



Legacy that Inspires the Future

R&D Newsletter

Quarterly Newsletter of the Office of the Dean (R&D), IIT(ISM) Dhanbad

Vol. 3, October-December, 2024



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About R&D Newsletter

The quarterly newsletter of the Office of the Dean (R&D), IIT(ISM) Dhanbad called "*R&D Newsletter*" is an in-house publication. The e-version of this newsletter is available on our official website at www.https://people.iitism.ac.in/~research/

Dear Reader,

This issue of "*R&D Newsletter*" is to showcase our excellence in academic and research activities. With our ever expanding academic network and research base, we are able to show our strength as an Institute of National Importance.



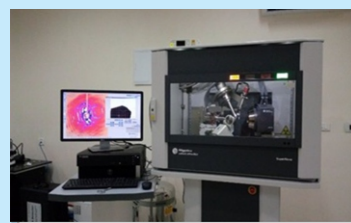
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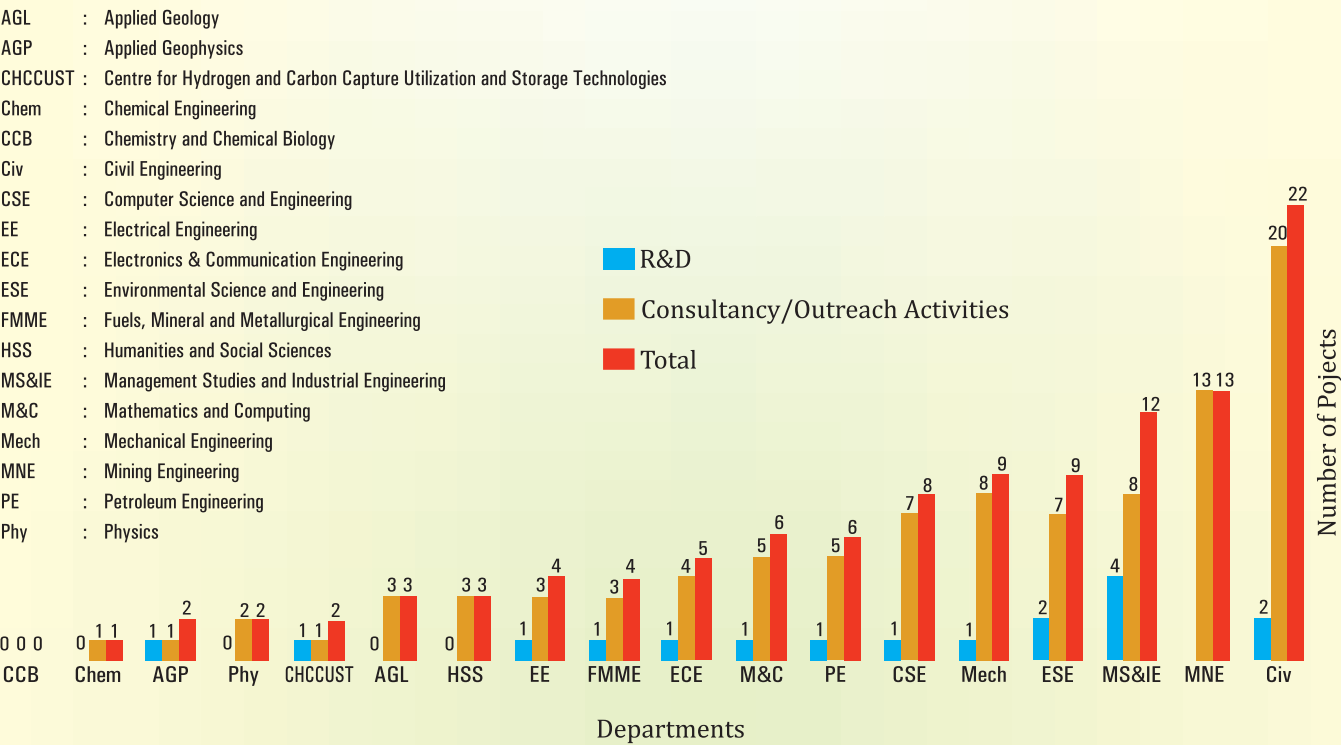
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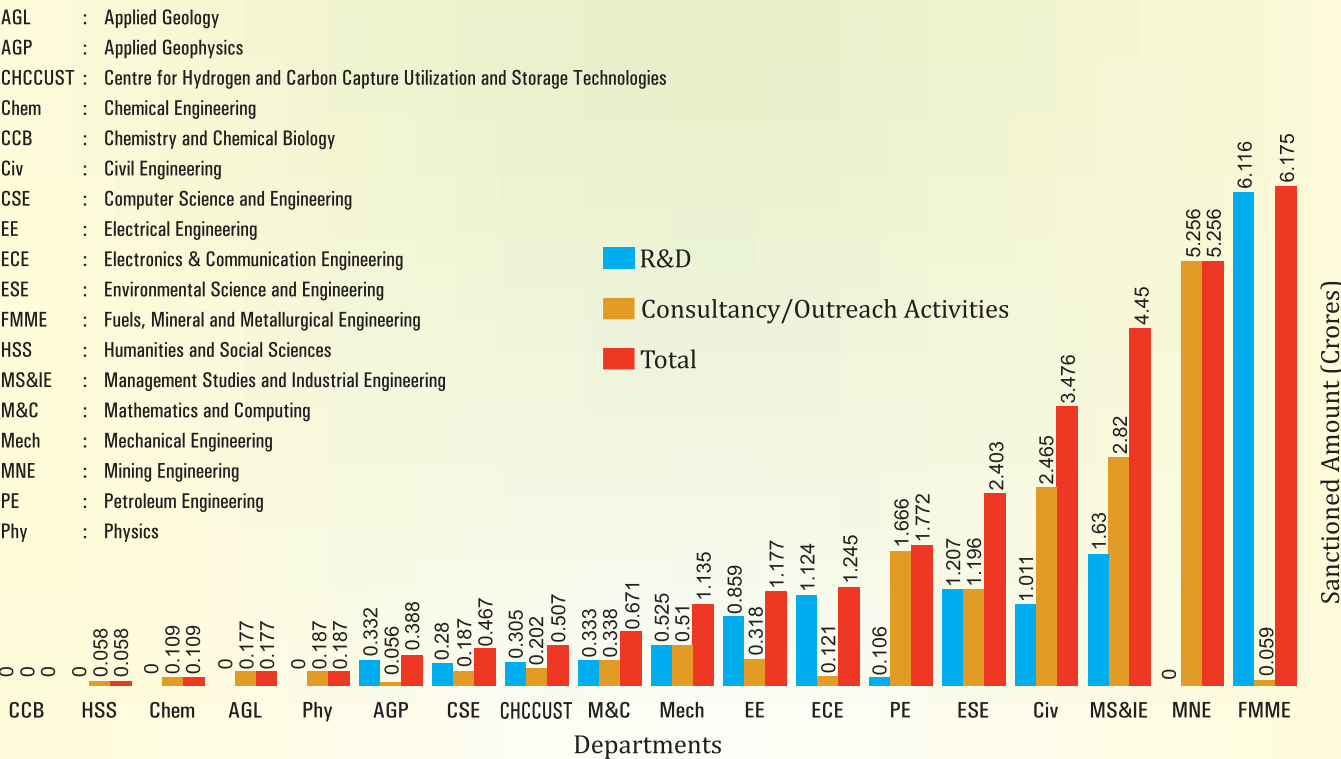


R&D Funding of the Institute

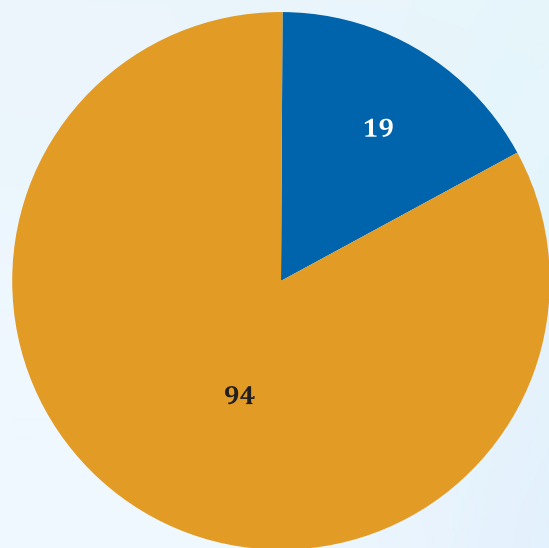
No. of R&D Projects, Consultancy/Outreach Activities (Oct.-Dec., 2024)



Sanctioned Amount (in Crore) of R&D Projects, Consultancy/Outreach Activities (Oct.-Dec., 2024)



