AICTE Training & Learning Academy, New Delhi

Faculty Development Program

Report

on

"Clean Engineering Materials"

(18 December 2023 to 23 December 2023)

Organized by

Department of Civil & Mechanical Engineering
SND College of Engineering & Research Centre,
Babhulgaon, Yeola

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Co-coordinator
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Overview

In a significant stride towards advancing knowledge in Clean Engineering Materials, the AICTE ATAL Faculty Development Program was successfully concluded from December 18 to 23, 2023. The program was spearheaded by the diligent efforts of Coordinator Dr. Ansari U.S. and Co-coordinator Dr. Harjit Pawar.

The program witnessed insightful contributions from esteemed resource persons:

Dr. Ratnesh Kumar
Professor,
Department of Applied Mechanics,
VNIT, Nagpur

Dr. Sachin Bakare
Professor,
Department of Applied Mechanics,
VNIT, Nagpur

Dr. Mate Nilesh Uttamrao Associate Professor, Department of Civil Engineering,
AVCOE, Sangamner

Dr. Sudarshan Sampatrao Bobade
Associate Professor,
Department of Civil Engineering,
PCCOE&R, Pune

Er. Vikas Sahebrao Patil
CEO,
Savi Infrastructure,
Pune

Dr. Mujahid Hussian
Professor,
Department of Civil Engineering,
SSBTCOE&T, Jalgaon

Dr. Pradip Mohansingh Solanki
Associate Professor,
SSBTCOE&T, Jalgaon

Dr. Madhukar Ramchandra Wakchaure
Professor, Department of Civil Engineering,
AVCOE, Sangamner

Er. Sachin Himmat Patil
Senior Manager (Mfg.),
Mahindra & Mahindra Pvt. Ltd. Igatpuri,
Nashik

Er. Kalpesh Lotan Patil
Senior Manager (Project),
Gammon India Ltd.

Participants List

Total participants in FDP were 60, which were from different AICTE approved technical Institutions of Nashik, Ahmad Nagar, Jalgaon and Pune region of Maharashtra. Few post graduates students also attended this FDP.

List with all participants is as following:

Sr. No.	Name	Organization
1	Mr. Rohit Kailas Pote	S.N.D College of Engineering & Research Centre Yeola
2	Mr. Saurabh Sanjay Kasliwal	SND College of Engineering and Research Centre, Yeola
3	Mr. Hiraman Ananda Shirsath	SNJB CoE Chandwad
4	Dr. Dilawar Husain	Maulana Mukhtar Ahmad Nadvi Technical Campus Malegaon
5	Mr. Ramdas Shinde	Sanjivani K. B. P. Polytechnic Kopargaon
6	Dr. Mdazhar	Maulana Mukhtar Ahmad Nadvi Technical Campus Malegaon
7	Dr. Md Tanwir Alam	Maulana Mukhtar Ahmad Nadvi Technical Campus Malegaon
8	Mr. Vakte Vikramsingh Balasaheb	Sanjivani K B P Polytechnic, Kopargaon
9	Mr. Gujar Vilas Dharma	MIT Polytechnic Dhanore
10	Mr. Nitin Shantaram Aher	MIT Polytechnic , Yeola
11	Mr. Bhorkade Vilas Jalindar	MIT Polytechnic Yeola
12	Mr. Manoj Nivrutti Wagh	MIT Polytechnic Yeola
13	Mr. Kavade Yogesh Karbhari	MIT Polytechnic, Yeola
14	Miss Nikita Uttam Pawar	MIT Polytechnic, Dhanore
15	Mr. Sharad Arun Gadekar	MIT Polytechnic Dhanore
16	Mr. Pravin Prabhakar Tambe	MIT Polytechnic, Dhanore
17	Mr. Karale Sandip Ashok	SND COE& RC Yeola
18	Mr. Mayur Ratnakar Diwan	MIT Polytechnic Dhanore
19	Miss Gauri Kamalakar Shinde	MIT Polytechnic, Yeola
20	Mr. Ahire Ramkisan Nana	SND Polytechnic Babhulgaon Yeola
21	Mr. Chatur Rohit Suryabhan	S.N.D. Polytechnic Yeola
22	Dr. Samadhan Ganpat Morkhade	Vidya Pratishthans Kamalnayan Bajaj Institute of Engineering and Technology Baramati
23	Mr. Nilesh Bhatu Gawali	S.N.D COE & RC YEOLA
24	Mr. Harshal Rameshrao Aher	SND College of Engineering & Research Center, Babhulgaon, Yeola
25	Dr. Harshal Subhash Rane	SND College of Engineering & Research Center, Yeola
26	Mr. Vishal Thakare	S.N.D COE AND RC YEOLA

