CURRICULUM VITAE of PROF. BHABESH CHANDRA SARKAR

1.	**Name**	:	**Prof. BHABESH CHANDRA SARKAR**	
2.	**Father's name**	:	(Late) Dwija Pada Sarkar	
3.	**Present Postal Address**	:	Professor, Department of Earth Sciences, Indian Institute of Technology, Bombay, Powai Mumbai- 400076, Maharashtra Tel. +91-22-2576 7272 (O), Cell: +917260930073; +919431121653 E-mail: bhabesh@iitb.ac.in; bhabeshsarkar2005@gmail.com	
4.	**Nationality**	:	INDIAN (Male, Married)	
5.	**Date of Birth**	:	18 OCTOBER 1958	

6. Educational Qualifications:

Degree / Certificate	**Year of Passing**	**Board/University**
All India Higher Secondary from Sainik School, Purulia	1975	CBSE, New Delhi
B.Sc. (Hons.) in Geological Sciences	1978	I.I.T Kharagpur
M.Sc. in Applied Geology	1980	I.I.T Kharagpur
Ph.D. in Mining Geostatistics (Mining Engineering)	1988	Royal School of Mines, Imperial College of Science and Technology, University of London
DIC in Mineral Resources Engineering	1988	Royal School of Mines, Imperial College of Science and Technology, Univ. of London

7. Broad Field(s) of Specialization: Computational Geostatistics with AI and ML on modelling and characterization of Mineral Deposits; Mineral Exploration and Evaluation.

8. PhD Thesis Title: An Integrated System for Geology-controlled Geostatistical Evaluation (submitted to Imperial College of Science and Technology, University of London in July 1988 and PhD Degree awarded in September 1988).

9. Experience (Academic & Administrative):

(i) Academic & Industry:

Sl. No.	**From**	**To**	**Organization**	**Position**
1	August 2024	To date	IIT Bombay	Professor, Dept. of Earth Sciences
2	March 2022	June 2024	IIT (ISM), Dhanbad	Professor (HAG), Dept. of Applied Geology
3	Sept. 2008	March 2022	IIT (ISM), Dhanbad	Professor, Department of Applied Geology
4	Sept. 2004	Sept. 2008	Indian School of Mines, Dhanbad	Associate Professor, Applied Geology
5	July 1997	June 1998	All India Council for Technical Education, New Delhi	Director (on deputation)
6	March 1993	Sept. 2004	Indian School of Mines, Dhanbad	Assistant Professor Applied Geology

7	Dec. 1989	March 1993	Indian School of Mines, Dhanbad	Lecturer Applied Geology
8	July 1986	Nov. 1989	Hindustan Zinc Limited, Udaipur	Senior Geologist (RP&D)
9	July 1981	June 1986	Hindustan Zinc Limited, Udaipur	Geologist
10	Oct. 1980	June 1981	Mineral Exploration Corporation Ltd., Nagpur	Officer Trainee (Geology)

(ii) Administrative:

Sl. No.	From	To	Organization	Position
1	July 1997	June 1998	**All India Council for Technical Education (AICTE), New Delhi**	**Director (on deputation)**
2	January 2010	Dec 2012	ISM, Dhanbad	Head, Department of Applied Geology
3	January 2013	June 2014	ISM, Dhanbad	Founder Head, Department of Civil Engineering
4	June 2004	August 2010	ISM Dhanbad	Coordinator, Preparatory Course
5	Feb. 2011	Feb 2014	ISM, Dhanbad	President, Sports and Physical Education Centre
6	January 2015	Till date	IIT (ISM) Dhanbad	Professor-in-Charge, Special Projects
7	Sept. 2013	Oct. 2017	IIT (ISM) Dhanbad	Chairman, Committee on IIT(ISM)-Industry-Institute Interaction Facility at Kolkata.
8	Oct. 2015	Oct. 2017	IIT (ISM) Dhanbad	Chairman, Committee on IIT(ISM)-Industry-Institute Interaction Facility at N. Delhi.
9	August 2016	Oct. 2017	IIT (ISM) Dhanbad	Professor-in-Charge, IIT(ISM)-Industry-Institute Interaction Facilities at Kolkata and New Delhi
10	August 2019,	Till date	IIT(ISM) Dhanbad	Chairman, Centenary Celebration Committee
11	Nov. 2015	Till date	IIT(ISM) Dhanbad	Chairman, Maintenance of Artificial Recharge & Rain Water Harvesting Structures
12	July 1997	June 1998	AICTE, New Delhi	Member, Board of Governers of REC, Shilchar as AICTE nominee

10. Awards/Distinctions/Honours Received

(i) National Geoscience Award 2019 of Ministry of Mines, Govt. of India in recognition of outstanding contribution in the field of Applied Geology (Geostatistics and IT Applications in Mineral Exploration);

(ii) Service Excellence Awards of MEAI for the Years 2022 and 2021 in recognition of extraordinary services to MEAI and to the Mineral Industry of India;

(iii) Distinguished Alumnus Award of IIT Kharagpur for the year 2020 for outstanding achievements, leadership, contribution to society, and peer recognition;
(iv) Information Technology Award of MEAI-SRG for the year 2018-19 for significant contribution in Information Technology for Mining and Mineral Industries;
(v) Dr. J. Coggin Brown Memorial Gold Medal award of MGMI for the year 2014-15 for Geological Sciences;
(vi) Master Tanay Chadha Memorial Geologist Award of MEAI for the year 2014 in the field of Mineral Exploration;
(vii) Award of Excellence of SGAT for the year 2014 for contributions in the field of Geostatistics;
(viii) S. Narayanaswami Award 2014 of Geological Society of India for significant contributions in the field of Economic Geology;
(ix) Outstanding Leadership Award of MEAI for the year 2014 for meritorious contribution to the Mineral Industry;
(x) Distinguished Academic Award of IGC for the year 2013 for enhancement and enrichment of the knowledge of Geosciences;
(xi) Dr. P. N. Bose Award of the Indian Mining & Engineering Journal 2013 for contribution in the field of Geological Sciences in general and Geostatistics & IT Applications in particular;
(xii) Subarna and Sashibhusan Bhattacharya Memorial Award of ISM Dhanbad for the year 2009 for Innovative Research in Earth Sciences;
(xiii) Certificate of Membership in the American Association for the Advancement of Science, ABI, USA, 2003;
(xiv) Honorary Appointment to Research Board of Advisors, ABI, USA, 1999;
(xv) Cash prize of £300 for contributing Best Research Paper in Mining Magazine, London, September 1988;
(xvi) Citation honoured by Indian Geological Congress, Feb. 2014 in recognition of scholarship, impeccable devotion to work and outstanding contribution in the field of geostatistics and momentous role in developing intimate academia-mineral & mineral industry liaison;
(xvii) National Overseas Scholarship, Govt. of India 1985 for PhD research in Mining Geostatistics at Royal School of Mines, Imperial College of Sc. & Tech., University of London.

