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Preface

Dear Members of the Mechanical Engineering Community,

It is a moment of great pride and enthusiasm for us to welcome you to the **2023 edition for the year 2022-2023 of the e-Newsletter of the Department of Mechanical Engineering, Birla Institute of Technology, Mesra.**

The launch of this newsletter represents the beginning of a new avenue for sharing the many activities, achievements, ideas, and experiences that enrich our department.

We hope that it will serve as a common platform connecting our faculty members, researchers, students, alumni, collaborators, and well-wishers, irrespective of where they are located. The initiative to establish this platform has received inspiration and encouragement from our Honourable Vice-Chancellor, **Prof. Indranil Manna**, whose vision for promoting academic interaction and institutional engagement has been instrumental in bringing this effort forward.

The newsletter seeks to capture the spirit of a department that is constantly learning, innovating, researching, and contributing to society.

Within this edition, readers will find glimpses of the academic pursuits and accomplishments of our community—from research and innovation to the achievements of faculty and students, as well as important activities and events taking place within the department.

The Editorial Board expresses its sincere appreciation to everyone who has contributed their time, ideas, and efforts towards the preparation of this inaugural edition.

With best wishes and warm regards,
Editorial Board
Departmental e-Newsletter
Department of Mechanical Engineering
Birla Institute of Technology, Mesra

Editorial Team



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Amarnath
(BTECH/10241/22)
Editor

From the Desk of HOD



Dr. Dipti Prasad Mishra
Professor and Head

The Department of Mechanical Engineering at Birla Institute of Technology, Mesra has been an integral part of the Institute's academic journey since its early years. Over the decades, the Department has grown into a centre of learning and research, contributing to the development of competent engineers, researchers, and professionals.

Its academic ecosystem is supported by experienced faculty members, comprehensive laboratory facilities, contemporary computational resources, and a curriculum designed to balance fundamental engineering knowledge with emerging technological developments. The Department takes pride in its strong academic standards and continued recognition through various accreditation and quality-assurance processes. Its alumni have established successful careers across industries, research organisations, academic institutions, and entrepreneurial ventures in India and abroad.

As mechanical engineering undergoes rapid transformation in response to digitalisation, automation, sustainability, and intelligent manufacturing, the Department is actively preparing for the opportunities of the future. In keeping with the vision of the National Education Policy 2020 and the technological transition associated with Industry 4.0, new academic and research directions are being pursued across a broad range of emerging areas.

Simultaneously, efforts are being made to strengthen the Department's experimental and computational capabilities through the development and modernisation of laboratories and research infrastructure.

Through these continuing initiatives, the Department seeks to create an academic environment that encourages innovation, collaboration, hands-on learning, and meaningful engagement with industry and society.

About the Department

About

Since its inception in 1955, the Department of Mechanical Engineering has a wide reputation for the quality of teaching and research it offers. It has been awarded top grades for both teaching and research activities from independent and government bodies. The excellent laboratory facilities, modern computer clusters, systematically designed curriculum, and dedicated faculty members make this Department a dynamic place to study. Mechanical Engineering Graduates from BIT Mesra are sought after by many prestigious companies. There is also an excellent careers center on campus, which helps the students to get entry into multinational companies.

Department vision

The Mechanical Engineering Department of Birla Institute of Technology, Mesra, Ranchi, strives to be globally recognized for quality engineering education and research, leading to well-qualified engineers, academicians and researchers who are innovative, entrepreneurial, and successful in achieving excellence in their field of study.

Department mission

- ✓ To impart quality education to the students and enhance their knowledge and skills to be globally competitive Mechanical Engineers.
- ✓ To maintain state-of-the-art research facilities to enable its students and faculty to create, interpret, apply, and disseminate knowledge with an understanding of the limitations.
- ✓ To develop linkages and interaction with industry, R&D organizations, and educational institutions for excellence in consultancy practices, research, and teaching.
- ✓ To provide a conducive environment for learning, creativity, and problem-solving skills.

About the Department

Programme Educational Objectives (PEOs)

- ✓ To provide a quality undergraduate education for students entering the mechanical engineering profession who seek careers in related fields.
- ✓ To advance scientific knowledge through basic and applied research through scholarly publication, conferences, and continuing education.
- ✓ To acquire knowledge of relevant technologies and multidisciplinary fields, including broad social, ethical, and environmental issues within which engineering is practiced.
- ✓ To develop a problem-solving approach using analytical abilities, effective communication skills and teamwork.
- ✓ To create awareness and understanding related to social issues, apart from developing a sense of commitment to the community and profession, with sincere involvement.

