communicated with him. He inculcated highest values mostly through example. He was extremely dear to his students and treated them as his family members. He was indeed a true guru, guide, friend and philosopher to them. He was not only worried about the welfare of his students but always took great interest in the welfare of their families. Deeply spiritual, he worshiped Lord Ganesh and studied Bhagvad Gita.



and always found his understanding of physics bringing him closer to God. Lectures delivered by him on "Ancient Indian Philosophy and Modern Science" are examples of his interest in scientific thought process, going beyond the common perception that science means only laboratory work. In his lucid style, quoting from scriptures and citing results of scientific experiments and he had brought out the consonance between ancient philosophy and modern science. He always loved excellence, and would be thrilled by excellence in any field. But driving force in his life was always physics. Even at this age while watching beauty of deep blue skies in Malaysia, with his wife, he would still remember Raman effect and scattering of light. Meticulous about use of government facilities, often people would see Dr Bhide getting down official car, followed by his family alighting from his personal car to attend the same event. Even during his last illness, he would try to analyze the data generated by various tests and would put few pointed queries to Doctors and then quietly accept the situation. He accepted every opportunity to perform gracefully, used all his might to find solutions and accepted the results equanimously; a true *karmoyogi*.

After completing hectic programme of science day on Feb 28, 2006, Professor Bhide suffered a stroke after which his body refused to co-operate with his spirits. In his death on June 25, 2006, scientific community, education circles, industries, innovation centres, non-government organizations and most importantly the common man have lost their champion and patron. By his enormous scientific talent, his passion for the upliftment of the quality of schools, colleges and university education in our country, his vision for a better future for our students driven by his nationalist spirit, his ability to lead by example, his inner purity of purpose and the ability to work extremely hard towards a cherished goal, he touched almost all aspects of social fabric related to the betterment of our future.

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