11. Training Programmes Organised/coordinated

Organized various Training Programmes in the domain of Computational Geostatistics and Mineral Exploration.

Sl No	Organisation	Duration	Title of the Training	No. of Participants & Dates
1	Atomic Minerals Directorate for Exploration and Research (AMD) Hyderabad	5-Day	Geostatistics in Exploration Modelling	06 Geoscientists from various Regional Offices of AMD (February 23-27, 2026)
2.	Coal India Ltd, Kolkata	5-Day	Geostatistics and AI	15 Geologists and Mining Engineers (April 21-25, 2025)
3.	Atomic Minerals Directorate for Exploration and Research (AMD) Hyderabad	5-Day	Geostatistics in Exploration Modelling	05 Geoscientists from various Regional Offices of AMD (February 24-28, 2025)
4.	Mineral industry and Universities	3-Day	Introduction to Geostatistical Data Analysis	21 Geoscientists from mineral industry and universities (June 10-12, 2019)

5.	ONGC, Dehradun *	12 weeks	Competency Development for Reservoi Engineers for ONGC Executives (conducted 08 Training programmes from 2017-2019 (Self delivered 12 lectures on Geostatistics of 90 minutes	20 (Geoscientists and Reservoir Engineers) Training conducted during the years 2017 to 2019
			each)	
6.	UltraTech Cements Ltd, Mumbai	One Week	One-week Training Programmes for UltraTech Cements Ltd Mining Engineers and Geologists on 'Geostatistics in Mineral Industry'	20 Geologists & Mining Engineers (Sept. 10-14, 2018)
7.	MECL, Nagpur	Two Weeks	Two-weeks Training Programmes for MECL Executives on 'Mineral Resources Evaluation'	14 Geologists (Nov. 06-17, 2017)
8.	HZL, Udaipur	One Week	Training Programme on 'Advanced Geostatistics for HZL Geoscientists'	15 Geoscientists (Feb. 13-17, 2017)
9.	MECL, Nagpur	Two Weeks	Two-weeks Training Programmes for MECL Executives on 'Mineral Resources Evaluation and Geostatistics'	12 Geologists (Sept. 19-30, 2016)
10.	HZL, Udaipur*	Four Weeks	Advanced training on 'Mining Operations for HZL Young Underground Mining Engineers'	17 Mining Engineers (January-February 2015)
11.	AMD, Hyderabad	Two weeks	Training programmes on 'Geostatistics'	40 Geoscientists (10 each during Sept 2011, Oct 2012, Sept 2013 & Sept 2014)
12	Oil India Limited, Duliajan	4-Day	Geostatistics for Reservoir Modelling and Characterization	12 Geoscientists & Reservoir Engineers (Oct-Nov 2013)
13.	Ministry of Mines, Government of Afghanistan	Two weeks	International Training programme on 'Geological Exploration and Resource Evaluation'	13 Geoscientists of Ministry of Mines, Govt. of Afghanistan (April 2013)
14.	DST, New Delhi	One week	National Training Programmes on 'Mineral Geostatistics' for Scientists and Technologists working in Government Sector under Plan Scheme	75 Government Officers (25 each during March 2010, January 2011 and January 2012)
15.	HZL, Udaipur*	Four Weeks	Advanced training on 'Mining Operations for HZL Young Underground Mining Engineers'	35 Mining Engineers (September 2012)
16.	HZL, Udaipur*	Four Weeks	Advanced training on 'Mining Operations for HZL Young Underground Mining Engineers'	36 Mining Engineers (July 2012)
17.	Reliance Industries Limited, Navi Mumbai	Four days	Training on Geostatistics for Reservoir Modelling and Characterization'	24 Geoscientists (June 2011)
18.	Various Mineral based Industries	Three days	Training on 'Mineral Economics and Management'	18 Geoscientists and Mining Engineers) in March 2008 and Sept 2008
19.	Steel Authority of India, Ranchi	One week	Taining programme on 'Exploration and Orebody Modelling'	25 (Mining Engineers and Geologists) in August 2008
20.	Konkola Copper Mines, Chingola, Zambia (Vedanta)	One week	Offshore International Training programme on 'Geostatistics in Mineral Industry'	35 (Mining Engineers and Geologists) in June 2008
21.	Dept. of Mines & Geology, Jharkhand	Two -week	Training programme on 'Geological Exploration'	13 Geoscientists (March 2008)
22.	ONGC Ltd, Dehradun*	Four-week	Induction training of ONGC executives	25 Engineers & Geoscientists (July 2008)

23.	ONGC Ltd, Dehradun*	Four-week	Induction training of ONGC executives	30 Engineers & Geoscientists (January 2007)
24.	Cairn Energy India Pty Ltd, Chennai	Three days	Training on 'Geostatistics for Reservoir Modelling and Characterization'	30 Geoscientists (February 2005
25.	Tata Steel, Jamshedpur	Two- week	Training Programme on 'Applied Geology'	15 Geoscientists in April 2003
26.	Various mineral industry	One week	Training programme on 'Geostatistics'	52 Mining Engineers during Sept 1992, Sept 2001, and April 2007
26.	UGC Academic Staff College	Three weeks	Refresher course on 'Mineral Exploration'	40 (Geology Teachers in Universities and Colleges) during Nov 1990 and Jan 1996
28.	HZL, Udaipur	One week	Off-campus Training Programme on 'Computer Applications in Mining'	20 (Geologists &Mining Engineers) in June 1990
*As Team member in the Training Programme				

12. Technologies deployed

(i) Artificial Recharge and Rooftop Rain Water Harvesting at IIT(ISM) Dhanbad;
(ii) Geostatistical Modelling and Evaluation of Mineral Resources in Hindustan Zinc Limited;
(iii) Technical Computing in Geology and Mining for Hindustan Zinc Limited;
(iv) Economic evaluation scheme for detailed exploration of Bamnia Kalan zinc-lead prospect, Rajsamand district, Rajasthan;
(v) Computer modelling for an Integrated Ore Reserve-Mine Planning System in Rajpura-Dariba Mines of HZL, Rajasthan;
(vi) Hydrogeological modelling for Rajgamar Dipside, Korba District, Chattisgarh;
(vii) Hydrogeological modelling of Milupara Coalfields, Chattisgarh;
(viii) Geostatistical input provided to Hindustan Copper Limited on Occurrence of Ore Deposits in Singhbhum Copper Belt.