Programme Specific Outcomes (PSOs)

- ✓ The student will be able to design mechanical systems in various fields and challenges, such as machine elements, thermal systems, manufacturing, and industrial and interdisciplinary fields like additive manufacturing, soft computing, to meet the demands of the day in industry as well as society.
- ✓ The student will be capable of starting their entrepreneurship, be employable and suitable for various fields like design, manufacturing, production industries, academic and industries, research, and development organisations in and outside the country.
- ✓ The student will be able to pursue advanced degrees in engineering, business or other professional fields through their knowledge and learnt skills through formal as well as informal self-study and motivation.

Departmental Activities



Visit by Dr. Nitya Nand Gosvami, Department of Mechanical Engineering, IIT Delhi during 18-24 Dec, 2023.



Visit by Dr. Soupitak Pal, CSIR CGCRI during 18-24 Dec, 2023.

Departmental Activities



Visit by Dr. Ratnakar Das, Department of Mechanical Engineering, NIAMT Hatia during 18-24 Dec, 2023.



Visit by Dr. Soumya Gangopadhyay , Department of Mechanical Engineering, IIT Bhilai during 18-24 Dec, 2023.

Projects Approved

SI No.	Project Title	Approval amount (Rs)	Duration	Name of PI & CO-PI	Ongoing/C complete	Agency	Year of approval
1	To increase economy of villagers by technology Intervention	3,00,000	6 Months	Co-PI - Rajeev Kumar	Completed	MoE	2022
2	Role of hybrid nano fillers on the physio-mechanical and tribological behavior of polymer nanocomposites for load bearing advanced mechanical component application	45,83,889	3 Years	PI-Kaushik Kumar, Co-PI Sudeepan J.	Ongoing	DST	2022
3	Advanced Research in Energy Technology and Material Testing	88,00,000	05 years	PI- HOD (Mechanical)	Ongoing	DST	2022
4	Development of multi-layered lead free electroless Ni-B coating with high resistance, thermal stability and corrosion resistance for tribological applications	37,95,264	03 Years	PI- Dr. Arkadeb Mukhopadhyay, Co-PI- Dr. Arun Kumar Kadian, Dr. Mukesh Sharma, Dr. Anil C. Mahato	Ongoing	SERB DST	2023

Journal Publications

Sl No .	Authors Name	Title of the Paper	Journal Name	Volume, No, Page	Year
1	Dharmendra Kumar and Anil C. Mahato	A feasibility and dynamic performance analysis of hydromechanical hybrid power transmission technology for wind turbines	Mechanical Sciences	14, 1, 33-45	2023
2	Abhijit Maity, Sayoni Bhattacharya, Anil C Mahato, Sujit Chaudhuri and Manik Pradhan	A pattern-recognition-based clustering method for non-invasive diagnosis and classification of various gastric conditions	European Journal of Mass Spectrometry	29, 3, 192-199	2023
3	Ishan Kashyap , Sidharth Kumar , Anil C. Mahato , Arkadeb Mukhopadhyay , Mukesh Sharma	Numerical investigations on boiling of moderator during PT/CT contact in 220 MWe IPHWR under postulated accidental scenario	Nuclear Engineering and Design	397, 2022, 111920	2022
4	Md Modassir Khan, Arun Kumar Kadian, RP Sharma	Investigation of high fuel injection pressure variation on compression ignition engines powered by jatropha oil methyl ester-heptanol-diesel blends	Alexandria Engineering Journal	65, 675-688	2023
5	Md Modassir Khan, Arun Kumar Kadian, RP Sharma	An investigation of performance and emission of diesel engine by using quaternary blends of neem biodiesel–neem oil–decanol–diesel	Sādhanā	48,1,28	2023
6	Md Modassir Khan, Arun Kumar Kadian, Rabindra Prasad Sharma	Attempt to mitigate marine engine emissions with improved performance by the investigation of alcohol inclusion in sunflower biodiesel-sunflower oil-diesel blend	Environmental Science and Pollution Research	30,12,33974-33991	2023
7	Md Modassir Khan, Arun Kumar Kadian, Rabindra Prasad Sharma, SM Mozammil Hasnain, Ahmed Mohamed, Adham E Ragab, Ali Zare, Shatrudhan Pandey	Emission Reduction and Performance Enhancement of CI Engine Propelled by Neem Biodiesel-Neem Oil-Decanol-Diesel Blends at High Injection Pressure	Sustainability	15,11,9084	2023
8	S. K. Sarangi & D.P.Mishra	Evaluation of Thermo-fluid Performance of a Split-winglet Supported Elliptical Tube type Fin-and-tube Heat Transfer Surface	Scientia Iranica Transactions B: Mechanical Engineering	29(4), 1782-1794	2022
9	Ayan Sengupta, D.P.Mishra & S. K. Sarangi	Computational Performance Analysis of Solar Chimney using Surface Modifications of a Absorber Plate	Renewable Energy,	185, 1095-1109	2022
10	Rishikesh Sharma, Shailesh Kumar Sarangi, D. P. Mishra & L. S. Brar	Performance Evaluation of a Fin and Tube Heat Exchanger based on Different Shapes of Winglets	Journal of Thermal Science and Engineering Applications (ASME)	15, 050905-1 to 050905-10	2023