27	Mr. Gaurav Jagadish Pathak	SND COE RC YEOLA
28	Mr. Sunny Kailas Sonawane	S.N.D Polytechnic Yeola
29	Mr. Pagare Sunil Uttam	SND College of Engineering and Research Center Yeola
30	Mr. Gandole Vijay Ambadas	S.N.D Polytechnic Yeola
31	Miss Bharud Sakshi Pandit	S.N.D Polytechnic Yeola
32	Mr. Wagh Vivek Sharad	MET's IOE, Nashik
33	Mrs. Kolhe Swati Nana	SND Polytechnic Babhulgaon Yeola
34	Dr. Pavan N. Ghumare	MET's Institute of Engineering
35	Mr. Ramesh Rajendra Kotwal	Santosh N. Darade Polytechnic, Babhulgaon, Yeola
36	Mr. Alkesh Subhash Ajamere	SNJB's SHHJB Polytechnic, Chandwad
37	Mr. Savant Sachin Govind	S.N.D College of Engineering & Research center , At Post Babhulgaon Tal-Yeola Dist Nashik
38	Mrs. Bhattad Kavita Sachin	S.K.B.P. Polytechnic
39	Mr. Sanap Sajan Sitaram	SND College of Engineering And Research Center
40	Mr. Sanap Santosh Tukaram	SND College of Engineering And Research Center
41	Mr. Gawande Yogesh Bhagwanrao	SND COE &RC,YEOLA
42	Mr. Savandre Nivrutti Ratan	SNJBs SHHJB Polytechnic Chandwad
43	Mr. Sandeep Ramrao Asude	Santosh N Darade Polytechnic
44	Mr. Shekhar Prakash Kale	METs Institute of Engineering Bhujbal Knowledge City Adgaon Nashik
45	Mr. Saurav Anil Roham	S.N.D College Of engineering and research center
46	Dr. Pramod Keshav Kolase	Pravara Rural Engineering College
47	Mr. Vishal Kacharu Paithankar	MET BKC IOE NASHIK
48	Mr. Kunal Vilas Holkar	SNJB's Shri Hiralal Hastimal (Jain Brothers Jalgaon) Polytechnic, Chandwad
49	Mr. Kishor Subhash Sonawane	SNJB's Shri. Hiralal Hastimal (Jain Brothers, Jalgaon) Polytechnic
50	Miss Sakshi Subhash Shinde	S H H J B Polytechnic Chandwad
51	Mr. Deshmukh Mahesh Subhash	SND College Of Engineering & RC, Yeola
52	Dr. Farooq Ismail Chavan	SSBT College Of Engineering And Technology Bambhori
53	Mr. Vikas Dnyandeo Gholap	Pravara Rural Engineering College, Loni
54	Mr. Sachin Pundalik Harkal	SNJB'S LSKBJ COE, Chandwad
55	Mr. Vikrant Dattatray Londhe	S.N.D College of Engineering & Research Center
56	Miss Harshada wagh	SRES ,SCOE
57	Miss Mahewi Shriyaz Shaikh	Sanjivani College of Engineering, Kopargaon
58	Dr. Kisan Laxman Bidkar	SNJB COE,CHANDWAD
59	Miss Rajani Vyawahare	Sanjivani college of Engineering, Kopargaon
60	Mr. Akash Digambar Gaikwad	SND College of engineering &Rc Yeola

FDP detailed Schedule:

Day	Date	Session Time (IST)	Title of the Session	Name of Resource Person
1	18/12/2023	9.00 am to 9.30 am	Inauguration Ceremony	
		9.30 am to 11.30 am	Exploring the Principles of Ductility and Ductile Detailing.	Dr. Ratnesh Kumar
		11.30 am to 12.00 pm	Interactive Session/Question Answers	Dr. Ratnesh Kumar
		12.00 pm to 1.00 pm	Research Article Discussion	Dr. U. S. Ansari
		2.00 pm to 4.00 pm	Advances In Structural Engineering: Use Of Energy Dissipating Devices For Seismic Response Control.	Dr. Sachin V. Bakare
		4.00 pm to 4.30 pm	Interactive Session/Question Answers	Dr. Sachin V. Bakare
		4.30 pm to 5.30 pm	Research Article Discussion	Dr. U. S. Ansari
2	19/12/2023	9.30 am to 11.30 am	Permeable pavements with clean materials.	Dr. Sudarshan Sampatrao Bobade
		11.30 am to 12.00 pm	Interactive Session/Question Answers	Dr. Sudarshan Sampatrao Bobade
		12.00 pm to 1.00 pm	Research Article Discussion	Dr. U. S. Ansari
		2.00 pm to 4.00 pm	Innovative Solutions for High Earth Fill.	Er. Vikas Sahebrao Patil
		4.00 pm to 4.30 pm	Interactive Session/Question Answers	Er. Vikas Sahebrao Patil
		4.30 pm to 5.30 pm	Research Article Discussion	Dr. U. S. Ansari
3	20/12/2023	9.30 am to 11.30 am	Integration of science and spirituality for clean future.	Dr. Mujahid Hussian
		11.30 am to 12.00 pm	Interactive Session/Question Answers	Dr. Mujahid Hussian
		12.00 pm to 1.00 pm	Research Article Discussion	Dr. H. S. Rane
		2.00 pm to 4.00 pm	Thermoelectric Generator as alternative source of Energy.	Dr. Pradip Mohansingh Solanki
		4.00 pm to 4.30 pm	Interactive Session/Question Answers	Dr. Pradip Mohansingh Solanki
		4.30 pm to 5.30 pm	Research Article Discussion	Dr. H. S. Rane
4	21/12/2023	9.30 am to 11.30 am	Smart materials in earthquake resistant design.	Dr. Nilesh Uttamrao Mate
		11.30 am to 12.00 pm	Interactive Session/Question Answers	Dr. Nilesh Uttamrao Mate
		12.00 pm to 1.00 pm	Research Article Discussion	Dr. H. S. Rane
		2.00 pm to 4.00 pm	Low cost housing with alternative Materials.	Dr. Madhukar Ramchandra Wakchaure
		4.00 pm to 4.30 pm	Interactive Session/Question Answers	Dr. Madhukar Ramchandra Wakchaure
		4.30 pm to 5.30 pm	Research Article Discussion	Dr. H. S. Rane
5	22/12/2023	9.30 am to 5.00 pm	Industrial Visit and Report Writing	At Drip India Pvt., Ltd., Nashik, Maharashtra,

				India
6	23/12/2023	9.00 am to 11.00 am	Internal Combustion Engines Materials.	Er. Sachin Himmat Patil
		11.00 am to 11.30 am	Interactive Session/Question Answers	Er. Sachin Himmat Patil
		11.30 am to 12.30 pm	Research Article Discussion	Dr. Harjit U. Pawar
		1.00 pm to 3.00 pm	Cooling Tower construction and materials.	Er. Kalpesh Lotan Patil
		3.00 pm to 3.30 pm	Interactive Session/Question Answers	Er. Kalpesh Lotan Patil
		3.30 pm to 4.00 pm	Research Article Discussion	Dr. Harjit U. Pawar
		4.00 pm to 5.00 pm	MCQ Test	
		5.00 pm to 5.30 pm	Valedictory Session	

Inauguration function

The AICTE ATAL Faculty Development Program on Clean Engineering Materials was inaugurated on December 18, 2023, with esteemed personalities gracing the occasion. Among the dignitaries present, Hon. Rupesh Darade, Director of Jagdamba Education Society, played a crucial role in inaugurating the program.