13. Role in National Innovation System (NIS)

(i) Developed improved techniques of Orebody modelling using Geostatistics for modelling, characterization and evaluation of mineral deposits;
(ii) Developed the role of economics in planning for exploration of lead-zinc deposits in the country;
(iii) Developed and Implemented the technique of Rooftop Rain Water Harvesting and Artificial Recharge of rain water to groundwater aquifers at ISM for augmentation of ground water, thereby making ISM a fully Rain water harvested campus;
(iv) Trained various Government Scientists in the subject domain of 'Mineral Geostatistics' through National Training Programmes of DST, Govt. of India as part of Capacity Building in the country, thereby making ISM a DST Nodal Training Centre for Mineral Geostatistics;
(v) Organized All India Exploration Geologists Meet in 2014 as its Chairman at Hyderabad towards capacity building mission of Mining Engineers Association of India (MEAI);
(vi) Actively involved in various activities of DST, CSIR, MoES and other government bodies, like UGC, GSI, Ministry of Mines;
(vii) Evaluated various schemes of Geological Survey of India (GSI) and Mineral Exploration Corporation Limited (MECL) under XIth Plan programme for continuance in XII plan and provided various measures of improvement for country's development in the field of Mineral Survey and Exploration;
(viii) Coordinated a two-week training programme for the officials of Afghanistan Geological Survey as part of country's tie-up Programme with Afghanistan;
(ix) Co-coordinated DST INSPIRE programme at ISM Dhanbad in 2010 and 2012 for inspiring senior secondary school students to pursue Innovation in Science Pursuit for Inspired Research;

14. Contributions to the Nation including Strategic Sector:

(i) Evaluated the XI Plan Schemes of Geological Survey of India (GSI) continuing to XII Plan period, Ministry of Mines, Govt. of India providing national input for geoscientific development;
(ii) Evaluated Scheme for Promotional Projects funded by Ministry of Mines for Detailed Exploration of Mineral Prospects by Mineral Exploration Corporation Limited (MECL) providing input for mineral exploration activity of the country;
(iii) Coordinated several capacity building programmes for geoscientists of Atomic Minerals Directorate for Exploration & Research – a strategic sector;
(iv) Making ISM a fully Rain water harvested campus;
(v) Re-assessed and Vetted DMG, Jharkhand Report on the Iron Ore Deposits of Lease-hold Areas of Steel Authority of India Limited in West Singhbhum District, Jharkhand.
(vi) Coordinated and organized of Ministry of External Affairs, Govt. of India sponsored training programme for officials of Ministry of Mines, Govt. of Afghanistan.
(vii) Formulating and Policy Planning of various activities of country's National Mineral Exploration Trust (NMET) of Ministry of Mines, GOI being its Executive Committee Member.
(viii) Geoscience policy planning for the country as a Member of Geoscience Advisory Council, Ministry of Mines, Govt. of India
(ix) Formulated and Co-ordinated various schemes of Technical Education in the country during deputation as Director in the All India Council for Technical Education in New Delhi.

15. Size of the Research and Development team managed

(i) Developed a team of Geologists and Mining Engineers (15 nos) for Computerisation of Integrated Ore Reserve-Mine Planning system at Hindustan Zinc Limited;
(ii) Nodal Officer for Artificial Recharge and Rain Water Harvesting Structures for augmentation of ground water and impact assessment within the campus of Indian School of Mines, Dhanbad involving a team of 20 members (Geoscientists, Civil Engineers and Environmental Engineers);
(iii) Geostatistical Research Team constituting one Professor (self), one Associate Professor, one Assistant Professor, 16 Research Scholars and 20 postgraduate students at ISM.
(iv) Chaired the R&D activities of Dept. of Applied Geology (2010-12) at ISM Dhanbad.
(v) Coordinator, DST Nodal Training Centre for Mineral Geostatistics at ISM Dhanbad.

16. Professional Experience

Professor at IIT (ISM) Dhanbad

As Professor since Sept 2008 and as **Head of the Department of Applied Geology at IIT (ISM) Dhanbad** during January 2010 to December 2012, had taken up various developmental and collaborative projects on various aspects of Applied Geology, Mineral Exploration, Computer based Modelling and Geostatistics. Supervised and executed various R&D projects and consultancy work in association with National and International Institutions. Conducted various training programmes on Applied Geology including development of Industry-Institution relationship, a dimension which is unique in the country. Organised, supervised and contributed in various National and International events (DST meeting, International Conference, Brainstorming Session, IGC Lecture, Memorial Lectures etc.) to showcase the developmental activities of the Department and formulation of collaborative proposals.

Spearheaded the developments of the Department of Civil Engineering at IIT (ISM) Dhanbad during January 2013 to June 2014 as its Founder Head. Held the responsibility of Professor-in-Charge of Special Projects and Professor-in-Charge of IIT (ISM) Industry Institute Interaction Facility at Kolkata and at New Delhi.

Academic Research and R&D

At IIT(ISM), Dhanbad, been the Principal Coordinator of 8 sponsored projects funded by UGC, CSIR, and AICTE, MHRD and CGWB respectively and Consultant of 30 industrial consultancy programmes including training on Mineral Exploration and Geostatistics. In the research front, to date, supervised 10 PhD research fellows with another 02 on-going at present, 28 M.Tech students, and 88 M.Sc.Tech students and has dealt with exploration modelling of lead, zinc, copper, iron ore, gold, limestone, chromite, bauxite, coal deposits, groundwater potentiality, CBM potentiality, reservoir characterisation of oilfield, and geo-environmental impact assessment.