Journal Publications

SI No	Authors Name	Title of the Paper	Journal Name	Volume, No, Page	Year
11	Rishikesh Sharma, Dipti Prasad Mishra, Marek Wasilewski and Lakhbir Singh Brar	Application of Surface Response Methodology and Artificial Neural Network to Optimize the Curved Trapezoidal Winglet Geometry for Enhancing the Performance of a Fin-and-Tube Heat Exchanger	Energies (MDPI)	16(10), 4209, 1-30	2023
12	Pandey S., Brar L.S.	On the performance of cyclone separators with different shapes of the conical section using CFD	Powder Technology	407: 1–17	2022
13	Sharma R., Mishra D.P., Sarangi S.K., Brar L.S.	Performance evaluation of a fin and tube heat exchanger based on different shapes of the winglets	J. of Th. Sc. & Eng. Appl.	15(5): 050905	2023
14	Brar L.S., Wasilewski M.	Investigating the effects of temperature on the performance of novel cyclone separators using large-eddy simulation	Powder Technology	416: 1–21	2023
15	Pandey S., Brar L.S.	The impact of increasing the length of the conical segment on the cyclone performance using large-eddy simulation	Symmetry	15(3): 1–20	2023
16	Pandey S., Brar L.S.	Performance analysis of cyclone separators with bulged conical segment using large-eddy simulation	Powder Technology	2401:24:00	2023
17	Sharma R., Mishra D.P., Wasilewski M., Brar L.S.	Application of Response Surface Methodology and Artificial Neural Network to Optimize the Curved Trapezoidal Winglet Geometry for Enhancing the Performance of a Fin-and-Tube Heat Exchanger	Energies	16(10): 4209	2023
18	Sanga P. J., Oraon R., Datta P.	Study of forced convection turbulent flow over a heated microprocessor chip	Journal of Analysis		2023
19	Ashutosh Ranjan, Arpan Kumar, Apurba Kumar Roy and Kaushik Kumar,	Python Assisted Numerical Analysis of Heat Conduction for an Orthotropic Material	Advances in Materials and Processing Technologies	8, Issue sup4,	2022
20	Ranjan Kumar, Apurba Kumar Roy and Kaushik Kumar	Comparative Study on Controllable Electro-Magneto Rheological Fluids- A Brief Review	Journal of Molecular and Engineering Materials	11(1&2), 2023. 11 pages	2023