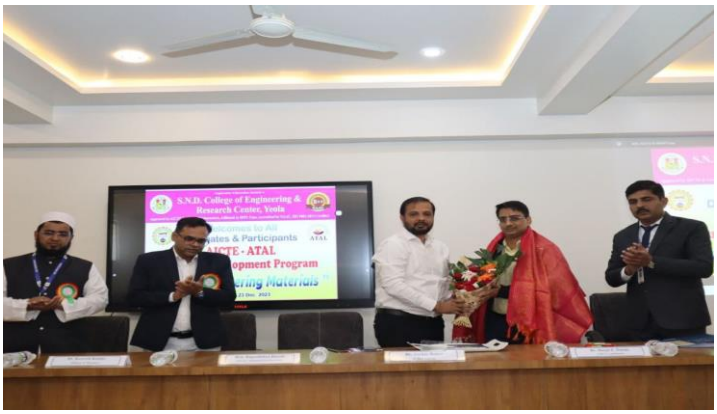
Chief Guest Dr. Sachin Bakre, in his address, commended the initiative taken by AICTE ATAL and the program coordinators for focusing on Clean Engineering Materials. He underscored the importance of such initiatives in nurturing a sustainable and environmentally conscious approach to engineering practices. Dr. Bakre shared insights from his experiences and encouraged participants to actively engage in the upcoming sessions for a holistic learning experience.

Dr. Ratnesh Kumar, the Guest of Honour, highlighted the dynamic nature of materials engineering and its pivotal role in addressing contemporary challenges. He expressed his optimism about the impact the program could have on shaping the knowledge and skills of the participants. Dr. Kumar urged the participants to embrace the interdisciplinary nature of Clean Engineering Materials and leverage their learnings for real-world applications.

The ceremony also featured the lighting of the lamp, symbolizing the enlightenment and knowledge that the program aimed to impart. This was followed by the formal inauguration, where the Chief Guest and Guest of Honour, along with Dr. Ansari U.S. and Dr. Harjit Pawar, officially declared the AICTE ATAL Faculty Development Program on Clean Engineering Materials open.

Glimpses of Inaugural function

Lamp Lightening by Hon. Guests



Felicitation of Hon. Guests

Shri Saraswati Pujan

Felicitation of Hon. Guests

Session Report

Day 1	Date:18/12/2023	Session: Morning
Speaker Name:	Dr. Ratnesh Kumar, Professor, NIT Nagpur	
Topic Name:	Exploring the Principles of Ductility and Ductile Detailing	

Glimpses

Session Summary

The session delved into the fundamental concepts of ductility in materials and the importance of ductile detailing in structural engineering. The presenter emphasized how ductility, the ability of a material to deform under stress, contributes to a structure's resilience and safety.

Key points covered:

1. Definition of Ductility: The session began by defining ductility as the property that enables a material to undergo significant deformation before failure. This property is crucial in structures subjected to dynamic forces.
2. Importance in Structural Engineering: The discussion highlighted how ductility plays a pivotal role in ensuring structures can absorb energy and deform without catastrophic failure during seismic events or extreme loading conditions.
3. Ductile Detailing Principles: Participants learned about the principles of ductile detailing, including reinforcing structures with materials that exhibit ductile behavior. Proper detailing involves designing connections, joints, and members to accommodate deformation.
4. Seismic Design Considerations: The presenter discussed how ductile detailing is particularly crucial in seismic design, as structures need to withstand and absorb the energy generated during an earthquake, allowing controlled deformation rather than sudden collapse.
5. Building Codes and Standards: An overview of relevant building codes and standards related to ductility and ductile detailing was provided, emphasizing the need for compliance to ensure structural integrity.
6. Case Studies: The session included case studies illustrating the real-world applications of ductile detailing. These examples showcased successful implementations and highlighted the impact of proper ductility considerations on the performance of structures.

7. Q&A Session: The session concluded with a question and answer segment, allowing participants to seek clarification on specific aspects of ductility and ductile detailing.

Overall, the session provided a comprehensive understanding of the principles of ductility and the practical aspects of ductile detailing in structural engineering. Participants gained insights into designing resilient structures capable of adapting to varying loads and ensuring the safety of occupants.

Day 1	Date:18/12/2023	Session: Afternoon
Speaker Name:	Dr. Sachin Bakre, Professor, NIT Nagpur	
Topic Name:	Use of Energy Dissipating Devices for Seismic Response Control	

Glimpses

Session Summary

In this session, the focus was on the application of energy dissipating devices as effective tools for mitigating seismic response in structures. The presenter highlighted key principles, types of devices, and their role in enhancing the seismic resilience of buildings.