Artificial Recharge to Ground Water

Leading a team of geoscientists and officers as the Nodal Officer-cum-Principal Investigator of a mega-project on '**Artificial Recharge and Rain Water Harvesting Structures for augmentation of ground water and impact assessment within the campus of Indian School of Mines, Dhanbad**' sponsored by Central Ground Water Board, Ministry of Water Resources, Govt. of India at a total outlay of Rs. 1.89 Crores. Developed and submitted a proposal for setting up of a Centre for Geoscientific Studies for Groundwater Resource Development to the Ministry of Water Resources, Govt. of India for consideration.

Mineral Exploration

Served in Mineral Exploration Corporation Ltd. (MECL), Hindustan Zinc Limited (HZL) and Indian School of Mines (ISM) and contributed significantly in the mineral exploration developments various explored and un-explored deposit areas and mines in the country and aboard. Project formulation, supervision and successful implementation of mineral exploration programme were taken up during 41 years professional career.

Geostatistics Modelling and its Application

Carried out PhD research (1985-1988) at Imperial College of Science and Technology, University of London, developed an Integrated Geological-Geostatistical System, GEXSYS **(**details published in *Mining Magazine, London in 1988*) and had applied the integrated system to five mineral deposits across the globe representing different *mineralisation types*, *viz.*

(i) Rampura-Agucha *stratiform type* zinc-lead deposit, Rajasthan, India;
(ii) Quellaveco *porphyry type* copper deposit, Peru, South America;
(iii) Hogranch *low grade disseminated type* gold deposit, Nevada, USA;
(iv) Tel *vein type* gold deposit, British Columbia, Canada; and
(v) Mfamosing *bedded type* limestone deposit, Cross River state, Nigeria, West Africa.

Supervised projects with special reference to the applications of geostatistics for modelling and characterization of mineral resources and exploration optimisation in various mining projects. Subsequently, the integrated system has been successfully applied in India for mineral deposit modelling, mineral inventory estimation and exploration optimization of several mineral deposits, *viz*. lead, zinc, copper, iron ore, gold, limestone, chromite, bauxite, coal etc.

Ground Water and other Modelling: Conceptualization, formulation, supervision and implementation of various ground water modelling studies including modelling of groundwater potentiality, aquifer characteristics, CBM potentiality, reservoir characterisation of oilfields, and geo-environmental impact assessment.

Mineral Exploration and Deposit Modelling

Supervised Mineral Exploration and Deposit Modelling work related to lead-zinc deposits while in Hindustan Zinc Limited, *viz.* Sargipali Mines (Orissa), Rajpura-Dariba Mines (Rajasthan), Bamnia Kalan Project (Rajasthan) and Rampura-Agucha Mines (Rajasthan) among others which include preparation of exploration scheme of Tosham tin deposit (Haryana), Degana tungsten deposit (Rajasthan).

Guided a team of geologists for computerisation of mining geological activities, which was instrumental at Rajpura-Dariba Mines of HZL for computerization of integrated ore reserve-mine planning system. A team of geoscientists was created after proper training and capacity building for computer based exploration modelling using geomathematical techniques.

During the tenure at **Mineral Exploration Corporation Ltd (MECL),** Nagpur, worked on Coal Exploration in Kendua Block of Jharia Coalfield and preparation of Geological Report.

ADVANCED COMPUTERISED GEOSTATISTICAL MODELLING IN MINERAL EXPLORATION

Significant contribution made in the field of Mineral Exploration using geostatistical modelling includes:

- Development of Computerised Mineral Exploration System for Iron Ores of India;
- Exploration Modelling for Bauxite Resources using Geostatistical techniques;
- Economic modelling for planning exploration strategy with reference to lead-zinc deposits in India;
- Coal Exploration Modelling using Geostatistics in Jharia Coalfield, Jharkhand;
- Prediction Modelling of mineral resources using Zipf's law and fractal regression;
- Geospatial Modelling of Copper Mineralisation in Singhbhum Belt, Jharkhand;
- Geostatistical modelling of Iron ore deposits of Singhbhum-Keonjhar-Bonai Belt;
- Statistical modelling of Jhabua phosphorite deposit, Madhya Pradesh;
- Development of integrated statistical model to evolve exploration guides for mica search in Nellore mica belt around Gudur, Andhra Pradesh;
- Geostatistical modelling of Gurahar Pahar gold prospect in Mahakoshal greenstone belt, Central India;
- Geostatistical Modelling of Polymetallic Nodules from parts of Central Indian Ocean Basin;
- Exploration drilling optimization using Geostatistics;
- Geostatistical modelling of gold mineralisation at Hutti mine, Raichur district, Karnataka;
- Geostatistical modelling of Rampura-Agucha zinc-lead deposit, Bhilwara district, Rajasthan;
- Geo-environmental quality assessment in Jharia coalfield using multivariate statistics.
- Geostatistical reservoir modelling of an Indian Oilfield using kriging and simulated annealing.

Contribution to the Government Projects

Notable deliverables were made for departments of Government of India and PSU's through various projects and studies which *inter alia* include:

- Evaluation of the **XI Plan Schemes of Geological Survey of India (GSI) continuing to XII Plan period**;
- Evaluation of **Scheme for Promotional Projects** funded by Ministry of Mines for Detailed Exploration of Mineral Prospects by Mineral Exploration Corporation Limited (MECL);
- **Vetting of DMG, Jharkhand Report** on the Iron Ore Deposits of Lease-hold Areas of Steel Authority of India Limited in West Singhbhum District, Jharkhand;
- **Coordinating Training Programme (2011 to 2014)** on 'A Primer on Geostatistics' for Scientists of **Atomic Minerals Directorate for Exploration and Research**, Department of Atomic Energy, Govt. of India;
- **Coordinating DST, Govt. of India sponsored National Training Programmes** on Mineral Geostatistics for Scientists and Technologists working in Government Sector under Plan Scheme for the years 2010, 2011 and 2012;
- **Coordinating Capacity Building Programmes** on Geostatistics for Hindustan Zinc Ltd, Mineral Exploration Corporation Limited and Oil India Limited.

- Providing inputs for locating favourable targets of viable copper mineralization under the Technical Programme *'**Future exploration programme of Singhbhum Copper Belt**'* of **Hindustan Copper Limited** in 1999.