Journal Publications

Sl No	Authors Name	Title of the Paper	Journal Name	Volume, No, Page	Year
21	Birendra Kishore, Apurba Kumar Roy and Kaushik Kumar	Design and Numerical Simulation of a Solar Cooker with Aluminium Absorber Plate	Materials Today: Proceedings	92(2023) 1040-1046	2023
22	Paritosh Mahata, Amar Shrivastava, Chandan Kumar Sahu, Abhishek Kumar Barnwal, Arvind Kumar Minz, Suraj Oraon, Laxminarsimharao Vennamneni	Electrostatic interaction with a rigid curved domain causes nonlinear deformation of a thin elastic sheet: implications for biosystems	Physica B: Physics of Condensed Matter	646, 414274 (2022)	2022
23	Faisal Rahmani, R. K. Pandey, J. K. Dutt	Experimental Investigations on the Effect of Surface Pocket in a Powder-Lubricated Journal Bearing on Friction and Vibration	ASTM Journal of Testing and Evaluation	51(2), 706–719	2023
24	Rohit Agrawal, Arkadeb Mukhopadhyay	The use of machine learning and metaheuristic algorithm for wear performance optimization of AISI 1040 steel and investigation of corrosion resistance	Proceedings of the Institution of Mechanical Engineers, Part J: Journal of Engineering Tribology	237(4) 701–717	2023
25	Rohit Agrawal, Arkadeb Mukhopadhyay	Development of Ni-B electroless coating from stabilizer free bath and characterization of high temperature tribological behaviour, scratch and corrosion resistance	Surface Topography: Metrology and Properties	10 045028	2022
26	Rohit Agrawal, Arkadeb Mukhopadhyay	Inclusion of W in electroless Ni–B coating developed from a stabilizer free bath and investigation of its tribological behaviour	Journal of the Indian Chemical Society	Volume 100, Issue 4, April 2023, 100966	2023
27	Rohit Agrawal, Arkadeb Mukhopadhyay	A Systematic Investigation of Lead-Free Electroless Ni-B-W Coating Properties Using Taguchi’s Methodology	Coatings	2023, 13(9), 1585	2023
29	Rohit Agrawal, Arkadeb Mukhopadhyay	The effect of bath temperature on the structure and tribological behaviour of electroless Ni-B-Mo coatings obtained from stabilizer free bath	Surface Review and Letters		2023
30	Anand Kumar Karn, Rohit Agrawal, Abhinandan Kumar, Arkadeb Mukhopadhyay	Deposition and process parameter optimization of electroless Ni-B coating from a stabilizer free bath to achieve enhanced microhardness, scratch-hardness and adhesion using taguchi’s methodology	Engineering Research Express	5 035036	2023 11

Journal Publications

Sl No	Authors Name	Title of the Paper	Journal Name	Volume, No, Page	Year
31	Abhinandan Kumar, Arkadeb Mukhopadhyay	Investigation of reciprocating wear characteristics of carbon steel at varying load, relative humidity, and operating temperature using ANN-NSGA methodology	Proc IMechE Part E: J Process Mechanical Engineerin	DOI: 10.1177/09544089221149404	2023
32	Ishan Kashyap, Sidharth Kumar, Saurav Kumar Singh and Mukesh Sharma	Numerical Investigation on Heat Flux variation in fuel bundle over fully voided concentric channel of IPHWR under severe accidental scenario	Journal of Thermal Science and Engineering applications	146(3), pp. 1-17	2023
33	Rohit Agrawal, Arkadeb Mukhopadhyay	Optimization of wear rate and COF of heat treated electroless Ni-B-W coating from a stabilizer free bath using grey relational analysis	Materials Today: Proceedings	91(119-124)	2023
34	Sujeet Kumar Mishra, Vinay Sharma, Ashok Misra	Some investigations on the intermittent electromagnetic radiation during plastic deformation of sintered powder zinc specimens under compression	Materials Today: Proceedings	61, 62-72	2022
35	Ranjan Kumar, Sujeet Kumar Mishra, S M Mozammil Hasnain, Shtrudhan Pandey, Ahmed Farouk Deifalla, Sudeepan Jayapalan	Study of thermal and mechanical behavior by analyzing reinforcement effect of graphene nanoplateletes on polyamide-66 composite system developed via melt-mixing technique	Materials Research Express	10, 105306	2023
36	A.D. Roy, S.K.Dhiman	Solutions of one-dimensional inverse heat conduction problems:a review	Transactions of the Canadian Society for Mechanical Engineering	VOL.47:271-285	2023
37	P. Hishikar, V. K.Gaba, S.K. Dhiman, A.K.Tiwari	Thermal performance of four cylinders in different layouts of spacing ratios under cross-flow at Reynolds number of 35000	Ocean Engineering (Elsevier	Volume 281, 114834	2023
38	A.Rahman, S.K. Dhiman	Performance evaluation of turbulent circular heat exchanger with a novel flow deflector-type baffle plate	Journal of Engineering Research (Elsevier)	Online first	2023
39	A. Rahman, S.K. Dhiman	Investigations of the turbulent thermo-fluid performance in a circular heat exchanger with a novel flow deflector-type baffle plate	Bulletin of the Polish Academy of Sciences Technical Sciences	Vol.71(4),e145939	2023
40	Ranjan Kumar, Apurba Kumar Roy and Kaushik Kumar	Comparative Study on Controllable Electro-Magneto Rheological Fluids - a Brief Review	Journal of Molecular and Engineering Materials	11 (1 & 2) (Article ID 2330002	2023