Key highlights from the session:

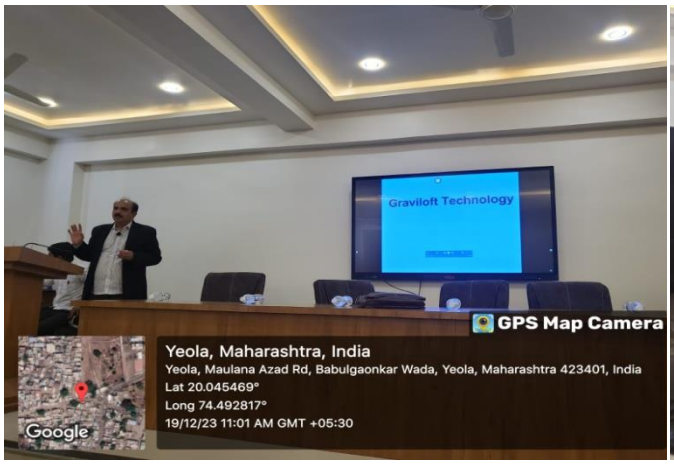
1. Introduction to Seismic Response Control: The session commenced with an overview of seismic response control and the need for strategies to reduce the impact of seismic forces on structures.
2. Role of Energy Dissipating Devices: Participants were informed about the crucial role of energy dissipating devices in absorbing and dissipating seismic energy. These devices act as shock absorbers, reducing the forces transmitted to the structure.
3. Types of Energy Dissipating Devices: The presenter discussed various types of energy dissipating devices, including tuned mass dampers, viscous dampers, base isolators, and friction dampers. Each type was explained in terms of its mechanism and suitability for specific applications.
4. Design Considerations: The session emphasized the importance of careful design and selection of energy dissipating devices based on the characteristics of the structure, seismic hazard, and desired performance objectives.

5. Implementation in Structural Engineering: Practical applications of energy dissipating devices in real-world structural engineering projects were showcased. Case studies demonstrated successful installations and the positive impact on reducing structural damage during seismic events.
6. Advantages and Limitations: A balanced discussion on the advantages and limitations of energy dissipating devices was presented. Considerations such as cost, maintenance, and potential drawbacks were addressed to provide a comprehensive understanding.
7. Codes and Standards: Participants were briefed on relevant building codes and standards governing the use of energy dissipating devices. Compliance with these regulations is essential to ensure the safety and effectiveness of the implemented solutions.
8. Future Trends and Innovations: The session concluded with a glimpse into emerging trends and innovations in the field, encouraging participants to stay informed about advancements that could further enhance seismic response control.

Overall, the session offered valuable insights into the practical application of energy dissipating devices, providing engineers and practitioners with knowledge to implement effective seismic response control measures in their projects.

Day 2	Date:19/12/2023	Session: Morning
Speaker Name:	Er. Vikas Patil, CEO, Savi Infrastructure, Pune	
Topic Name:	Retaining Wall Construction with Clean Materials and Graviloft Technology	

Glimpses



Session Summary

This session focused on the innovative approach to retaining wall construction by incorporating clean materials and Graviloft Technology. The presenter highlighted the sustainable and efficient aspects of using such materials and technology in the design and construction of retaining walls.

Key Points Covered:

1. Introduction to Clean Materials: The session began with an introduction to clean materials, emphasizing the importance of environmentally friendly options in construction. Clean materials typically have minimal environmental impact, reduced carbon footprint, and contribute to sustainable building practices.

2. Overview of Graviloft Technology: Participants were introduced to Graviloft Technology, a cutting-edge approach to retaining wall construction. This technology combines the use of clean materials with innovative design principles, offering enhanced performance and durability.
3. Sustainable Construction Practices: The presenter discussed how the integration of clean materials aligns with sustainable construction practices, promoting eco-friendly alternatives that minimize resource depletion and environmental degradation.
4. Advantages of Graviloft Technology: The session outlined the advantages of Graviloft Technology, including improved stability, reduced maintenance, and the ability to adapt to various soil conditions. The technology's role in optimizing the structural integrity of retaining walls was emphasized.
5. Case Studies: Real-world case studies were presented to illustrate successful projects where clean materials and Graviloft Technology were employed in retaining wall construction. These examples showcased the practical application and positive outcomes of this approach.
6. Design Considerations: The presenter discussed key design considerations when implementing clean materials and Graviloft Technology in retaining walls. Factors such as load-bearing capacity, drainage, and long-term performance were addressed to guide engineers in the planning process.
7. Environmental Impact Assessment: A segment of the session was dedicated to evaluating the environmental impact of retaining wall construction using clean materials and Graviloft Technology. Life cycle assessments and comparisons with traditional methods were discussed.
8. Q&A Session: The session concluded with a question and answer session, allowing participants to seek clarification on specific aspects of clean materials and Graviloft Technology in retaining wall construction.

In summary, the session provided valuable insights into the integration of clean materials and Graviloft Technology in retaining wall construction, highlighting the environmental benefits, structural advantages, and real-world applications of this innovative approach. Participants gained a deeper understanding of how sustainable practices can be seamlessly integrated into engineering solutions for retaining walls.

Day 2	Date:19/12/2023	Session: Afternoon
Speaker Name:	Dr Sudarshan Bobade, HoD Civil Engineering, PCCOE&R, Pune	
Topic Name:	Permeable Concrete as a Clean Engineering Material	

Glimpses

Session Summary

This session focused on the use of permeable concrete as a clean and sustainable engineering material. The presenter highlighted the environmental benefits, applications, and design considerations associated with permeable concrete in various construction projects.