Global Achievement

- **Team Member, World Bank Assisted Project** on 'Implementation Assistance for Strengthening of Environmental and Social Management capability for Coal India Limited';
- **Consultant for International Training Programme on** '**Geostatistics in Mineral Industry**', held **at Konkola Copper Mines, Chingola, Zambia** during June 09-14, 2008;
- **Member, International Earth Science Olympiad**, 2012-2015;
- **International Scientific Committee member** for International Association of Mathematical Geosciences 2014;
- Coordinator of training programme on '**Geological Exploration and Resource Evaluation' for Officials of Ministry of Mines, Government of Afghanistan sponsored by Ministry of External Affairs, Govt. of India** during April 14-28, 2013;
- **Convene**r, International Conference on 'New Paradigms of Exploration and Sustainable Mineral Development: **Vision 2050 during Nov. 10-12, 2011**.
- **Convener** of 5th, 6th and 7th Indian Mineral Congress during 2013, 2014 and 2015.
- **Convener**, Brain Storming Workshop on Geostatistics for Natural Resources Modelling during Feb. 28, 2014.
- **Convener**, National Conference on Water and its Sustainability in Mining and Other Environment: Vision 2050 during March 28-29, 2014.
- **Convener,** Brain Storming Workshop on Mineral Exploration and Ore Body Modelling (MEOBM) in the Ist Triennial Congress
- **Convener,** Brain Storming Workshop on 'Mineral Exploration and Ore Body Modelling (MEOBM)' in the 1st Triennial Congress of the Federation of Geosciences Association (FIGA), Dhanbad, November 8-10, 2016.
- **Member,** Scientific Programme Committee of International Geological Congress to be held in March 2020.

Training & Capacity Building

Extensive experience of **designing and conducting various training and capacity building programmes** for geoscientists of various Organisations (*viz.* ONGC, OIL, Cairn India, AMD, MECL, GSI, IBM, DMGs, HZL, HCL, CIL, NMDC, UCIL, NALCO, BALCO, SAIL, MOIL, CGWB, CIMFR TISCO, RSMDC, GMDC, ACC, L&T, Cairn India and Reliance Industries Ltd. Organising and coordinating Professional Development Training Programmes on Geostatistics and Mineral Exploration Modelling for Spatial Mapping of Mineral Resources.

Trained Geologists and Mining Engineers of Konkola Copper Mines, Zambia in Advanced Resource Evaluation and Mining Geostatistics; Coordinated and organised of Ministry of External Affairs, Govt. of India sponsored training programme for officials of Ministry of Mines, Govt. of Afghanistan.

Planning and Policy formulation for Technical Education

As **Director in the All India Council for Technical Education (AICTE), New Delhi** on deputation during 1997-98, had been responsible for Planning and Policy formulation for Technical Education in the country**.** Contributed towards the formulation of standards and guidelines, implementation of AICTE schemes, and coordinating with the Ministry of Human Resource Development, Govt. of India.

17. Publications and Patents

Published a **total of 128 geoscientific research papers** in various **International and National journals and conference proceedings of repute** besides having published **02 Patent Granted and 11 Patents Filed and published, 03 Books (including Elsevier USA 2016), 05 Edited Volumes; 04 Technical Reports;** reflecting advances in mineral exploration and resource assessment.

Research Papers (128)

1. Sarkar, B. C., O' Leary, J., Mill, A. J. B. (1988) An integrated approach to geostatistical evaluation; *Mining Magazine*; London; vol. 159, no. 3, pp 199-207.
2. Sarkar, B. C., O' Leary, J., Mill, A. J. B. (1990) Computer based geological-geostatistical evaluation system; *Proc.* International Symposium on Application of Computers and Operations Research in the Mineral Industry, Berlin, vol. 2, pp. 601-612.
3. Sarkar, B. C. and Sen, P. (1992) A geostatistical approach to open pit mine parametrization; Proc. National Seminar on Surface Mining, IME Publ., Calcutta, pp. 2.2.1 - 2.2.5.
4. Sarkar, B. C. and O' Leary, J. (1993) Computer-aided geology-controlled geostatistical modelling for Rampura-Agucha lead-zinc deposit, India; *Proc.* 24th International Sym. on Application of Computers and Operations Research in the Mineral Industry, Montreal, vol .2, pp. 430-437.
5. Sarkar, B. C. (1993) Advances in the techniques of orebody modelling; *Proc.* 2nd Indian Conference on Computer Applications in Mineral Industry, Madras; pp. 59 - 61.
6. Sarkar, B. C., O' Leary, J., Mill, A. J. B. (1993) GEXSYS - An expert system for geology-controlled geostatistical evaluation; *In:* Dev. of India's Mineral Resources - geological and mineral economic aspects, Hindustan Publ. Corp. (India); Delhi; pp. 136 - 144.
7. Sinha, D. K., Sarkar, B.C. and Majumder, T. (1994) Mineral Inventory database through computer - an integral part of total mine planning system; In: Computers in Mineral Industry, Oxford & IBH Publ. Co.; pp.127 - 164.
8. Kala, P. P., Bahadur, S., Gandhi, S. M. and Sarkar, B.C. (1994) On some economic concepts for planning an exploration strategy with special reference to lead-zinc deposits in India; *Jour.* Mines. Metals and Fuels; vol. XLII, no. 7, pp.163-170.
9. Sarkar, B.C., Nayak, V.K. and Rao, P.S. (1995) Statistical modelling of exploration data for grade potential of the phosphorite deposit, Khatamba blocks, Jhabua District, Madhya Pradesh; *Jour*. Geol. Soc. India; vol. 46; no. 2; pp. 139 - 147.
10. Sarkar, B.C. (1995) Geostatistics and its proper use in mineral exploration and mine planning; Proc. National Seminar on Status of Mineral Exploration in India, MINEX - 95; New Delhi; pp. 39 - 42.
11. Chakraborty, P.K., Sen, A.K. and Sarkar, B.C. (1995) Geostatistical parametrization for grade control of stratiform banded iron formations in Singhbhum - Keonjhar - Bonai belt of India; *Proc.* 25th International Symposium on Application of Computers and Operations Research in the Mineral Industry, Brisbane, pp. 161 - 169.
12. Basumallick, S., Sarkar, B.C. and Banerjee, S. (1996) Tidal cyclicity in lower Bhander sandstone, Maihar, Madhya Pradesh; *Jour*. Geol. Soc. India; vol. 47; no. 2; pp. 189 - 194.
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123. Arya Vinod, Anup Krishna Prasad, Sameeksha Mishra, Bitan Purkait, Shailayee Mukherjee Anubhav Shukla, Nirasindhu Desinayak, Bhabesh Chandra Sarkar and Atul Kumar Varma (2024) A novel multi-model estimation of phosphorus in coal and its ash using FTIR spectroscopy. *Scientific Reports* 14:13785 (https://doi.org/10.1038/s41598-024-63672-x)
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125. Satyam Priyadarshi, Ashwani Dev and Bhabesh C Sarkar (2025) Shaping the Future of Geosciences with Exponential Technologies for the Fossil Fuel Industry. In: Innovative and Responsible Mining for Inclusive Growth, Springer Proceedings in Earth and Environmental Sciences; pp.3-12;

(https://doi.org/10.1007/978-3-032-09929-7_1).