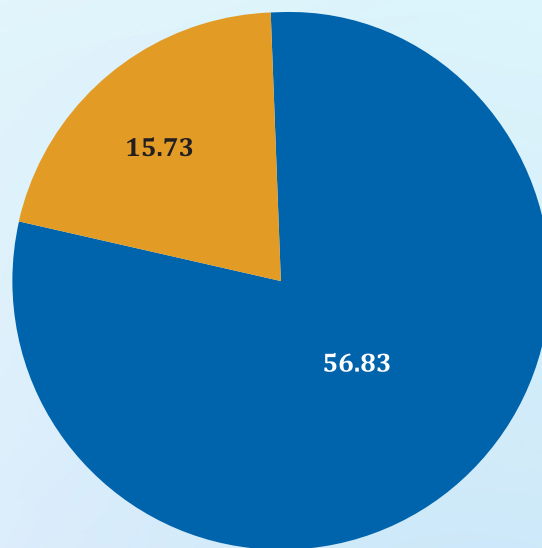
No. of R&D Projects, Consultancy/ Outreach Activities (Oct-Dec, 2024)



■ R&D Projects
■ Consultancy/Outreach Activities

R&D Projects (No)	Consultancy/Outreach Activities (No)
19	94

Sanctioned Amount (in Crore) of R&D Projects, Consultancy/ Outreach Activities (Oct-Dec, 2024)



■ R&D Projects
■ Consultancy/Outreach Activities

Sanctioned amount of R&D Projects (Crores)	Sanctioned amount of Consultancy/Outreach Activities (Crores)
56.83	15.73

Major R&D Projects/Consultancy / EDP/CoEs

Prof. Esha Saha/MS&IE (Coordinator), along with her team members (Prof. Shikha Singh, Prof. Pradeep Rathore, Ms. Monika Sonu, Mr. Kingshuk Chakraborty) received an R&D Project (**Rs. 96 lakhs**) titled “*Future-Ready Hospitals: Strategic Adoption of Industry 4.0 Technologies in Eastern and North-Eastern India*” funded by ICSSR, New Delhi.

Prof. Sukanta Halder/ EE (Coordinator), along with his team members (Dr. Naveen Yalla, Dr. Narendra Babu A., Dr. Sanjay Tolani) received an R&D project (**Rs. 85.96 lakhs**), titled “*Sustainable Learning Environments Design of an Off-Grid Distributed Energy System Integrating an Intelligent Water Management Pump in the Eruvapalem Village School Premises*” funded by DST, New Delhi.

Prof. Anshumali/ ESE (Coordinator) along with his team members (Prof. Prasoon Kumar Singh, Prof. Brijesh Kumar Mishra, Prof. Vittal Hari, Prof. Tinesh Pathania, Prof. Upendra Kumar Singh, Prof. Sanjit Kumar Pal, Prof. Pranab Das), received an R&D Project (**Rs. 78.79 lakhs**) titled “*Impact of climate change on vulnerable aquifer systems in and around industrial and mining areas of Damodar River Basin (Eastern India) using GIS based Modified DRASTIC Model and Global Climate Model*” funded by Department of Water Resources, River Development and Ganga

Rejuvenation, Ministry of Jal Shakti, New Delhi.

Prof. Shalini Gautam/ FMME (Coordinator), received an R&D Project (**Rs. 6.11 Crore**) titled “*Development and Standardization of Biochar and By-products for Application in the Indian Iron & Steel Industry*” funded by Sentra. World Technologies Private Limited, Bangalore.

Prof. Satyabrata Sahoo/MECH (Coordinator) received an R&D Project (**Rs. 52.52 lakhs**) titled “*Investigation into the dynamics of the adsorption systems based on waste source-derived indigenously developed adsorbents for carbon capture application*” funded by ANRF (SERB), New Delhi.

Prof. Piyali Sengupta/ CE (Coordinator) received R&D Project (**Rs. 52.13 lakhs**) titled “*Component Level and System-Level Vulnerability Assessment of Various Bridges under Diverse Loading Conditions*” funded by Sparsh Engineering Company Private Limited, Ranchi, Jharkhand.

Prof. Tarun K. Naiya/ PE (Coordinator) along with his team members (Prof. Keka Ojha, Prof. Ajay Mandal, Prof. Archana, Prof. Chandan Sahu) received a Consultancy Project (**Rs. 1.18 Crore**) titled “*Technical Assessment of Diesel Samples of Heavy-Duty Machineries used by Devprabha Construction Pvt. Ltd.*” funded by Devprabha Construction Pvt. Ltd., Dhanbad.

Prof. D. P. Mishra/ MNE (Coordinator) and his team members (Prof. V. G. K. Villuri, Prof. Bhaskara Behera) received a Consultancy Project (**Rs. 1.48 Crore**) titled “*Scientific Assessment of Old and Dangerous Workings of BCCL Mines (Phase-1)*” funded by Bharat Coking Coal Limited, Dhanbad.

Prof. Srinivas Pasupuleti/ CE (Coordinator) and his team members (Prof. A. S. Venkatesh, Prof. A. K. Pandey) received a Consultancy Project (**Rs. 89.78 Lakhs**) titled “*Hydrological Study for the Gare Palma Sector-I Coal Mine, Tamnar, Raigarh (CG)*” funded by Jindal Power Ltd., Raigarh.

Prof. Piyali Sengupta/ CE (Coordinator) received a Consultancy Project (**Rs. 70.8 Lakhs**) titled “*Proof Checking of Design and Drawings of Various Components of Bridges*” funded by Sparsh Engineering Company (P) Limited, Ranchi.

Prof. B. S. Choudhary/ MNE (Coordinator) and his team members (Prof. VMSR Murthy, Prof. D. Gopi Krishna) received a Consultancy Project (**Rs. 63.72 Lakhs**) titled “*Monitoring of Controlled Blasting Methodology for Rock Dredging in the inner Harbour Channel near ORI, ORII, ORIII and Fertiliser Berth, Visakhapatnam Port Authority*”, funded by ITD Cem India Ltd., Visakhapatnam.

Prof. B. K. Mishra/ ESE (Coordinator) and his team member (Prof. Rajib Sarkar) received a Consultancy

Project (**Rs. 53.10 Lakhs**) titled “*A Scientific Study for the Comprehensive/ Environmental and Stability Assessment of Iron Ore Tailings*” funded by Lloyds, Maharashtra.

Prof. Shikha Singh/ MS&IE (Coordinator), along with her team member (Prof. Preeti Roy) received an EDP (**Rs. 1.79 Crore**) titled “*Refresher Training Program for CIL Executives*” funded by CIL, Kolkata.

Prof. Dheeraj Kumar/ MNE (Coordinator) and his team members (Prof. V.G.K. Villuri, Prof. M.S. Alam) received an EDP (**Rs. 1.57 Crores**) titled “*Six-Week Intensive Course on “Advances in Mine Surveying Technology”*” funded by CIL and its subsidiaries.

Prof. V. L. Srinivas/ EE (Coordinator) along with his team members (Prof. Sukanta Das, Prof. Ashok Kumar, Prof. Ejaz Ahmad, Prof. Rajni Singh) received Centre of Excellence (**Rs. 1 Crore**) funded by ReNew Foundation, New Delhi.

Prof. Sagar Pal/ CCB (Coordinator) along with his team members (Prof. Siddharth Agarwal, Prof. Saurabh Dutta Gupta, Prof. Ejaz Ahmad, Mr. Suraj Prakash, Mr. Muhammed Danish as co-coordinators and Prof. Dheeraj Kumar as Advisor) received *Centre of Excellence (WIN-CoE)* (**Rs. 42 Crores**), funded by Wadhwani Charitable Foundation, a California based non-profit public benefit corporation.