Key Points Covered:

1. Introduction to Permeable Concrete: The session began with an overview of permeable concrete, emphasizing its unique characteristic of allowing water to pass through. This eco-friendly material is designed to reduce surface runoff and promote sustainable water management.
2. Environmental Benefits: Participants learned about the environmental advantages of permeable concrete, including reduced stormwater runoff, improved groundwater recharge, and mitigation of urban heat island effects. The material's contribution to sustainable urban development was discussed.
3. Applications in Construction: The presenter explored the diverse applications of permeable concrete in construction, including driveways, parking lots, sidewalks, and stormwater management systems. Case studies showcased successful implementations and demonstrated the versatility of this material.
4. Structural Considerations: Design considerations for permeable concrete were discussed, covering aspects such as load-bearing capacity, compaction, and proper installation techniques. The importance of engineering solutions that balance permeability with structural integrity was emphasized.
5. Water Quality Improvement: The session highlighted how permeable concrete contributes to improved water quality by allowing natural filtration of pollutants. This aspect is crucial for meeting environmental regulations and creating sustainable urban environments.
6. Maintenance and Longevity: Participants received insights into the maintenance requirements and longevity of permeable concrete. Proper care practices were discussed to ensure the continued effectiveness of the material over its lifecycle.
7. Cost Considerations: The presenter addressed cost considerations associated with permeable concrete, comparing them with traditional materials. Life cycle cost analysis and potential long-term savings were discussed to provide a comprehensive understanding of economic implications.
8. Integration with Green Infrastructure: The session emphasized the role of permeable concrete in green infrastructure initiatives. Its synergy with rain gardens, bioswales, and other sustainable practices was explored as part of holistic urban planning.
9. Regulatory Compliance: Participants were briefed on regulatory standards and certifications related to permeable concrete. Compliance with industry guidelines ensures that projects using this material align with environmental and engineering standards.
10. Q&A Session: The session concluded with a question and answer segment, allowing participants to seek clarification on specific aspects of permeable concrete and its applications.

In conclusion, the session provided valuable insights into the use of permeable concrete as a clean engineering material, offering a sustainable solution for addressing urban water challenges and promoting environmentally conscious construction practices. Participants gained practical

knowledge that can be applied in the design and implementation of projects incorporating permeable concrete.

Day 3	Date:20/12/2023	Session: Morning
Speaker Name:	Dr. Mujahid Hussain, HOD and Professor ,Civil Engineering, SSBT college of Engineering, Jalgaon, Chairman BOS Civil Engineering, KBC North Maharashtra university, Jalgaon	
Topic Name:	Exploring the Principles of Ductility and Ductile Detailing	

Glimpses

Session Summary

The session delved into the fundamental concepts of ductility in materials and the importance of ductile detailing in structural engineering. The presenter emphasized how ductility, the ability of a material to deform under stress, contributes to a structure's resilience and safety.

Key points covered:

1. Definition of Ductility: The session began by defining ductility as the property that enables a material to undergo significant deformation before failure. This property is crucial in structures subjected to dynamic forces.
2. Importance in Structural Engineering: The discussion highlighted how ductility plays a pivotal role in ensuring structures can absorb energy and deform without catastrophic failure during seismic events or extreme loading conditions.
3. Ductile Detailing Principles: Participants learned about the principles of ductile detailing, including reinforcing structures with materials that exhibit ductile behavior. Proper detailing involves designing connections, joints, and members to accommodate deformation.
4. Seismic Design Considerations: The presenter discussed how ductile detailing is particularly crucial in seismic design, as structures need to withstand and absorb the energy generated during an earthquake, allowing controlled deformation rather than sudden collapse.
5. Building Codes and Standards: An overview of relevant building codes and standards related to ductility and ductile detailing was provided, emphasizing the need for compliance to ensure structural integrity.

6. Case Studies: The session included case studies illustrating the real-world applications of ductile detailing. These examples showcased successful implementations and highlighted the impact of proper ductility considerations on the performance of structures.
7. Q&A Session: The session concluded with a question and answer segment, allowing participants to seek clarification on specific aspects of ductility and ductile detailing.

Overall, the session provided a comprehensive understanding of the principles of ductility and the practical aspects of ductile detailing in structural engineering. Participants gained insights into designing resilient structures capable of adapting to varying loads and ensuring the safety of occupants.

Day 3	Date:20/12/2023	Session: Afternoon
Speaker Name:	Dr. Pradip Solanki, Associate Professor, Mechanical Engineering, SSBT college of Engineering, Jalgaon	
Topic Name:	Thermoelectric Generator as an Alternative Source of Energy	

Glimpses

Session Summary

This session explored the principles, applications, and potential of thermoelectric generators (TEGs) as an alternative and sustainable source of energy. Participants gained insights into the technology's capabilities and its role in addressing energy challenges.

Key Highlights:

1. Introduction to Thermoelectric Generation: The session began with an overview of thermoelectric generation, explaining the fundamental concept of converting temperature differences into electrical power using thermoelectric materials.
2. Working Principles: Participants delved into the working principles of TEGs, understanding the Seebeck effect where a voltage is generated across a temperature gradient in a conductive material. The efficiency of this process and its applications in energy conversion were discussed.
3. Applications: The presenter highlighted various applications of thermoelectric generators, ranging from waste heat recovery in industrial processes to powering electronic devices in

remote areas. The versatility of TEGs makes them suitable for both large-scale and small-scale energy harvesting.

4. Advantages of TEGs: The session outlined the advantages of using thermoelectric generators, including their reliability, low maintenance requirements, and the ability to generate power from heat sources that would otherwise go unused.
5. Materials and Technological Advances: Participants were updated on recent advancements in thermoelectric materials and technology, improving the efficiency and performance of TEGs. This included developments in materials with enhanced thermoelectric properties.
6. Environmental Impact: The environmental impact of thermoelectric generators was discussed, emphasizing their potential role in reducing greenhouse gas emissions by utilizing waste heat from industrial processes and other sources.
7. Challenges and Solutions: The presenter addressed challenges associated with TEGs, such as efficiency limitations and material costs. Ongoing research and potential solutions, including advancements in material science and system design, were discussed.
8. Case Studies: Real-world case studies showcased successful implementations of thermoelectric generators in diverse settings, providing tangible examples of their effectiveness in generating clean energy.
9. Future Prospects: The session concluded with a discussion on the future prospects of thermoelectric generators, including their integration into mainstream energy systems, advancements in efficiency, and potential breakthroughs in materials science.
10. Q&A Session: The session ended with a question and answer session, allowing participants to seek clarification on specific aspects of thermoelectric generators and their applications.