Journal Publications

SI No	Authors Name	Title of the Paper	Journal Name	Volume, No, Page	Year
41	Chikesh Ranjan, Gautam Sarkhel and Kaushik Kumar	Investigation of Mechanical, Tribological and Electrical Properties of Silk Reinforced Polymeric Composite	Advances in Materials Science and Engineering	Article ID 1507891	2023
42	Chikesh Ranjan, Gautam Sarkhel and Kaushik Kumar	Mathematical and Simulation Based Investigation Towards Deformation Behavior of Bombyx Mori Moth Silk /Vinyl Ester Reinforced Laminated Composite	Advances in Materials and Processing Technologies	Online	2023
43	Jeenendra Shiv, Kaushik Kumar and Sudeepan Jayapalan	Recent Advances in Polymer Using Metal Oxides Nanocomposite and Its Hybrid Fillers for Tribological Application	Advances in Materials and Processing Technologies	Online	2023
44	Arpan Kumar, Apurba Kumar Roy and Kaushik Kumar	Heat Conduction in an Orthotropic Material – Numerical Analysis Using Python	International Journal on Interactive Design and Manufacturing	17 (3), 1089–1097	2023
45	Hridayjit Kalita and Kaushik Kumar	Virtual Prediction and Estimation of the Tensile Properties of Engineering Materials	International Journal on Interactive Design and Manufacturing	17 (1), 407–419	2023
46	P. Jayakrishna, Saurav Chakraborty, S. Ganguly, P. Talukdar	Numerical investigation on role of vertical electromagnetic brake system in reducing remelting effect and improving thermal characteristics in thin slab continuous casting	International Journal of Thermal Sciences, Elsevier	vol. 192(B), p.108434	2023
47	P. Singh, Saurav Chakraborty, P. Talukdar	A novel non-intrusive imaging technique to quantify shrinkage of Elephant Foot Yam during convective drying	Journal of Thermal Science and Engineering Applications, ASME	vol.15(5), p.050903	2023
48	Chikesh Ranjan, Gautam Sarkhel and Kaushik Kumar	Efficacy of Natural Fibres Reinforced Biodegradable Composite Towards Industrial Products – An Extensive Review	Materials Today: Proceedings	92 (2), 1047-1054	2023
49	Jeenendra Shiv, Kaushik Kumar, Sudeepan Jayapalan	Recent Advances in Tribological Properties of Silicon Based Nanofillers Incorporated Polymer Nanocomposites	Materials Today: Proceedings	92 (2), 1231-1239	2023
50	Asim Ahmad, Om Prakash, Anil Kumar	Drying Kinetics and Economic Analysis of Bitter Gourd Flakes Drying inside Hybrid Greenhouse Dryer	Environmental Science and Pollution Research	30(72026–72040)	2023