126. Ritik Dubey, Rahul Kumar Singh, Asim Tewari, and Bhabesh C. Sarkar (2025) Deep Kernel Learning Framework for Anisotropic Modelling of Iron Ore Grade Distributions. In: Innovative and Responsible Mining for Inclusive Growth, Springer Proceedings in Earth and Environmental Sciences; pp. 449-462. (https://doi.org/10.1007/978-3-032-09929-7_32).
127. Vedant Heda, Ritik Dubey, Asim Tewari, and Bhabesh C. Sarkar (2025) Integrating Domain-Aware Machine Learning for Mineral Prospectivity Modelling. In: Innovative and Responsible Mining for Inclusive Growth, Springer Proceedings in Earth and Environmental Sciences; pp. 463-476. (https://doi.org/10.1007/978-3-032-09929-7_33).
128. Anup K. Prasad, Sameeksha Mishra, Arya Vinod, Anubhav Shukla, Bitan Purkait, Shailayee Mukherjee, Atul K. Varma, and Bhabesh C. Sarkar (2025) A Novel Machine Learning Approach to Rapid Estimation of Coal Quality Parameters Using Mid-Infrared FTIR Spectroscopy. In: Innovative and Responsible Mining for Inclusive Growth, Springer Proceedings in Earth and Environmental Sciences; pp. 477-491. (https://doi.org/10.1007/978-3-032-09929-7_34).

Patents Granted (02):

1. Estimation of Ash Yield in Coal An Indian patent titled "Multi-model method and system of estimation of ash yield in coal using mid-infrared Fourier transform infrared spectroscopy" (Application No. 202431065336) was granted on November 18, 2025. The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are Anup Krishna Prasad, Sameeksha Mishra, Arya Vinod, Anubhav Shukla, Shailayee Mukherjee, Bitan Purkait, Atul Kumar Varma, and **Bhabesh Chandra Sarkar**.
2. Estimation of Gross Calorific Value (GCV): An Indian patent titled "A novel multi-model method of estimation of the gross calorific value (GCV) in coal using mid-infrared Fourier transform infrared spectroscopy" (Application No. 202531012376) was granted on December 31, 2025. The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are Anup Krishna Prasad, Arya Vinod, Sameeksha Mishra, Bitan Purkait, Anubhav Shukla, Shailayee Mukherjee, **Bhabesh Chandra Sarkar**, and Atul Kumar Varma

Patents Filed and Published (11)

1. Estimation of Soil Vanadium Content: An Indian patent application titled "A system and method for the rapid estimation of soil vanadium content using mid-infrared FTIR spectral data analysis and a multi-model machine learning framework" (Application No. 202531078724) was published on August 29, 2025. The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed include Anup Krishna Prasad, Rachna Rakesh, Bitan Purkait, Shailayee Mukherjee, Arya Vinod, Sandhya Sonker, Tathastu Das, Ayesha Nayak, Suren Nayak, Nirasindhu Desinayak, Ashish Panda, Ashmeer Mohammad, **Bhabesh Chandra Sarkar**, Atul Kumar Varma, and Akella Satya Venkatesh.
2. Estimation of Chromium Content: An Indian patent application titled "A method and system for the rapid estimation of chromium content in soil using mid-infrared FTIR spectral data analysis and a multi-model machine learning framework" (Application No. 202531074870) was published on August 15, 2025. The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are Anup Krishna Prasad, Bitan Purkait, Shailayee Mukherjee, Arya Vinod, Rachna Rakesh, Ayesha Nayak, Tathastu Das, Sandhya Sonker, **Bhabesh Chandra Sarkar**, and Atul Kumar Varma.
3. Estimation of Carbon in Coal: An Indian patent application titled "A method of multi-model estimation of carbon in coal using mid-infrared Fourier transform infrared spectroscopy" (Application No. 202431076911) was published on October 18, 2024. The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are Anup Krishna Prasad, Sameeksha Mishra, Arya Vinod, Anubhav Shukla, Bitan Purkait, Shailayee Mukherjee, Atul Kumar Varma, and **Bhabesh Chandra Sarkar**.