In summary, the session provided a comprehensive overview of thermoelectric generators as an alternative source of energy, covering their principles, applications, advantages, challenges, and future potential. Participants gained valuable insights into the role of TEGs in the broader context of sustainable energy solutions.

Day 4	Date:21/12/2023	Session: Morning
Speaker Name:	Dr Nilesh Mate Association Professor, Amrutvahini College of Engineering, Sangamner	
Topic Name:	Smart Materials in Earthquake-Resistant Design	

Glimpses

Session Summary

The session focused on the integration of smart materials in earthquake-resistant design, offering a comprehensive exploration of innovative solutions to enhance the structural resilience of buildings and infrastructure in seismic-prone regions.

Key Highlights:

1. Definition of Smart Materials: Dr. Nilesh Mate provided a clear definition of smart materials, emphasizing their unique ability to adapt their properties in response to external stimuli, such as mechanical stress or temperature changes.
2. Role of Smart Materials in Earthquake Resistance: The presenter highlighted the crucial role of smart materials in mitigating earthquake-induced damage by dynamically adjusting their properties. This adaptability allows structures to better absorb and dissipate seismic energy.
3. Types of Smart Materials: The session covered various types of smart materials relevant to earthquake-resistant design, including shape memory alloys, piezoelectric materials, and magnet or rheological fluids. Each material type was discussed in terms of its specific applications and benefits.
4. Applications in Structural Engineering: Participants gained insights into practical applications of smart materials, such as seismic dampers, base isolators, and self-healing concrete. Case studies were presented to illustrate successful implementations and the positive impact on structural performance during seismic events.
5. Advantages of Smart Materials: Dr. Mate outlined the advantages of incorporating smart materials, including increased flexibility, improved energy dissipation, and the potential for real-time monitoring of structural health. These features contribute to overall safety and longevity of structures.
6. Challenges and Considerations: The presenter addressed challenges associated with the use of smart materials, including cost considerations, long-term durability, and the need for standardized testing protocols. Practical solutions and ongoing research efforts in overcoming these challenges were discussed.
7. Integration with Modern Technologies: The session explored how smart materials can be integrated with modern technologies such as sensors and data analytics to create intelligent and adaptive structural systems. This combination enhances the overall effectiveness of earthquake-resistant designs.
8. Future Trends and Research Directions: Dr. Nilesh Mate concluded the session by discussing emerging trends in smart materials research for earthquake resistance. This included advancements in material science, collaborative interdisciplinary research, and the potential for smart materials to contribute to sustainable and resilient urban development.
9. Q&A Session: The session concluded with an engaging question and answer segment, allowing participants to seek clarification on specific aspects of smart materials in earthquake-resistant design.

In summary, the session provided a thorough examination of the role and applications of smart materials in earthquake-resistant design, offering valuable insights for engineers, researchers, and practitioners in the field of structural engineering. Participants left with a deeper understanding of the transformative potential of smart materials in creating more resilient and adaptive structures in earthquake-prone regions.

Day 4	Date:21/12/2023	Session: Afternoon
Speaker Name:	Dr Madhukar Wackchaire, Professor and Head Civil Engineering, Amrutvahini College of Engineering, Sangamner	
Topic Name:	Low-Cost Housing with Alternative Materials	

Glimpses

Session Summary

Introduction: Low-cost housing is a critical need globally, and exploring alternative materials can contribute to sustainable and affordable solutions. This report focuses on utilizing bamboo and other clean materials for constructing economical housing.

Benefits of Bamboo:

1. Renewable Resource: Bamboo grows rapidly, making it a sustainable and renewable building material.
2. Strength and Flexibility: Bamboo's tensile strength and flexibility make it suitable for construction, providing resilience against natural disasters.

Utilizing Clean Materials:

1. Recycled and Sustainable Materials: Incorporating recycled materials reduces environmental impact, promoting eco-friendly construction practices.
2. Energy-Efficient Design: Implementing energy-efficient designs can lower long-term costs for occupants and contribute to environmental sustainability.

Case Studies:

1. Bamboo Housing Projects: Showcase successful low-cost housing projects utilizing bamboo, such as those in Southeast Asia and South America.
2. Clean Material Innovations: Highlight innovative projects globally that leverage clean materials, such as recycled plastics or sustainable composites.

Challenges and Solutions:

1. Treatment and Preservation: Address the need for proper treatment to enhance bamboo's durability.
2. Regulatory Compliance: Discuss challenges related to building codes and regulations, proposing strategies to streamline approval processes.

Community Engagement:

1. Local Collaboration: Emphasize the importance of involving local communities in the construction process, fostering a sense of ownership and sustainability.
2. Training Programs: Implement training programs to educate communities on construction techniques using alternative materials.

Economic Impact:

1. Job Creation: Highlight the potential for job creation within local communities through the use of alternative materials.
2. Affordability: Explore how the cost-effectiveness of these materials can make housing more accessible to a broader population.

Conclusion:

Promoting low-cost housing with alternative materials like bamboo and clean options not only addresses the housing crisis but also aligns with sustainable development goals. Collaborative efforts, innovation, and community involvement are crucial in realizing the full potential of these solutions.