Publications

Total No. of Publications : 256

Selected Publications

- Dutta, and **K. Sarkar**, *Journal of Earth System Science*, 133(201), **2024**.
- S. K. S. Akhter, D. Srivastava, A Mishra, N. Patra, P. Kumar, **S. K. Padhi**, *Chem. Eur. J*, 30, e202403321, **2024**.
- W. Enam, A. Chowdhury, K. Laichter, K. L. Lin, A. Mandal, B. Malakar, A. Bhaumik, T. E. Muller, **B. Chowdhury**, *ChemCatChem*, 0, e202401281, **2024**.
- D. Paul, P. Sahoo, A. Sengupta, U. Tripathy, **S. Chatterjee**, *J. Phys. Chem. B* 0000, **2024**.
- K. Mondal, S. Paul, P. Halder, V. Talukdar, **P. Das**, *J. Org. Chem*, 89(23), 17042–17058, **2024**.
- Bera, P. Joshi, **N. Patra**, *Chem. Inf. Model*. 64(23), 8892–8908, **2024**,
- D. Srivastava, **N. Patra**, *J. Chem. Theory Comput*, 20(24), 10952–10960, **2024**.
- M. Kumar, **H. P. Nayek**, *Organometallics*, 43(22), 2906–2915, **2024**.
- S. Pramanik, A. K. Das, S. Debnath, **S. Maity**, *Organic Letters*, 26, 8447, **2024**.
- U. Hoque, S. Debnath, R. Lo, **S. Maity**. *Chem. Commun.* 60, 12429, **2024**.
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- Y. K Pandit, V. Mahato, **G. Udayabhanu**, *Energy Fuels*, 38, 1781–1798, **2024**.
- Y. K. Pandit, V. Mahato, **G. Udayabhanu**, B. Ravishankar, M. Dhandi, *Geoenergy Sci. Eng*, 235, 212707, **2024**.
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- T. Sen, A. Biswas, **G. Udayabhanu**, R. Thangavel, T. K. Raut, *Phys. Chem. Chem. Phys.* 26, 27141, **2024**.
- Maurya, N. Pradhan, K. Keshar, Manisha, **M. Yadav**, *Environ. Chem. Eng*, 12, 114709, **2024**.
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- Bera, P. Joshi, **N. Patra**. *J. Chem. Inf. Model*, 63, 8892–8908, **2024**.
- K. Negi, A. Kumar, G. Chakraborty, S. Sahoo, S. Patra, **N. Patra**, S. K. Bhutia, **S. K. Sahu**, *Dalton Trans*, 53, 17465, **2024**.
- B. Prasad, R. Dey, and **A. Samanta**. *Ind. Eng. Chem. Res*, **2024**.
- S. Shankar, P. D. Chavan, S. Saha, G. Sahu, S.K. Bhaumik, *Advanced Powder Technology*, 35, 104712, **2024**.
- S. Tiwary, S. K. Bhaumik. *MGMI News Journal* 50, **2024**.
- S. Prasad, A. Kumar, S. Dutta, E. Ahmad. *ChemPlusChem*, e202400573, **2024**
- K.N. Ranjana, Sajal, **P. Roy**, *Computer Methods in Applied Mechanics and Engineering*, 436, 117714, **2025**.
- Sajal, **P. Roy**. *Thin-Walled Structures*, 206, Part A, 112603, **2024**.
- R. K. Mishra, **B. Barman**, T. Pathania. *Physics of Fluids*, 36 (10), **2024**.
- D. Jain, **S. D. Adhikary**. *Structural Concrete Journal of the fib*, **2024**.
- M. A. Yimer and **T. Dey**. *Structures*, 70, 107674, **2024**.
- S. Dash, **T. Dey** and R. Kumar, *Acta Mechanica*, 1-24, **2024**.
- V. Kumar, P. K. Khan, **R. Sarkar**, S. K. Pal, *Journal of Earth System Science, Indian Academy of Sciences*, 134: 8, **2025**.
- K. Maity** and S. Mukhopadhyay, *The Visual Computer*, **2024**.
- Matta Krishna Kumari, **N. Tripathi**, *Computer & Security*, 148, 104124, **2025**.
- Rai, Anand Kumar, A. A. Shah, A. B. Dar, **Jeevesh Kumar**, M. Shrivastava. *Small Methods*: 2401001, **2024**.
- Vashishtha, Anchal, Subila K. Balakrishnan, Y. Dror, **Jitendra Kumar**, P. K. C. Parambil, E. Edri, *Inorganic Chemistry*, 63, no. 47 ,22492-22501, **2024**.
- A. Chhetri, D. K. Saini, M. Yadav, **Nitai Pal**, *Springer-Nature*, 1-15, **2024**.

- P. K. Saha, **Nitai Pal**, F. A. Khan, Aftab Alam, *Springer-Nature*, 1-9, **2024**.
- S. Ganguly, **A. Baral**, S. Chakravorti, "IEEE Transactions on Instrumentation and Measurement", 73, **2024**.
- V.K. Raushan, S. Ganguly, **A. Baral**, S. Chakravorti, *IEEE Instrumentation & Measurements Magazine*, IMM-D-24-00117, **2024**.
- S. Ganguly, **A. Baral**, S. Chakravorti, *IEEE Transactions on Dielectrics and Electrical Insulation*, DOI: 10.1109/TDEI.2024.3510227, **2024**.
- M. Mondal, A. Lahiri, **H. Vundavilli**, D. Del Priore, N. P. Reeves, A. Datta, *IEEE Access*, **2024**.
- **S. Sethupathy**, D. S. Balsara, D. Bhoriya, H. Kumar, *Communications on Applied Mathematics and Computation, Springer Nature*, 6, 2336–2384, **2024**.
- S. K. Mohanty, **P. K. Nayak**, P. Siano, A. Swetapadma, *International Journal of Electrical Power and Energy Systems*, 163, 110362, **2024**.
- R. Ujjwal, A. Tarafdar, N. Kamal, I. Burman, **A. Sinha**, *International Journal of Environmental Research*, 19 (2), 59, **2025**.
- R. K. Mishra, B. Barman, **T. Pathania**, *Physics of Fluids*, 36, 10, **2024**.
- R. Kumari, R. Prabhakar, **S. R. Samadder**, *Waste Management*, 193, 551-560, **2024**.
- T. Sukhbaatar, R. Piton, F. Giusti, G. Arrachart, M. Duvail, **A. Kumari**, S. Daware, S. Gupta, S. Goverapet, S. K. Sahu, B. Rai, Pellet-Rostaing, S. Lipophilic, *Hydrometallurgy*, 231, 106415 **2025**.
- S. Rathore, A. Kumar, A. Kumar, K. Mishra, **A. Singh**, *International Journal of Fatigue*, 193, 108804, **2025**.
- L. Wu, Y. Guan, **B. R Reddy**, C. Li, R. K. Liew, J. Zhou, *Fuel*, 383, 133893, **2025**,
- S. Mishra, **A. K. Majumder**, *Mining, Metallurgy & Exploration*, 41, 3475-3489, **2024**.
- M. K. Pandey, **G. N. Singh**, A. Bandyopadhyay, *Scientia Iranica*, **2024**.
- **G. N. Singh**, A. K. Alok, P. Chandra, *International Journal of Reliability, Quality and Safety Engineering*, 31(06), 2450029, **2024**.
- **M. K. Singh**, P. Bharti, *Physics of Fluids*, 36, 124134, **2024**.
- **A.K. Verma**, N. C. Priyanka, *Physical Review E*, 110(5), 054107, **2024**.
- **R. K. Upadhyay**, Amit Berman, P.S. Das, B. Panda, *Nonlinear Dynamics*, **2024**.
- **R. K. Upadhyay**, Sarita Kumari, B. Mondal, S. K. Tiwari, *Indian Journal of Pure and Applied Mathematics*, **2024**.
- B.K. Lenka, **R. K. Upadhyay**, *European Journal of Control*, 81, 1-15, **2024**.
- B.K. Lenka, R. K. Upadhyay, *Journal of the Franklin Institute*, **2024**.
- B.K. Lenka, **R. K. Upadhyay**, *European journal of Control*, 82, 1-16, **2024**.
- **R.K. Upadhyay**, D. Pradhan, R. D. Parshad, P Roy, *Communications in Nonlinear Science and Numerical Simulation*, 140, 1-38, **2024**.
- **G. K. Vishwakarma**, A. Bhattacharjee, B. Rajbongshi, A. Tripathy, *Journal of Computational and Applied Mathematics*, 451, 116103, **2024**.
- A. Hazra, **A. Kalita**, M. Gurusamy, D. Sah, *IEEE Internet Computing*, **2024**.
- **A. K. Singh**, H. Q. Dinh, M. Thakur, *Advances in Mathematics of Communications*, **2024**.
- **S. Chandrasah**, B. S. Choudhary, M. S. Venkataramayya, Y. Fissah, B. O. Taiwo, *Journal of Mining and Environment*, 14555, 2743, **2024**.
- Y. Rasool, M. Agrawal M, R. Shams, **S. Ghosh**, D. Singh, *Indian Geotechnical Journal*, **2024**.
- N. R. Dadi, **N. K. Maurya**, **P. Gupta**, *Journal of Molecular Liquids*, 126177, **2024**
- G. L. Rao, **A. Mandal**, N. Pal, *Chemical Physics*, 588, 112496, **2025**.
- D. Ray, L. Jangid, D. Joshi, S. Prakash, **K. Ojha**, O. Manor, **A. Mandal**, *ACS omega*, **2024**.
- D. Joshi, D. N. Ramesh, S. Prakash, R. K. Saw, **N. K. Maurya**, K. B. Rathi, S. Mitra, O. P. Sinha, P. K. Bikina, **A. Mandal**, *Surfaces and Interfaces*, 105615, **2024**.
- **R. Kiran**, V. K. Rajak, R. Upadhyay, A. Kumar, *Geothermics*, 122, 103078, **2024**.
- **R. Kiran**, R. Upadhyay, V. K. Rajak, A. Kumar, S. D. Gupta, *Renewable Energy*, 237, 121630 **2024**.
- D. Ray, L. Jangid, D. Joshi, S. Prakash, **K. Ojha**, O. Manor, **A. Mandal**, *ACS omega*, **2024**.
- M. Mandal, R. P. Kumar, **K. Ojha**, *Journal of Molecular Liquids*, 411, 125746, **2024**.
- S. Mishra, G. Chauhan, **K. Ojha**, *Petroleum*, 10(3), 483-493, **2024**.

Patents

Granted:

- **Ajay Suri**, Ankur Singh, “A natural, biodegradable kinetic hydrate inhibitor composition and a process for the preparation thereof”, Patent No. 554563, Dated 19.11.2024.