4. Estimation of Phosphorus Content; An Indian patent application titled “A method for rapid estimation of phosphorus content in coal and ash using mid-infrared Fourier transform spectroscopy and application of machine learning techniques” (Application No. 202531033924) was published on April 11, 2025. The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are Anup Krishna Prasad, Arya Vinod, Sameeksha Mishra, Bitan Purkait, Shailayee Mukherjee, Anubhav Shukla, Nirasindhu Desinayak, **Bhabesh Chandra Sarkar**, and Atul Kumar Varma.
5. Estimation of Lead in soil: An Indian patent application titled “A system and method for the rapid estimation of soil lead content using mid-infrared FTIR spectral data analysis and a multi-model machine learning framework". (Application No. 202531114907, 12/12/2025). The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are Anup Krishna Prasad, Shailayee Mukherjee, Bitan Purkait, Sandhya Sonkar, Rachna Rakesh, Ayesha Nayak, Tathastu Das, Arya Vinod, Atul Kumar Varma, **Bhabesh Chandra Sarkar**.
6. Estimation of Manganese in Ore: An Indian patent application titled “A system and method for the rapid estimation of manganese content in manganese ore using mid-infrared FTIR spectral data analysis and a multi-model machine learning framework". (Application No. 202531116056, Published 09-01-2026). The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are Anup Krishna Prasad, Shailayee Mukherjee, Bitan Purkait, Nirasindhu Desinayak, Rachna Rakesh, Ayesha Nayak, Tathastu Das, Arya Vinod, Atul Kumar Varma, **Bhabesh Chandra Sarkar**, Suren Nayak, Dhirendra Pratap Singh.
7. Estimation of Copper in Ore: An Indian patent application titled “A system and method for the rapid estimation of copper in copper ores using mid-infrared FTIR spectral data analysis and a multi-model machine learning framework”. (Application No. 202531133765, Published 16-01-2026). The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are Anup Krishna Prasad, Tathastu Das, Ayesha Nayak, Nirasindhu Desinayak, Suren Nayak, Bitan Purkait, Shailayee Mukherjee, Arya Vinod, Rachna Rakesh, Dhirendra Pratap Singh, **Bhabesh Chandra Sarkar**, Atul Kumar Varma.
8. Estimation of Iron in Ore: An Indian patent application titled A system and method for the rapid estimation of iron in iron ores using mid-infrared FTIR spectral data analysis and a multi-model machine learning framework” (Application No. 202531133736, Publsihed 16-01-2026). The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are Anup Krishna Prasad, Tathastu Das, Ayesha Nayak, Suren Nayak, Nirasindhu Desinayak, Rachna Rakesh, Bitan Purkait, Arya Vinod, Shailayee Mukherjee, Dhirendra Pratap Singh, Ashmeer Mohammad, Akella Satya Venkatesh, **Bhabesh Chandra Sarkar**, Atul Kumar Varma.
9. Estimation of Zinc in soil: Indian Patent Application titled “A method for rapid estimation of soil zinc content using mid-infrared FTIR spectral data analysis and a multi-model machine learning framework.” (Application No. 27/02/2026). The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are: Anup Krishna Prasad, Shailayee Mukherjee, Bitan Purkait, Sandhya Sonker, Rachna Rakesh, Tathastu Das, Ayesha Nayak, Arya Vinod, Atul Kumar Varma, **Bhabesh Chandra Sarkar**.
10. Estimation of Cobalt in soil: An Indian patent application titled “A system and method for the rapid estimation of cobalt content in soil using mid-infrared FTIR spectral data analysis and a multi-model machine learning framework”. (Application No. 202631040763, Filed 31.03.2026). The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are Anup Krishna Prasad, Rachna Rakesh, Bitan Purkait, Shailayee Mukherjee, Arya Vinod, Tathastu Das, Ayesha Nayak, Kumari Preety, Akella Satya Venkatesh, **Bhabesh Chandra Sarkar**, Atul Kumar Varma.
11. Estimation of Nickel in soil: A system and method for the rapid estimation of nickel content in soil

using mid-infrared FTIR spectral data analysis and a multi-model machine learning framework. (Application No. 202631040739, Filed 31.03.2026). The patent was assigned to the Indian Institute of Technology (Indian School of Mines), Dhanbad. The inventors listed are Anup Krishna Prasad, Bitan Purkait, Shailayee Mukherjee, Arya Vinod, Rachna Rakesh, Ayesha Nayak, Tathastu Das, Sandhya Sonker, **Bhabesh Chandra Sarkar**, Atul Kumar Varma.

Books, Manuals and Edited Volumes (08)

1. Trivedy, A.N., **Sarkar, B.C**., Ghose, N.C. and Dhar, Y.R. (2000) Geology and Mineral Resources of Bihar and Jharkhand. IGE Monograph 2, Patna, 355p.
2. **Sarkar, B. C.** (2003) Geographic Information System and its Role in Geo-environmental Issues. MINENVIS Monograph, Ministry of Environment and Forest, ISSN 0972-4656, 143 p.
3. Saxena, N.C., Singh, G., Patha, P., **Sarkar, B.C**., and Pal, A.K. (2005) Mining Environment Management Manual'. Scientific Publishers (India), ISBN: 81-7233-366-8; 711 p.
4. Varma, A.K., Dubey, R.K., **Sarkar, B.C**., and Saxena, V.K. (2010) Geological and Technological Facets of CBM, Shale gas, Energy resources and CO_2 Sequestration. Allied Publishers Pvt. Ltd., ISBN: 978-81-8424-643-8; 288 p.
5. Varma, O.P., **Sarkar, B.C**., Varma, A.K., Mukherjee, M.K. and Singh, Sahendra (2011) New Paradigms of Exploration and Sustainable Mineral Development: Vision 2050, ISBN: 978-81-8465-954-2, 852p.
6. **Sarkar, B.C.** (2014) Geostatistics for Natural Resources Modelling, ISBN: 978-93-5156-635-9, 178 p.
7. **Sarkar, B. C.**, Srinivas, P. and Kolathayar, S. (2014) Water and its Sustainability in Mining and other Environment: Vision 2050, ISBN: 978-93-5156-850-6, 319 p.
8. **Gandhi, S.M. and Sarkar, B.C. (2016) Essentials of Mineral Exploration and Evaluation. Elsevier Publishers, USA, 406 p.**

Technical Reports/ Book Review (04)

1. Technical Computing in Geology and Mining for Hindustan Zinc Limited, 1988 (Prepared jointly in a team in Hindustan Zinc Ltd).
2. Economic evaluation scheme for detailed exploration Bamnia Kalan zinc-lead prospect, Rajsamand district, Rajasthan, 1988 (Prepared jointly in a team in Hindustan Zinc Ltd).
3. A GIS approach to groundwater potentiality of Shamri micro-watershed in the Shimla Taluk, Himachal Pradesh - NNRMS sponsored ISRO project, 2000.
4. Book Review on 'Water and its Sustainability in Mining and other Environment : Vision 2050'; R. H. Sawkar and B. C. Sarkar (2014), *Jour*. Geological Society of India, Vol. 84, No. 1, pp. 114-119.

18. Total Professional Experience:

- **Total Length of Professional Experience to date:** 45 yrs 06 months (as on 31.03.2026).
- **Academic & Administrative Experience:** 36 yrs 04 months at IIT(ISM) Dhanbad and AICTE New Delhi (on deputation 1997-98).
- **Industry Experience:** 09 years 02 months at MECL Nagpur and HZL Udaipur.