Day 5	Date:22/12/2023	Session: Industry Visit
Name of Industry:	Drip India Irrigation Pvt. Ltd. Gat No. :- 273, Dindori Road, Pimpalnare Tal:- Dindori Nashik, Maharashtra 422004	

Glimpses

Visit Summary

In view of providing industrial exposure to the participants the FDP coordinator and team had plan one day industrial visit to Drip India Irrigation Pvt. Ltd., Gat No. :- 273, Dindori Road, Pimpalnare, Tal:- Dindori, Nashik, Maharashtra 422004 on 22/12/2023. This tour has been successfully executed under the coordination of Dr. U. S. Ansari, Dr. H. U. Pawar and the team members of the programme for the participants. This is a visit to an industry as far as participants are concern which made them through enthusiastic in exploring the environment. Drip India derives its name from the pioneering work it did for the micro irrigation industry in India. However, there is more to Drip India Irrigation than Irrigation. The corporation has multi product industrial profile and manufacturers of drip and sprinkler irrigation systems. Each of their product is an outcome of an effort to conserve natures precious resources through substitution or value edition. This is the legacy of deliberate and conscious endeavor that stems from a deep-rooted concern for nature. On the day of visit, participants were given an AV presentation by Mr. Kiran Mene, senior manager which described the success story of the company and its wonderful outcomes. Later the participants were accompanied by the production team by dividing them into groups. They were taken to various sections of the departments, like Raw Material Storage, Mixing Chamber, Quality Check Area. They explained the process involve in the production system of PE, PVC and HDPE pipes. The participants were immensely satisfied with this visit by resolving their queries regarding manufacturing system and its operations. They had experienced a practical exposure to industrial environment in this visit which gave knowledge based outcome to the participants.

Key Highlights in Visit:

1. Demonstration of Drip and Sprinkler Irrigation System.
2. Requirement, Storage and effective Utilization of Raw Materials.
3. Coordination and management of corporate and production process.
4. Manufacturing of PE, PVC and HDPE pipes, accessories and other components.
5. Methods of recycling plastic waste and application to agriculture purpose.

Day 6	Date:23/12/2023	Session: Morning
Speaker Name:	Mr.Sachin Patil, Senior Manager, (Manufacturing) Mahindra and Mahindra, Igatpuri	
Topic Name:	Future of Engines/Mobility	

Glimpses

Session Summary

Introduction:

The session aimed to provide participants with a comprehensive understanding of material properties, exploring the fundamental characteristics that influence the behavior and performance of various materials in engineering and manufacturing.

Key Highlights:

1. Definition of Material Properties: The presenter began by defining material properties as the intrinsic qualities or attributes that describe how a material responds to external forces, environmental conditions, and various stimuli.
2. Classification of Material Properties: Different types of material properties were discussed, including mechanical properties (e.g., strength, elasticity), thermal properties (e.g., conductivity, expansion), electrical properties (e.g., conductivity, resistivity), and optical properties (e.g., transparency, reflectivity).
3. Mechanical Properties: In-depth exploration of mechanical properties such as tensile strength, hardness, ductility, and toughness. Real-world examples and case studies were presented to illustrate how these properties influence material selection for specific applications.
4. Thermal Properties: Discussion on the thermal behavior of materials, covering concepts like thermal conductivity, specific heat, and coefficient of thermal expansion. Practical examples demonstrated how these properties impact the suitability of materials in various temperature environments.

5. Electrical Properties: Insight into electrical properties, including conductivity, resistivity, and dielectric strength. The session emphasized the importance of these properties in the design and functionality of electronic components and systems.
6. Optical Properties: Exploration of optical characteristics such as transparency, reflectivity, and refractive index. The presenter highlighted the significance of these properties in fields like optics, telecommunications, and display technologies.
7. Factors Influencing Material Properties: Participants gained an understanding of the factors that influence material properties, including composition, microstructure, temperature, and external forces. The presenter discussed how modifications at the atomic and molecular levels can alter material behavior.
8. Testing and Measurement Techniques: Overview of common techniques used to measure and evaluate material properties, such as tensile testing, hardness testing, and thermal analysis. The session emphasized the importance of accurate testing in material characterization.
9. Applications in Engineering and Design: Practical applications of material properties in engineering and design were explored. This included selecting materials for specific structural components, considering thermal properties in electronic device design, and optimizing optical properties for various applications.
10. Future Trends and Innovations: The session concluded with a glimpse into future trends and innovations in material science, discussing emerging technologies and research directions that may influence the development of materials with novel properties.

Key Materials in Electric Vehicles:

1. Battery Materials: Lithium, cobalt, nickel, manganese, and graphite are crucial components of the batteries powering electric vehicles. These materials impact energy density, charging speed, and overall battery performance.
2. Lightweight Structural Materials: Aluminum widely used in EVs for its lightweight properties, aluminum helps improve energy efficiency and extends the vehicle's range. Carbon Fiber commonly found in high-end electric vehicles, carbon fiber composites contribute to weight reduction, enhancing efficiency and range.
3. Electric Motors: Copper essential for the conductive coils in electric motors, copper plays a critical role in motor efficiency and performance. Permanent Magnets Neodymium, dysprosium, and praseodymium are used in the production of powerful permanent magnets in electric motors.
4. Charging Infrastructure Materials: Copper and Aluminum materials are prevalent in the wiring and conductive elements of charging stations, ensuring efficient power transfer.
5. Interior Materials: EV manufacturers are increasingly incorporating recycled plastics, bio-based materials, and sustainable textiles for interior components to reduce environmental impact.

Significance of Materials in EVs:

1. Energy Efficiency:- Lightweight materials reduce overall vehicle weight, improving energy efficiency and extending the driving range of electric vehicles.
2. Battery Performance: The choice of materials in batteries directly influences their energy density, charging speed, and overall performance, addressing key concerns in EV adoption.
3. Environmental Impact: The use of recycled and sustainable materials in both the vehicle structure and interior components aligns with the environmental goals of reducing carbon footprint and minimizing waste.

4. Resource Considerations: The availability and ethical sourcing of materials, especially rare earth elements in motors and batteries, are important considerations for sustainable EV manufacturing.