Published:

- **K. Prasad, A. K. Varma, B. C. Sarkar**, Sameeksha Mishra, Arya Vinod, Anubhav Shukla, Shailayee Mukherjee, Bitan Purkait, “Multi-model method and system of estimation of ash yield in coal using mid-infrared Fourier transform infrared spectroscopy”, Patent Application No. 202431065336, dated 06.09.2024.
- **K. Prasad, A. K. Varma, B. C. Sarkar**, Sameeksha Mishra, Arya Vinod, Anubhav Shukla, Bitan Purkait, Shailayee Mukherjee, “A method of multi-model estimation of carbon in coal using mid-infrared Fourier transform infrared spectroscopy”, Patent Application No. 202431076911, dated 18.10.2024.
- **T. K. Naiya**, Sampa Guin, “A biodegradable pour point depressant from coconut oil for flow assurance of Indian waxy crude oil, a process for the preparation thereof and the use thereof in flow assurance of Indian waxy crude oil”, Patent Application No. 202431083740, dated 08.11.2024.
- **Ajay Mandal**, “Surfactant Stabilized Green Nano Emulsion and Method of Preparation thereof for Application in Petroleum Industries”, Patent Application No. 202531001027, dated 04.01.2025.
- **Tanmoy Maity**, Soumyadip Banerjee, Mihir Datta, “A small-scale straight-blade hybrid Darrieus-Savonius vertical axis wind turbine for urban power generation” Patent Application No. 202431076064, dated 18.10.2024.
- **Ashok Kumar**, S. K. Sena, “A Single-Stage Single-Phase Non-isolated Microinverter for Residential Rooftop Photovoltaic Application”, Patent Application No. 202431087391, dated 22.11.2024.
- **K. C. Jana, Pradipta Kumar Pal**, Bikramaditya Chandan, “A multi-level switched-capacitor-based single source inverter generating boosted output voltage” Patent Application No. 202431093206, dated 06.12.2024.
- **Ashok Kumar**, Chandan Verma, S. K. Sena, “Photovoltaic based single dc input hybrid output converter” Patent Application No. 202431100461, dated 27.12.2024.
- **Biswajit Chowdhury**, A. S. Rane, Aniruddha Singha, “A catalyst for the synthesis of cyclic urea, a process for the preparation thereof”, Patent Application No. 202331045425, dated 18.10.2024.
- **Soumitra Maity**, Apurba Samanta, “A novel bifunctional phosphoaminating agent, a process for the preparation thereof and the application thereof in the synthesis of aminophosphonates/aminophosphonic acids”, Patent Application No. 202431083569, dated 15.11.2024.
- **Sagar Pal**, Kalipada Manna, “A new light responsive polymeric micelle for real time monitored delivery of therapeutics and a process for the preparation thereof”, Patent Application No. 202431103949, dated 10.01.2025.
- **K. Samanta, S. K. Das, S. S. Gupta**, Babuni Prasad, “An adsorbent/catalyst support material from the byproduct of hydrolysis of aluminium waste or scrap and a process for the preparation thereof”, Patent Application No. 202431092364, dated 29.11.2024.
- **Aditya Kumar**, Sapan Kumar Pandit, “A biodegradable water-repellent PLA coated jute and a process for the preparation thereof”, Patent Application No. 202431092143, dated 29.11.2024.
- **Aditya Kumar**, Preeti Kumari, “A transparent anti-dust and corrosion-resistant spray coating for the protection of copper artifacts and a process for the preparation thereof”, Patent Application No. 202431095100, dated 13.12.2024.
- **Ejaz Ahmad**, Afaq Ahmad Khan, Aakash Rajpoot, “Stoichiometrically tuned Fe₅-Co- Zn/?-Al₂O₃ nanocatalysts, a process for the preparation thereof and use of the same for methane (CH₄) cracking” Patent Application No. 202431097535, dated 20.12.2024.
- **Ejaz Ahmad**, Afaq Ahmad Khan, Aakash Rajpoot, “A process for the preparation of nitrogen-doped multilayer graphene nanopowder”, Patent Application No. 202431103966, dated 10.01.2025.
- **Tanmay Dutta**, Ram Babu Gupta, Devesh Kumar, Rahul Ranjan, “Thermal Management System for Lithium-Ion Battery Pack Using Curved Strips or Rings or Rings with Fins”, Patent Application No. 202431081150, dated 01.11.2024.
- **Vivek Bajpai**, Dhiraj Bajpai, “A machine to generate micro-cracks in the rock using a sonic vibrator to enhance subsequent deep drilling operation and a process for the same”, Patent Application No. 202431089892, dated 22.11.2024.

- **M. L. Chandravanshi, Rakesh Kumar**, Divya Mohan, "A Ferrous particle collector machine", Patent Application No. 202431092363, dated 06.12.2024.
- **R. N. Hota**, Nitish Kumar Sah, Nandan Kumar Jha, Vikram, "A system and method for acoustic pressure measurement in hot combustion ducts to protect microphone from heat using an acoustically tuned shorter waveguide", Patent Application No. 202431104915, dated 10.01.2025.
- **S. R. Samadder**, Pratima Kumari, "A Process of Discharging Spent-Lithium Cobalt Oxide Batteries using Ultrasonic-Assisted Partial Immersion Method", Patent Application No. 202431079756, dated 01.11.2024.
- **K. Mishra, G. C. Nayak**, Sourav Acharya, Sonalika, "An adsorbent from cow dung for the removal of metal ions from waste water and further use as an electrode in supercapacitor, and a process for the preparation thereof", Patent Application No. 202431094763, dated 06.12.2024.
- **R. K. Gangwar**, Nikesh Kumar Sahu, Sachin Maithani, "Multiband ceramic right hand circularly polarised dielectric resonator antenna for navigation and positioning applications", Patent Application No. 202431093704, dated 06.12.2024.
- **Manodipan Sahoo**, Saptarshi Neogi, "2D dual gate biosensor FET device and method of performance evaluation of the device in nanometric scale through multiscale simulation approach", Patent Application No. 202431100980, dated 27.12.2024.
- **Kaushik Mazumdar**, Chumki Das, "N-Polar AlGaIn/GaN High Electron Mobility Transistor (HEMT) using AlN Cap Layers and HfO₂ Dielectrics with enhanced DC and RF performance", Patent Application No. 202431097530, dated 20.12.2024.
- **S. C. Dutta**, Ishan Jha, Vikash Kumar, Subrat Kumar Sahu, "A concrete-filled quadruple steel tubular (CFQST) column for enhanced strength and ductility in seismic condition and the process of construction", Patent Application No. 202431097321, dated 20.12.2024.
- **Alakesh Kalita**, "An internet of thing (IoT) enabled system and process for real time monitoring of an infant to prevent falling off a surface above ground level", Patent Application No. 202431081152, dated 01.11.2024.
- **Prof. D. P. Mishra**, Tanmay Dasgupta, "An Apparatus for Multiparameter Coal Spontaneous Combustion & Quasi-Steady State Assessment and Method Thereof". Patent Application No. 202431013637, dated 22.11.2024.

Individual Faculty Achievements

- **Prof. Rajib Sarkar and Prof. Sanket Nayak**, Dept. of Civil Engineering were the Organizing Secretaries of the 8th International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics (8ICRAGEE), organized by Indian Society of Earthquake Technology (ISET) during 11th-14th December 2024 at IIT Guwahati



- **Prof. Rajendra Pamula**, Dept. of Computer Science & Engineering, has been elevated to the prestigious grade of *IEEE Senior Member*, a distinction held by only 10% of IEEE's 450,000 members.
- **Prof. Ravi Kumar Gangwar**, Dept. of Electronics Engineering, is conferred as a *Fellow of Institution of Engineers (IEI), India*.
- **Prof. Manodipan Sahoo**, Dept. of Electronics Engineering, is conferred as a *Fellow of Institution of Engineers (IEI), India*.
- **Prof. Nitai Pal**, Dept. of Electrical Engineering, is conferred as a *Fellow of the Institution of Engineers (IEI), India* and a *Fellow of the Institution of Electronics & Telecommunication Engineers (IETE), India*.
- **Prof. Shalini Gautam**, Dept. of Fuel, Mineral, & Metallurgical Engineering, received a project where the IIT (ISM) Dhanbad partnered with Sentra World, a Bangalore-based

sustainability startup, to embark on a pioneering research initiative aimed at decarbonizing the iron and steel industry using biochar—an eco-friendly alternative to coal.

- **Prof. Aarti Kumari**, Dept. of Fuel, Mineral, & Metallurgical Engineering, received a "Certificate of Reviewer Appreciation" from Transactions of the Indian Institute of Metals (TIIM) journal for the month of September 2024 for the outstanding service as a reviewer of TIIM.
- **Prof. Raj Kumar Dishwar**, Dept. of Fuel, Mineral, & Metallurgical Engineering, presented on "Novel Dual Beneficiation Method to Enrich the Carbon Content and End-value of Coal Washery Tailings" at the *78th Annual Technical Meeting of IIM (International Symposium on Transformational Technologies in Material and Manufacturing)* held from 20- 22 November at GKV Bengaluru.
- **Prof. Reddy, B. R.**, Dept. of Fuel, Mineral, & Metallurgical Engineering, delivered an invited talk in *PyroAisa 2024 (4th International Symposium on Analytical and Applied Pyrolysis)*, 28-29 November 2024 in IITG. He also chaired a session on "Pyrolysis of Biomass, Plastic Oils & Mixtures-I"
- **Prof. Gajendra K. Vishwakarma**, Dept. of Mathematics & Computing, received *Prof. K. Srinivasa Rao Best Researcher Award* of Indian Society of Probability and Statistics, 2024 and *Prof. B.G. Prasad Award* from the Indian Society for Medical Statistics (ISMS), 2024.
- **Prof. Ajay Mandal**, Dept. of Petroleum Engineering, received the *Distinguished Alumnus Award* from the Department of Chemical Engineering, Calcutta University.