19. Ph.D. Research Supervision: Awarded: 11; Ongoing: 2
M. Tech Dissertation Supervision: Awarded: 32;
M.Sc. Tech Dissertation Supervision: Awarded: 93;

20. Details of Sponsored/Consultancy Projects
(a) R&D Projects: 08 nos. (b) Consultancy Projects: 31 nos.

21. Industry-Institution Liaison

- Under the Programme *'Future exploration programme of Singhbhum Copper Belt'* of Hindustan Copper Limited, inputs for locating favourable targets of viable copper mineralisation were provided.
- Training Programme on '*Applied Geology'* for geoscientists of Tata Steel.
- Training programme on '*Mineral Geostatistics*' for various organisations, viz. AMD Hyderabad, SAIL Ranchi, DMG Govt of Jharkhand, DST, GOI, New Delhi etc.
- Training Programmes on '*Geostatistics for Reservoir Modelling and Characterization'*, for Cairn Energy India Pty Ltd, RIL, OIL, ONGC in 2005; 2011 in 2013; in 2017; and during 2018-2019.
- World Bank Assisted Project on 'Implementation Assistance for Strengthening of Environmental and Social Management Capability for Coal India Limited'.
- Interaction on Orebody modelling with Konkola Copper Mines, Chingola, Zambia, 2008.
- Knowledge dissemination to several mineral and mining industries through organisation of Professional Development Training Programmes.
- Consultancy to Monnet Ispat & Energy Limited, New Delhi on Hydrogeological Investigations.
- Knowledge intensive Training Programme on *Mineral Resource Evaluation and Geostatistics* to the geologists of MECL, Nagpur in 2016 and 2017.

22. Other Engagements

(i) Chairman, Expert Committee for the review of BSIP Lucknow, DST, New Delhi.
(ii) Member, Technical Programme Committee, ANRF-ARG, New Delhi, 2025-28.
(iii) Member, Technical Programme Committee, ANRF-MATRICS, New Delhi, 2025-28.
(iv) Expert Member, Selection Committee, Odisha Public Servive Commission.
(v) Member, Chintan Shivir of Ministry of Mines, Government of India, Group II "Encouraging Private Exploration Access to Geo-scientific Data to All"; December 2024 to date;
(vi) Evaluator of NMET projects under Ministry of Mines, Govt. of India, 2019-20.
(vii) Executive Committee Member, National Mineral Exploration Trust (NMET), Ministry of Mines, Government of India w.e.f. August 2015.
(viii) Member, Geoscience Advisory Council (GAC), Ministry of Mines, Government of India since w.e.f. 2016.
(ix) Co-opted Member of the Expert Committee on Earth and Atmospheric Sciences (EC-E&AS), SERB, DST, Govt. of India, 2022.
(x) Member of the Expert Committee for Mathematical Research Impact-Centric Support Scheme (MATRICS), SERB, DST, Govt. of India, 2022.
(xi) Council Member, Mining Geological Metallurgical Institute (MGMI), Kolkata.
(xii) Council Member, Indian Geological Congress, Roorkee.
(xiii) Council Member, The Geological, Mining, Met. Society of India, Kolkata.
(xiv) Council Member, The South Asian Association of Economic Geologists, New Delhi.
(xv) Member, Training & Development Committee, Mining Engineers Association of India, Hyderabad.
(xvi) Member of Academic Council, Aryan Institute of Technology, Bhubaneswar.
(xvii) Member of Selection Committees in various organizations.
(xviii) Vice-President, Indian Geological Congress, Roorkee.
(xix) Chairman, Dhanbad Regional Chapter of SAAEG, New Delhi.

(xx) Chairman, Mining Engineers Association of India, Dhanbad Chapter, Dhanbad.

(xxi) Convener, International Conference on 'New Paradigms of Exploration and Sustainable Mineral Development: Vision 2050' and 17th Convention of Indian Geological Congress, Dhanbad, 2011.

(xxii) Member, UGC Expert Committee on Special Assistance Programme (SAP) on Geology.

(xxiii) Member, Task Force on Empowerment and Equity Opportunities for Excellence in Science, SERB, DST, New Delhi.

(xxiv) Reviewer, Elsevier Publishing, Ore Geology Reviews, Natural Resources Research, Minerals.

(xxv) PhD Examiner, Andhra University, Jammu University, Nagpur University, Pondicherry University.

(xxvi) Member, Steering Committee, 18th Convention of Indian Geological Congress, Bhopal, 2013.

(xxvii) Member, Standing Committee on Earth Science Olympiad, Ministry of Earth Sciences, Govt. of India, 2013.

(xxviii) Evaluator of Scheme for Promotional Projects funded by Ministry of Mines for Detailed Exploration of Mineral Prospects by Mineral Exploration Corporation Limited.

(xxix) Evaluator of The XI Plan Schemes of Geological Survey of India continuing to XII Plan Period funded by Ministry of Mines, Govt. of India.

(xxx) Chairman, All India Exploration Geologists Meet (AIEGM)–2014, Organised by MEAI, Hyderabad.

(xxxi) President, SCOLOMIN Club, ISM Dhanbad (2010-12).

(xxxii) Member, Science Programme Committee (SPC) of International Geological Congress (IGC).

23. Membership in Professional Bodies

(i) Life Fellow, Geological Society of India, Bangalore;

(ii) Fellow, The Geological, Mining and Metallurgical Society, Kolkata;

(iii) Hon. Fellow, The Geological Association and Research Centre, Balaghat;

(iv) Life Fellow, Indian Geological Congress, Roorkee;

(v) Life Fellow, Indian Academy of Geosciences, Hyderabad;

(vi) Life Fellow, The South Asian Association of Economic Geologists, New Delhi;

(vii) Life Member, Indian Geophysical Union, Hyderabad;

(viii) Life Member, The Association of Environmental Geochemists, Hyderabad;

(ix) Life Member, Mining Engineers Association of India, Hyderabad;

(x) Life Member, Society of Geoscientists and Allied Technologists, Bhubaneswar;

(xi) Life Member, Mining, Geological and Metallurgical Institute of India, Kolkata;

(xii) Life Member, Society of Geo-Scientists Association, Ranchi, Jharkhand;

(xiii) Life Member, The Gondwana Geological Society, Nagpur

(xiv) Life Member, Indian Society of Engineering Geology, Kolkata

(xv) Member, Society for Mining, Metallurgy and Exploration, Englewood, CO, USA.

Date: 31.03.2026 **(Bhabesh Chandra Sarkar)**