Challenges and Future Trends:

1. Resource Availability: Limited availability of certain materials, such as rare earth elements, poses challenges. Ongoing research focuses on developing alternatives and improving recycling processes.
2. Circular Economy Practices: Emphasis on adopting circular economy practices, including recycling and reusing materials from end-of-life EVs, to minimize environmental impact.
3. Advanced Materials Research: Ongoing research explores advanced materials, like solid-state batteries and new alloys, aiming to improve performance, reduce costs, and address environmental concerns.

Conclusion:

Materials play a pivotal role in the development and sustainability of electric vehicles. The careful selection of materials contributes to improved energy efficiency, longer driving ranges, and reduced environmental impact. As the automotive industry continues to evolve, ongoing research and innovation in materials science will play a crucial role in shaping the future of electric mobility.

Conventional Fossil Fuels: The session provided an overview of the efficiency and challenges associated with conventional fossil fuels, emphasizing the need for cleaner alternatives due to environmental concerns and finite resources. Biofuels: Biofuels, derived from organic materials such as plants and algae, were discussed for their potential in reducing carbon emissions. The session highlighted ongoing research and developments to enhance the efficiency and scalability of biofuel production. Hydrogen Fuel Cells: The presenter explored the efficiency and advancements in hydrogen fuel cell technology. The discussion included the role of hydrogen as a clean and versatile energy carrier, with a focus on its potential applications in transportation.

Electric Vehicles (EVs): The session covered the efficiency gains and rapid development in the electric vehicle sector. The advancements in battery technology, charging infrastructure, and the overall growth of the EV market were highlighted as key contributors to a sustainable transportation future. Natural Gas and Propane: The efficiency and environmental considerations of natural gas and propane as alternative fuels were discussed. The session emphasized their potential in certain applications, such as fleet vehicles and heavy-duty transportation. Renewable Energy Integration: The integration of renewable energy sources, such as solar and wind, into the production of alternative fuels was explored. This approach aims to enhance the sustainability of fuel production processes. Policy and Regulatory Landscape: The impact of policies and regulations on fuel efficiency and development was discussed. Government initiatives promoting clean energy and sustainable transportation were highlighted as catalysts for industry advancements. Challenges and Solutions: Challenges, including infrastructure limitations, technological barriers, and public acceptance, were addressed. Potential solutions and collaborative efforts between industries, governments, and research institutions were emphasized to overcome these challenges.

Future Trends: Hybrid Technologies: The integration of hybrid technologies, combining traditional fuel sources with electric or hydrogen power, was identified as a promising trend for improving overall efficiency and reducing environmental impact. Advanced Fuel Production Techniques: Ongoing research in advanced fuel production techniques, such as synthetic fuels and algae-based biofuels, was highlighted as a key area for future development. Electrification of Transportation: The growing trend toward the electrification of transportation, encompassing not only passenger vehicles

but also buses, trucks, and even aviation, was discussed as a transformative force in the industry. International Collaboration: The session concluded with an emphasis on the importance of international collaboration to address global energy challenges, share best practices, and accelerate the development of sustainable fuel solutions.

Q&A Session: The session concluded with an interactive question and answer segment, allowing participants to seek clarification and delve deeper into specific aspects of material properties.

In summary, the session provided participants with a foundational understanding of material properties, offering insights into their significance across various disciplines. The exploration of real-world applications and future trends contributed to a comprehensive appreciation of the role material properties play in shaping the world of materials science and engineering.

Day 6	Date:23/12/2023	Session: Afternoon
Speaker Name:	Mr.Kalpesh Patil, Senior Manager, Gammon India, Mumbai	
Topic Name:	Cooling Tower Materials and Construction	

Glimpses

Session Summary

Introduction:

Cooling towers play a vital role in industrial processes by dissipating excess heat. This report delves into the materials and construction methods employed in cooling tower design for optimal efficiency and longevity.

Materials Selection:

1. Fiber-Reinforced Plastics (FRP): Widely used due to corrosion resistance, lightweight nature, and durability.
2. Concrete:* Provides stability and durability, especially for large cooling towers.
3. Galvanized Steel: Commonly used for structural components, balancing strength and cost-effectiveness.

Construction Techniques:

1. Counter flow vs. Cross flow Design: discuss the advantages and considerations of each design for efficient heat dissipation.
2. Modular Construction: High light the benefits of modular construction for faster installation and flexibility in capacity expansion.

Considerations for Longevity:

1. Corrosion Protection: Emphasize the importance of corrosion-resistant materials to extend the lifespan of cooling towers.
2. Regular Maintenance: Stress the need for routine inspections and maintenance to identify and address issues promptly.

Environmental Impact:

1. Water Conservation: Explore methods for minimizing water usage and optimizing water circulation within the cooling tower.
2. Energy Efficiency: Discuss strategies for enhancing energy efficiency, such as incorporating variable-speed drives and optimizing fan systems.

Safety Measures:

1. Structural Integrity: Address the importance of structural design to withstand environmental loads and potential seismic events.
2. Adherence to Regulations: Emphasize compliance with safety and environmental regulations to ensure safe operation.

Innovations in Cooling Tower Technology:

1. Smart Monitoring Systems: Explore the integration of IoT and data analytics for real-time monitoring and predictive maintenance.
2. Alternative Cooling Methods: Briefly touch upon advancements in alternative cooling technologies, such as hybrid systems and evaporative cooling.

Case Studies:

1. Successful Cooling Tower Projects: Highlight notable cooling tower projects that demonstrate effective material selection and construction practices.
2. Failure Analysis: Discuss instances of cooling tower failures, emphasizing the lessons learned and improvements in industry practices.

Conclusion:

Efficient cooling tower materials and construction are essential for maintaining industrial processes. The continuous evolution of materials and construction techniques, coupled with a focus on sustainability and safety, ensures the reliability and longevity of cooling towers in various industrial applications.