- **Prof. Ajay Mandal**, Dept. of Petroleum Engineering, received IOGCA 2024 Award in "Excellence in Chemistry and Chemical Engineering in Oil & Gas Industry and Petrochemical-Upstream Oil & Gas Industry" during 7th International Oil & Gas Chemistry,

Chemicals and Additives Conference & Exhibition on 26 & 27 September 2024.



- **Prof. Ajay Mandal**, Dept. of Petroleum Engineering, received "Energy & Fuels 2024 Excellence in Review Awards".
- **Prof. Ajay Mandal**, Dept. of Petroleum Engineering, joined the *Editorial Board of "Petroleum Exploration and Development" and "Petroleum"*. These journals are from Elsevier publications having Impact Factors of 7.0 and 4.2, respectively.
- **Prof. Tarun Kumar Naiya**, Dept. of Petroleum Engineering, delivered an invited talk on "Application of nanoparticle and bio-based co-polymer for flow assurance Indian waxy crude oil" in the *61st Annual Convention of Chemists (ACC 2024) and International Conference on Emerging Trends in Chemistry to Revolutionise Indian Chemical Industries for Viksit Bharat @ 2047* at JECRC University, Jaipur on 19-21 December 2024. He also served as Session Chair for a poster session in the same conference.
- **Prof. Mohammed Siddique**, Dept. of Petroleum Engineering, delivered an invited keynote speaker talk "Smart Energy Optimization using Artificial Intelligence for Electric Submersible Pump" in the international workshop on "Optimization Engineering Design with AI: A Focus on Ocean Energy Systems (OEDAI-2024)" at IIT Madras held between 17-20 November 2024.
- **Prof. Pawan Gupta**, Dept. of Petroleum Engineering, is selected as an *Early Career Advisory Board Member* for the "Energy and Fuel" journal.



- **Prof. S. Sarangi**, Dept. of Applied Geology, attended an National Seminar titled “Geoscience Education in India: Bridging Industry Needs and Advancing Sustainable Development Goals” scheduled during 18-19, October 2024 in the PC Saxena Auditorium, IIT Bombay on the basis of an invitation received from the Head, Department of Earth Sciences, IIT-Bombay and presented a paper with title *“Importance of field training in our curriculums and their implications for Indian geoscience education with special reference to hydrocarbon and critical metal exploration”*.
- **Prof A. S. Venkatesh**, Dept. of Applied Geology, attended the same seminar and presented a paper entitled “Framework of geoscience education focusing on critical minerals and sustainable development”.
- **Prof. Ajoy K. Bhaumik**, Dept. of Applied Geology, acted as a Member of the National Advisory Committee of the 29th Indian Colloquium on Micropaleontology and Stratigraphy (29-ICMS), a national biennial symposium held during 18 -20 October 2024 in the Delhi University. He also presented his research work titled 'Foraminifera: Clues for MTD and gas hydrate genesis' on 19th October 2024. He also chaired a technical session (Industrial application of micropaleontology, including hydrocarbon exploration) in this conference on 19th October 2024.



Major Research Output

- **Prof. A. K. Bhaumik and his team (Dept. of Applied Geology)**

The group showed that the Planktic foraminiferal morphological groups from the gas hydrate rich Krishna-Godavari Basin exhibited upper water column structure and productivity changes caused by monsoonal variations. The oligotrophic conditions and intense stratification prevailed during climatic warmth is due to intense SW monsoon and more river discharges.

- **Prof. A. K. Prasad and his team (Dept. of Applied Geology)**

Prof. A. K. Prasad and his team novel multi-model methods to estimate the ash and carbon content in coal using mid-infrared Fourier transform infrared spectroscopy. These are also published as patents, which are given below:

1. “Multi-model method and system of estimation of ash yield in coal using mid-infrared Fourier transform infrared spectroscopy” (*Patent Application No. 202431065336, dated 06.09.2024*)
2. “A method of multi-model estimation of carbon in coal using mid-infrared Fourier transform infrared spectroscopy” (*Patent Application No. 202431076911, dated 18.10.2024*)

- **Prof. K. Sarkar and his team (Dept. of Applied Geology)**

The group developed an ANN model using the Mohr-Coulomb and Barton Bandis parameters for rock and joints to predict planar failure in jointed rock slopes. This work is published in the *Journal of Earth System Science*.

- **Prof. U. Bansal and his team (Dept. of Applied Geology)**

Prof. U. Bansal presented her work on the formation of glaucony at a workshop, “Recent Advances in Ichnology and Glauconite Geochemistry”, organized by Department of Earth Sciences, IIT Bombay. The study's main objective was to decipher the limiting factors in the formation of glaucony from several Cretaceous glauconitic horizons from India and Germany. Based on the observations it is possible that greater bathymetry, specific temperature range, longer time period of

formation, and little sediment input do not affect the glaucony formation. Therefore, the well-established factors in ancient times may be fundamentally different from their modern analogue in Cretaceous, indicating some limitations in the direct application of the uniformitarian approach.

- **Prof. S. K. Padhi and his team (Dept. of Chemistry and Chemical Biology)**

S. K. Padhi and his team showcase recent work in "Chem. Eur. J. 2024, 30, e202403321" on the electrocatalytic reduction of CO₂ to CO, highlighting the use of CuII-based molecular catalysts to achieve enhanced selectivity above 80%. In their Research Article (DOI: [10.1002/chem.202403321](https://doi.org/10.1002/chem.202403321)), Prof. Padhi and collaborators provide an in-depth explanation of their findings, which also reveal the concurrent generation of hydrogen (H₂) as a by-product during the CO₂ reduction process. This hydrogen evolution occurs through a competitive proton reduction reaction (HER), wherein two protons (H⁺) are reduced by two electrons (e⁻), leading to the formation of H₂. The study further explores the kinetic behavior of these reactions and uncovers a key mechanistic insight: the hydrogen evolution reaction (HER) proceeds prior to the CO₂ reduction reaction (CO₂RR). This sequence of events suggests that HER, which competes for available electrons and protons, can significantly influence the efficiency and selectivity of CO₂ reduction. By examining the relative rates of the HER and CO₂RR, the authors demonstrate that minimizing the rate of hydrogen production is critical for optimizing the yield of CO as the desired product. This work not only sheds light on the dynamics of proton and electron transfer during CO₂ reduction but also provides valuable insights into the competitive nature of the reactions occurring at the catalyst surface. Understanding these processes is crucial for designing more efficient catalysts that can selectively reduce CO₂ to CO while suppressing undesired by-products like hydrogen. The findings contribute to advancing the field of electrocatalysis and offer a clearer understanding of how to improve the performance of molecular catalysts in CO₂ reduction reactions. The work has been highlighted in the cover feature of **Chemistry A European Journal** (Chem. Eur. J. 2024, 30, e202487004)

- **Dept. of Electrical Engineering**

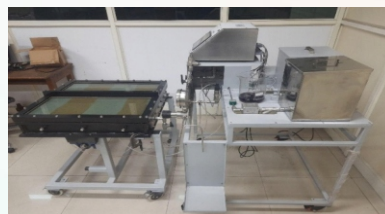
The impact of de-trapped charges, freed from deep and shallow traps, on variation of dielectric response of Power Transformer insulation has been successfully identified, isolated and thereafter such features are used to carry out diagnosis. Such analysis is reported for the first time. An insulation model containing time-varying parameter for condition assessment of mineral oil has been reported. Such model, previously unavailable, is shown to be capable of estimating different parameters using a single short-duration measurement. Thus, eliminating multiple costly equipment for health assessment of oil.

Major Instrumental Facilities Created

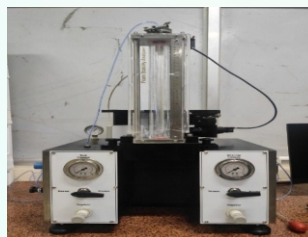
- **Dept. of Computer Science & Engineering**

The Department of Computer Science and Engineering at IIT (ISM) Dhanbad launched a specialized lab for Natural Language Processing (NLP), Machine Learning (ML), and Artificial Intelligence (AI) under the direction of **Prof. Mauajama Firdaus**. She received a research grant from the Institute, enabling the acquisition of high-end GPUs and fine-tuning of large language models (LLMs). The lab aims to tackle complex problems such as language generation, sentiment analysis, and machine translation with unparalleled efficiency. As AI is reshaping industries and redefining human-machine interaction, the lab aims to harness the potential of LLMs for transformative solutions in sectors like healthcare and education. Under Prof. Firdaus leadership, the lab is set to inspire groundbreaking work in AI and ML.