Conference Publications

Sl No.	Authors Name	Title of the Paper	Conference Name	International/National	Year
1	Ishan Kashyap, Sidharth Kumar, Saurav Kumar Singh and Mukesh Sharma	Numerical Investigation on Heat Flux variation in fuel bundle over fully voided concentric channel of IPHWR	AIP Conference Proceedings (ICTFSD)	International	2023
2	Mushtaque Momin and Mukesh Sharma	Flow Regimes and Flow Patterns for Kerosene - Water Flow Through 15o Inclined Return Bend	AIP Conference Proceedings (ICTFSD)	International	2023
3	Soham Mahindar , Mushtaque Momin and Mukesh Sharma	Numerical Investigation of Oil-Water Two Phase Flow Through Sudden Contraction Tube	Proceedings of the 9th International and 49th National Conference on Fluid Mechanics and Fluid Power	International	2023
4	Ramesh Kumar, Shivam Raj and S.K. Dhiman	Experimental and numerical analysis of ferro-fluid in partially heated closed rectangular micro-channel tube under non-uniform magnetic field	9th International and 49th National Conference on Fluid Mechanics and Fluid Power (FMFP-2022), December 14-16, 2022	International	2022
5	R.P.Kumbhakar, G.F.Ansari, S.K.Dhiman, A.A.Khan	Effect of ZnO on Structural, Physical and Optical Properties of Heavy Metal Oxides Doped Tellurite Glasses	IOP Conf. Series: Materials Science and Engineering ICMSMT-2022	International	2022
6	Suresh Prasad Mahato, Ghizal F. Ansari, Sukhdev Bairagi, S. K. Dhiman	Physical and Photonic Properties of Ternary Lead-Tellurite Glasses	Third International Conference on Advances in Physical Sciences and Materials: ICAPSM 2022	International	2022
7	Ramesh Kumar, S.K. Dhiman	Experimental and Numerical Analysis of ferrofluid in partially heated transparent enclosure microchannel under a non-uniform magnetic field generated by single, double, and circular ring permanent magnet	ISHMT-ASTFE, IHMTC-2023, Organised by IITPatna, 14-16 Dec 2023	International	2023
8	A. Prakash, A. Kumar, A. A. Sharma, Saurav Chakraborty	Quick and accurate estimation of non-linear heat flux profile in steel billet continuous casting process with limited temperature sensors	AIP Proceedings	International	2023
9	S. N. Laguri, P. Kasar, A. Soren, Saurav Chakraborty	Design of mobile cold storage system using phase change material for vaccines	AIP Proceedings	International	2023
10	Arpan Kumar, Harinadh Vemanaboina, B Sridhar Babu and Kaushik Kumar	COVID-19: Implications for Social Sustainability Through Artificial Intelligence – A Critical Review	AIP Conference Proceedings	International	2023

Book Chapters

Sl No.	Authors Name	Title of the Chapter	Book Name	Publisher	Year
1	Dharmendra Kumar and Anil C. Mahato	Various Concepts on Variable Inertia Flywheel in Rotating System	Recent Trends in Mechanical Engineering	Lecture Notes in Mechanical Engineering	2023
2	Ranjan Kumar, Sujeet Kumar Mishra, Kaushik Kumar	A critical review on finite element models towards physico-mechanical properties of bamboo fibre/filler-reinforced composite materials	Bamboo and sustainable construction	Springer Nature Singapore Pte Ltd	2023
3	S. Apoorv, A. Shankar, S. Chatterjee, B. Acherjee and K. Kumar	Solving Multiple Traveling Salesmen Problem using Prim's and Dijkstra's Algorithms: A Case Study on Emergency Medical Supplies	Handbook of Formal Optimization Methods	Springer	2023
4	A. Kumari, B. Acherjee and K. Kumar	Gear Material Selection using an Integrated PSI-MOORA Method	Handbook of Formal Optimization Methods	Springer	2023
5	R. Kumar and K. Kumar	Multi Response Optimization on Process Parameters of WEDM for Ti-6Al-4V Alloy Using Grey Relational Approach	Optimization Methods for Product and System Design	Springer	2023
6	R. Kumar, S. K. Mishra and K. Kumar	A Critical Review on Finite Element Models Towards Physico-Mechanical Properties of Bamboo Fibre/Filler-Reinforced Composite Materials	Bamboo and Sustainable Construction. Environmental Footprints and Eco-design of Products and Processes	Springer	2023
7	A.S. Vaka, P. Jayakrishna, Saurav Chakraborty, S. Ganguly, P. Talukdar	Application of Inverse Heat Transfer Technique in Thin Slab Continuous Casting for Estimating the Interfacial Boundary Heat Flux	Recent Advances in Thermal Sciences and Engineering	Lecture Notes in Mechanical Engineering. Springer, Singapore	2023

FDPs, Workshops and Seminars



One week Karyshala on Surface Engineering and Tribological Challenges in Sustainable Manufacturing sponsored by SERB during 18-24 December 2023.



One week Karyshala on Joining Techniques for Modern Transportation Sector sponsored by SERB during 05-11 December 2022.