- **Dept. of Petroleum Engineering**



Core Flood Five Spot



Foam Stability Analyzer



Nanobubble Generator

Women Faculty Achievers

Prof. U. Bansal, Dept. of Applied Geology delivered an invited talk at a three-day workshop at Department of Earth Sciences, IIT Bombay, on “Recent Advances in Ichnology and Glauconite Geochemistry” from 26 – 28 October 2024.



Prof. Sowmiya Chawla, Dept. of Civil Engineering, attended and presented the research work in the 5th International Conference on Transportation Geotechnics (ICTG) 2024, which was held at Sydney Masonic Centre (SMC) during 20-22 November 2024. This conference was organised by Transport Research Centre, University of Technology Sydney (UTS-TRC). In this conference, the latest developments in Transportation Geotechnics together with were amply reverberated by over 15 keynote lectures and nearly 20 invited theme lectures during three days of intensive intellectual discourse, knowledge sharing and brainstorming sessions. In this conference, she had an opportunity to present two research findings. The details of the research papers are as follows:

Paper 1: “Retrofitting of Existing Railway Tracks Using Micropiles as a Ground Improvement Technique: Finite-Element and Genetic Programming Approach”.

Paper 2: “Load-Bearing Behaviour of Geosynthetic Reinforced Soil Bridge Abutment for Railways with Waste Coal OB as Backfill Soil: Model Tests”.

The latest developments in Transportation Geotechnics together with were amply reverberated by over 15 keynote lectures and nearly 20 invited theme lectures during three days of intensive intellectual discourse, knowledge sharing and brainstorming sessions. There are over 450 delegates were attended the conference from over 30 countries, representing three prominent geo-paradigms embracing: (i) Transportation

Geotechnics (TC202) as the primary theme, in tandem with two co-themes, Ground Improvement (TC211) and Sustainability (TC307). During the visit to attend the 5th International Conference on Transportation Geotechnics (ICTG) 2024. Prof. Sowmiya Chawla has visited University of Technology Sydney (UTS-TRC) and University of Wollongong (UOW). This visit will help for future collaboration between India and Australia in terms of student exchange programme, research collaboration etc.



Prof. Sowmiya Chawla, during International Conference on Transportation Geotechnics (ICTG) 2024, held at Sydney Masonic Centre (SMC), Australia during 20-22 November 2024.



Prof. Sowmiya Chawla, Dept. of Civil Engineering, attended and presented the invited lecture in the Indian Geotechnical Conference (IGC) 2024, which was held at Civil Engineering Department, MIT, Chhatrapati Sambhajinagar (Aurangabad) during December 19-21, 2024. This conference was organised by Indian Geotechnical Society, Aurangabad Chapter. This conference was organized under the main theme of “Geotechnical Engineering for a Sustainable Tomorrow”. Prof. Sowmiya Chawla was invited to this conference to deliver the theme lecture. She has delivered the theme lecture under the topic entitled “Enhancement of Existing Railway Tracks for Higher Speed and Heavier Axle Loads –

Innovative Retrofitting Techniques". As an honorary secretary of Indian Geotechnical Society (IGS), Dhanbad Chapter, Prof. Sowmiya Chawla attended the National Executive committee meeting during the conference. Also, she actively participated in the 4th Indo-Japan Pre-Conference Workshop on "High-Speed Rail & Geotechnical Challenges" which was held before the IGC-2024.



Indian Geotechnical Conference (IGC) 2024, and 4th Indo-Japan Pre-Conference Workshop on High-Speed Rail & Geotechnical Challenges, held at Indian Geotechnical Society, Aurangabad Chapter and Civil Engineering Department, MIT, Chhatrapati Sambhajnagar (Aurangabad) during December 19-21, 2024.



Prof. Sowmiya Chawla, during Indian Geotechnical Conference (IGC) 2024, held at Indian Geotechnical Society, Aurangabad Chapter and Civil Engineering Department, MIT, Chhatrapati Sambhajnagar (Aurangabad) during December 19-21, 2024.

Prof. Aarti Kumari, Dept. of Fuel Minerals and Metallurgical Engineering, organized an invited talk by Dr. Dhruva Kumar Singh, Head, Hydrometallurgy & Rare Earths Development Section, BARC, Mumbai on October 24, 2024 in seminar hall of FMME department. The talk was delivered on the very relevant topic of "Sustainable Recovery of Rare Earths and Critical Metals from Primary & Secondary Sources: A Pathway to Energy Security". The program was successfully coordinated and attended by 102 participants which included 91 students (from B. Tech., M.Tech. and PhD) and 12 faculty members. The flyer and some photographs of the talk are included.

Prof. Keka Ojha, Dept. of Petroleum Engineering, was awarded the best paper the 7th International Oil & Gas Chemistry, Chemicals and Additives Conference & Exhibition on 26-27 September 2024, New Delhi



International Visits



Prof. Dharavath Ramesh, Dept. of Computer Science & Engineering, recently collaborated with Prof Teresa Zielinska, Institute of Aeronautics and Mechanics and Prof Sitnik Robert, Faculty of Mechatronics, Warsaw University of Technology, Warsaw, Poland, on a groundbreaking project that integrates Cybersecurity, Digital Twin technology, and Robotics with Probabilistic Machine Learning. This partnership is focused on addressing critical challenges in the robotics domain by leveraging the synergy between advanced technologies and innovative methodologies. Their research primarily aims to enhance the security and reliability of robotic systems through Digital Twin simulations, allowing real-time monitoring, predictive maintenance, and resilience against cyber threats. The incorporation of Probabilistic Machine Learning introduces a layer of adaptive intelligence, enabling robots to operate in dynamic environments with improved decision-making capabilities and risk assessment. By merging Cybersecurity with Digital Twin frameworks, the project aims to develop a robust ecosystem where robotic systems can be tested, validated, and secured virtually before deployment in real-world scenarios. This approach not only minimizes operational risks but also ensures data integrity and system safety. This collaboration signifies a step forward in interdisciplinary research, combining Prof Teresa's expertise in robotics and cyber security with his focus on Digital Twin and Machine Learning technologies. Together, the team is striving to redefine the future of secure, intelligent robotics, bridging the gap between academic research and industrial applications.

Department of Petroleum Engineering

• Visit of Dr. Abraham K John (1999 B Tech/PE) and senior reservoir engineering, OXY, Houston, Texas, USA



• Visit of Dr. Adwait Chawathe, Director (Subsurface) Chevron ENGINE



Department of Mining Engineering

Mr. Duncan Chalmers, Senior Lecturer at the School of Mining Engineering, University of New South Wales, Sydney, Australia, visited the Department of Mining Engineering for an engaging discussion on current mine ventilation challenges and the future of the mining industry. During his visit, Mr. Chalmers shared his expertise on advancing ventilation techniques, emphasizing the importance of safety and efficiency in underground operations. He also explored emerging trends and technologies shaping the future of mining, including automation, sustainability, and the integration of renewable energy. The exchange of ideas was invaluable in fostering collaboration and furthering research initiatives in the field of mining engineering.



MoUs Signed

- **MoU between IIT(ISM) Dhanbad and NIMS University, Jaipur Rajasthan**

This MoU has the purpose of facilitating all the exchanges and the cooperation initiatives embarked upon by the two Institutions within the scope of teaching and research, and the development of common academic programs, involving the Academic (faculties, departments, Institutes, postgraduate school) and Administrative Units, through the implementation of special types of cooperation, such as:

- Exchange of researchers
- Exchange of students
- Joint research activities
- Technical and/or training assistance

The local coordinator of this MoU is **Prof. S. K. Ghosh**.

- **MoU between IIT(ISM) Dhanbad and Renew Foundation, New Delhi**

The project is proposed to train **350 coal mine workers** in about one year **under Renew Project Surya**. The training facility will be inside IIT(ISM) Dhanbad campus. For technical training, master trainers will be developed with the help of ESSCI, while IIT(ISM) Dhanbad will help in terms of identification of beneficiaries and provide the infra support on ground classrooms and labs & other admin support. The local coordinator of this MoU is **Prof. Sukanta Das**, and his team members are Prof. V. L. Srinivas, Prof. Ashok Kumar, Prof. Rajni Singh, Prof. Ejaz Ahmad.

- **MoU between IIT (ISM) Dhanbad and CSIR-Central Road Research Institute, New Delhi**

The purposes of the cooperation are to promote cooperative research and to facilitate the exchange of ideas, the development of new knowledge, and to enhance high-quality research acumen. The major thrust of the research on which the parties will cooperate are in the fields of Science, Engineering Mathematics, Management, Social Sciences, Humanities and mutual interest. These modes of cooperation will include:

- a) Joint Supervision of M. Tech. (Projects and Internships) and Ph.D. students.
- b) Exchanges of faculty and students for the purposes of research and teaching.
- c) Development and implementation of cooperative research projects, professional development programs and capacity-building efforts.
- d) Dissemination of findings through scholarly publications, white papers, and in the media.

The local coordinator of this MoU is **Prof. Sarat Kr. Das**.

- **MoU between IIT (ISM) Dhanbad and Coal India**

- Limited (CIL), Kolkata**

CIL is interested in training maximum of 300 executives from Mining, E&M, and Executives Disciplines through IIT(ISM) Dhanbad on a specifically designed customized Refresher Training program in the Management, Operations, and other Interdisciplinary engineering domains for 15 days. The local coordinator of this MoU is **Prof. Shikha Singh**.

- **MoU between IIT(ISM) Dhanbad and TUAMAN Engineering Limited Kolkata**

This collaborative research and development initiative between academia and regulatory authority is aimed at creating a comprehensive platform for providing engineering solutions, technology development, product development, sustainability solutions, training and research jointly by TUAMAN and IIT (ISM). The objectives of this collaboration under the MoU, but not limited to, are envisaged as follows:

- i. Collaborative execution of studies in the jointly agreed thematic Research & Development areas, but not limited to,
 - a. Civil, Mechanical, Electrical, Electronics, Mechanical, Environmental Petroleum, Chemical Engineering
 - b. AlIoTML and IT enabled services
 - c. Development of Technologies and Specialized instruments for Ferrous & Non-Ferrous Material Handling, Mining. Oil and Refinery, Chemical & Fertilizer Power, Process Industries and T&D applications
- ii. Promoting Internships, visiting and adjunct faculty programs and research-oriented career and executive development programs
- iii. Conducting short- and long-term courses in IIT(ISM) and jointly organizing workshops. Seminars and conferences.

The local coordinator of this MoU is **Prof. S.K. Gupta**.

- **MoU between IIT(ISM) Dhanbad and Sentra World Technologies Private Limited, Bangalore**

Sentra. World and IIT (ISM) Dhanbad will collaborate on the development of biochar chemistry to meet the steel sector's requirements, addressing carbon reduction, energy efficiency, and process integration. The local coordinator of this MoU is **Prof. Shalini Gautam**.

- **MoU between IIT (ISM) Dhanbad and Tata Steel Limited**

The purpose of this MoU is to foster research collaboration and knowledge transfer, attracting and developing top talent, enhancing brand visibility and reputation, developing strategic partnerships, and

networking opportunities, and gaining access to emerging technologies to incubate, innovation etc. The local coordinator of this MoU is the **Director, IIT(ISM) Dhanbad.**

- **MoU between IIT(ISM) Dhanbad and Ranchi University (RU), Ranchi**

The purpose of this MOU is to promote cooperation between IIT (ISM) Dhanbad and RU. IIT (ISM) Dhanbad and RU agree that within the mutually acceptable fields, they intend to pursue the following general forms of cooperation:

- To promote innovation and startup ecosystems in different industrial sectors in Jharkhand.
- To promote technologies and contribute to the mission of Atmnirbharta.
- Promoting Industry- academia collaborations through seminars, symposiums. workshops and meets, etc.
- Mentoring the institutions of higher education under the ambit of RU.

The local coordinator of this MoU is the **Director, IIT(ISM) Dhanbad.**

- **MoU between IIT (ISM) Dhanbad and Tata Consultancy Service Limited (TCS)**

This is a 9-month certification programme in Artificial Intelligence (AI) and Emerging Technologies that offers a dynamic pathway to career advancement and professional success across three domains - Data Analytics Modeling and Visualization, Natural Language Processing (NLP) and Computer Vision. In an era defined by data-driven decision-making and technological innovations, the demand for skilled AI practitioners is at an all-time high. Individuals will gain the expertise needed to harness the power of data, develop predictive models and unlock actionable insights that drive business growth and innovation by investing in this programme. Through this certification course, candidates will get the opportunity to learn from IIT professors and leading industry experts in the domain. The local coordinator of this MoU is **Prof. Ayan Das.**

- **MoU between IIT(ISM) Dhanbad and Oil India Limited (OIL)**

The objective of this MoU is to foster industry-academia collaboration in the energy sector. The proposed collaboration aims to engage various joint research initiatives and develop advanced technology solutions in the energy sector and other areas of mutual interest. The local coordinator of this MoU is **Prof. Keka Ojha.**



Workshop / Conference / Seminar

- **Department of Applied Geology** organized three days Executive Development Program (EDP) on “Advanced practices for geo-engineering challenges for Hydro Power Project Development” for the Executives of NHPC Limited was held from 23-25 October 2024, IIT (ISM) Dhanbad. Chief Guest, Prof. Pijush Pal Roy, Former Outstanding Scientist of CSIR-CIMFR, Dhanbad & Director (Actg.), CSIR-CMERI, Durgapur; Patron, Prof. Sukumar Mishra, Director, IIT (ISM) Dhanbad; Prof. Shushanta Sarangi, HOD (AGL), **Prof. Kripamoy Sarkar** (Coordinator), Prof. S.K. Pal, Co-coordinator and HoD (AGP) were present during the Inaugural function. The training program aimed to bring together NHPC professionals from India to discuss geo-engineering challenges in Hydro Power Projects and various methods for assessing and predicting them. Several distinguished speakers provided valuable insights into geology, geophysics, civil, and mining engineering to seventeen participants in this EDP.



- **Department of Applied Geology** conducted a “Workshop on Well logging and Seismic Data Interpretation” from the hydrocarbon industry experts to impart industry knowledge to our pre-final year and final year UG-PG students on 26 and 27 October 2024. Dr. Sumani Das, Dy General Manager (Geosciences), Oilmax Energy Pvt. Ltd guided the students for seismic data interpretation after an exhaustive lecture on theoretical aspects of the same. Dr. Ranjan Sinha, Chief Hydrogeologist - Cairn Oil and Gas, guided the students for all types of well logging data interpretation (Formation evaluation) after a brief lecture on the theoretical aspects of the same. Over 100 students attended these exhaustive lectures cum practical.
- **Department of Chemistry & Chemical Biology** organized the two-day national workshop titled “Green Steel Production via Decarbonization for Sustainable and Circular Economy (GSP2024)” during 16-17 December 2024 at IIT

(ISM) Dhanbad with **Prof. Madhulika Gupta** (Convenor), Prof. Ejaz Ahmad (Co-Convenor). GSP2024 was supported by the Department of Scientific and Industrial Research (DSIR), Anusandhan National Research Foundation (ANRF), Jharkhand Council on Science, Technology and Innovation (JCSTI), Council of Scientific and Industrial Research (CSIR), and Indian National Young Academy of Sciences (INAYAS). American Chemical Society (ACS) Publication, Royal Society of Chemistry sponsored the oral and poster prizes. This prestigious event brought together around 240 industry leaders, researchers, policymakers, academicians and students to deliberate on the future of sustainable steel manufacturing and its critical role in addressing global climate challenges. The workshop highlighted the urgent need for transitioning to green steel production, emphasizing decarbonization technologies and circular economy practices. Participants engaged in robust discussions on innovative solutions, including hydrogen-based steelmaking, carbon capture and storage (CCS), enhanced recycling strategies to reduce the environmental impact of steel production, and scrap utilization. The workshop served as a pivotal platform for discussing the future of green steel production and its role in combating climate change.



- **Department of Chemical Engineering** organized the third edition of the National Conference on “Net-Zero Emission Technologies for Sustainable Development: Challenges and Opportunities (N0ET-2024)” was organized by the, IIT (ISM) Dhanbad, during 6-7 December 2024. The major themes of the conference were

(i) Energy Storage Systems (ii) Clean Energy Innovation (iii) Carbon Capture, Utilization & Storage (CCUS) (iv) Green Hydrogen (v) Renewable Energy (vi) Materials Science & Nanotechnology (vii) Electro, Chemical, Bio & Photo-catalysis (viii) Circular Economy. A number of experts from reputed institutions like IISc Bengaluru, IIT Delhi, IIT Kanpur, IIT Kharagpur, IIT Guwahati, University of Hyderabad, CSIR-CIMFR, RGIPT, CSIR-AMPRI, CSIR-IICT delivered lectures. In addition, many bachelors, masters, doctoral and postdoctoral scholars from institutions across India took part in oral and poster presentations.



- Department of Chemical Engineering** organized a three-day Anusandhan National Research Foundation (ANRF)-sponsored workshop on "Concepts of Interfacial Phenomena in Microscale Flows: Theory and Application (IPMF-2024)" during 10-12 December 2024 at IIT (ISM) Dhanbad. The workshop covered interesting topics ranging from interfacial science to microfluidics, focusing on pedagogy and advanced research. It featured eminent speakers with exemplary academic and research credentials, including IISc Bengaluru, IIT Kanpur, IIT Bombay, IIT Guwahati, IIT Kharagpur, and IIT(ISM) Dhanbad. It attracted widespread participation from all over the country, and the participants were able to gain invaluable insights into the field.



- Department of Electronics Engineering** successfully organized a three-day workshop on "Photonic Sensors for Biosensing Applications" during 17-19 October 2024. The workshop aimed to provide participants with a comprehensive understanding of the latest advancements in photonic sensor technology and its applications in healthcare, environmental monitoring, and beyond. **Prof. Sanjeev Kumar Raghuvanshi** was the coordinator of this event. The event provided a platform for exchanging ideas, fostering collaboration, and inspiring future innovations in the field of photonic sensors. With 62 participants, including 23 in-person and 39 online attendees, the workshop was a resounding success, contributing to the growing body of knowledge in photonic sensor technology. The workshop was graced by the eminent scientist from various CSIR labs and faculties from IISc Bangalore.



- Department of Electronics Engineering** successfully organized a two-day workshop on "Fiber Optic Sensors and its Applications" duration 6-7 December 2024. The workshop emphasized the importance of industry-academic collaboration in promoting fiber optic sensors as sustainable, high-precision solutions for modern challenges. The event highlighted real-world applications and bridged the gap between theoretical principles and practical implementation. The workshop received widespread acclaim for its well-structured sessions, technical depth, and interactive format. Students appreciated the exposure to cutting-edge technologies, while professionals valued the opportunity to discuss emerging trends with peers and researchers. The workshop was graced by the faculties from different IITs. This event witnessed enthusiastic participation from 79 attendees, including 10 renowned speakers, students, and industry professionals. The sessions offered in-depth insights into fiber optic sensor's working principles, design, and diverse applications. Eminent speakers such as Prof. Balaji Srinivasan (IIT Madras), Prof. Patha Roy Choudhuri (IIT Kharagpur), Prof. Rajan Jha (IIT Bhubaneswar), Prof. Sachin Kumar Srivastava (IIT Roorkee), and Dr. Santosh Kumar (KL

University) delivered impactful talks on advancements in structural health monitoring, biomedical engineering, and distributed sensing. Participants also engaged in hands-on training led by Dr. Nishit Malviya, who provided a detailed demonstration using COMSOL Multiphysics software. This session enabled attendees to model and simulate fiber optic sensors, exploring their performance under various conditions.



- **Department of Electronics Engineering** conducted a Drone Boot camp at BIT Sindri, Jharkhand, under the MeitY-funded project on "Capacity Building for Human Resource Development in Unmanned Aircraft Systems (Drone and Related Technologies)". Held during 3-7 December 2024, the boot camp aimed to provide participants with a robust understanding of drone technology through both theoretical and practical sessions. Nearly 60 students from various engineering disciplines participated in this five-day program, gaining hands-on experience in assembling, configuring and successfully flight-testing 12 drones, including 06 hex copters and 06 quad copters. The boot camp's curriculum encompassed key aspects of UAV systems such as UAV introduction, aerodynamics, sensors, GPS, antenna design, UAV communication, image processing, artificial intelligence (AI) and machine learning (ML), control systems and embedded systems. This initiative not only equipped students with essential skills but also fostered a deeper interest in cutting-edge UAV technologies.



- **Department of Electrical Engineering** organized an Expert Lecture on the theme "Emerging Roles of Hydrogen in Power and Transport Sectors" on 24th December 2024. The coordinator for this event was **Prof. Arijit Baral**. The lecture, technically co-sponsored by DEIS Chapter of IEEE Kolkata Section, provided an

excellent and unique opportunity to interact with the expert to develop research ideas related to the potential of Hydrogen in transport and power sectors. The lecture was delivered by Prof. K.V. Vidyanandan, PoP, NIT Calicut.



- **Department of Environment Science & Engineering** organized workshop titled "Microbial and Chemical Risk Assessment Framework", in which Prof. **Sukha Ranjan Samadder** acted as the Convenor of the event. The workshop provided an in-depth introduction to risk assessment methodologies, focusing on qualitative, semi-quantitative, and quantitative approaches. Participants learned the four-tier framework of hazard identification, exposure assessment, hazard characterization, and risk characterization. The workshop explored applied statistics and Monte Carlo Simulation using an Excel-based plugin for quantitative risk assessment and predictive modeling of microbial and chemical risks. Hands-on sessions encouraged creative problem-solving, allowing students to address real-world challenges individually or in groups. Insights were further enriched by case studies and examples from Dr. Rajat's published research, offering a practical understanding of probabilistic risk models. Event Duration 4 days, Nos. of Participants 62, Event Date: 10th -13th December 2024, Venue: Computer lab, NLHC, IIT (ISM), Dhanbad



Dignitaries at the dais (L to R): Invited Expert - Dr. Rajat Nag, Assistant Professor, UCD School of Biosystems and Food Engineering, University College Dublin, Ireland; Guest of Honour - Prof. Sukumar Mishra, Director, IIT (ISM) Dhanbad; Chief Guest - Prof. Prem Vrat, Chairman, BoG, IIT (ISM) Dhanbad; Prof. Sunil Kumar Gupta, HOD (CD), Dept. of ESE, IIT (ISM) Dhanbad; Prof. S. R. Samadder, Professor, Dept. of ESE, IIT (ISM) &

Convener of the Workshop. Address about the Workshop by Prof. S. R. Samadder, Workshop Convener.

- **Department of Fuel, Minerals and Metallurgical Engineering** and the Department of Mechanical Engineering jointly organized a one-week workshop titled "CFD in Practice: Fundamental Research to Recent Industrial Applications" from 16–20 December 2024 at IIT (ISM) Dhanbad. The event welcomed over 110 participants from academic institutions and industries across India. The workshop included insightful expert lectures covering diverse topics such as coal combustion modelling, granular flows, fluidized bed reduction of iron ore fines, microfluidics, biomedical flows, GPU-accelerated simulations, and hydrogen combustion, providing attendees with an in-depth understanding of cutting-edge advancements in Computational Fluid Dynamics (CFD). A specialized hands-on session on Ansys Fluent further enriched the experience by equipping participants with practical skills in modern CFD methodologies. The workshop concluded with great enthusiasm, motivating participants to apply innovative approaches and drive advancements in CFD across various domains.
- **Department of Mathematics & Computing** organized the National Mathematics Day, a special 2-day program to celebrate the 137th birth anniversary of one of the greatest mathematicians in history, Srinivasa Ramanujan. This event was led by **Prof. Jyoti Dasgupta** and **Prof. Neeru Bala**. The program took place over two days 22 and 23 December each filled with insightful talks from distinguished speakers. On 22 December, Prof. Gadadhar Misra from IIT Gandhinagar and ISI Bangalore delivered a talk on "Euler's product formula and the Ramanujan sum", while Prof. Jaydeb Sarkar from ISI Bangalore presented "How Google googles?". On 23rd December, the second day of the event, the program featured two online talks: Prof. Anoop Singh from IIT (BHU) spoke on "On the moduli space of Lie algebroid connections over a compact Riemann Surface", and Prof. Amartya Kumar Dutta from ISI Kolkata discussed "Emergence of Algebra in Ancient India". The program was a fitting tribute to Ramanujan's legacy, fostering enriching discussions and inspiring future advancements in mathematics.



- **Department of Management Studies and Industrial Engineering** organized the 3-day residential Dealers Development Program for the Hindustan Petroleum Corporation Limited (HPCL). Prof. M.K Singh, Dean (Academics) and Shri Debjit Mitra (Sr Regional Manager, HPCL) attended the inaugural ceremony of the program. **Prof. Shashank Bansal** (Coordinator), and **Prof. Himanshu Gupta** (Co-coordinator), highlighted that the program is designed to enhance the leadership and managerial skills of the dealers. The program focuses on helping dealers improve their self-awareness, marketing & financial knowledge, communication skills, and emotional intelligence.



- **Department of Petroleum Engineering** organized "The International Conference on Petroleum, Hydrogen & Decarbonization (ICPHD-2024)", themed "Sustainability through energy transition," during 12-14 December 2024 at IIT (ISM) Dhanbad with the purpose to bring together the leading professionals from academia and industry to discuss the future of energy transition and the role of emerging technologies and imbibe the same to the young/budding professions. The inaugural function on December

12-14 featured a series of key addresses, inspiring discussions, and a formal agenda highlighting global energy challenges and solutions. With participation from around~300 delegates representing both India and overseas, the event witnessed an impressive lineup of 3 plenary lectures, 28 keynote lectures, 8 invited speeches, 89 oral presentations, and 32 poster presentations spread across 28 technical sessions.



- **Department of Mining Engineering** organized a four-week Mine Surveying Technique course. The 4-week Mine Surveying Technique course was conducted by Prof. **Dheeraj Kumar**, and **Prof. V. G. K. Villuri** for 32 Participants from Mahanadi Coalfields Limited and Bharat coking Coal Limited. During the program, the dignitaries highlighted the importance of advanced surveying techniques in mining operations and applauded the participants for their commitment to learning. Certificates were distributed to the attendees, marking the successful completion of the course. The event concluded with an inspiring message from the coordinators, encouraging participants to apply their knowledge to foster innovation and excellence in the mining industry.



- **Department of Mining Engineering** successfully organized an International Conference on “Mine Ventilation and Environment for Green Mining (MVEGM-2024)” at Puri, Odisha during 20-22 December 2024. About 150 participants including mine ventilation and environmentalists, safety professionals, academicians, government, mine operators, consultants, and equipment manufacturers from around the world gathered and deliberated on the advances in mine ventilation, mine environmental monitoring and control, mine fires, explosions, mine rescue and recovery, coalbed methane, underground coal gasification, radiation problems in uranium mines, geothermal energy, mine waste management, applications of geomechanics and AI/ML in mine ventilation and environment, CO₂ sequestration and reduction of carbon footprint, ventilation problems in deep mines, diesel issues in opencast and underground mines, ventilation and environmental aspects of tunnels and underground space, and many more allied areas for green mining.

