Dr. T. Thimmaiah Institute of Technology, K.G.F

EMERALD

DEPARTMENT OF MINING ENGINEERING

OCT, 2022
Technical Magazine

VOL. 3

MINERS' NEVER GIVE UP

Visit : www.drttit.gvet.edu.in

About the Department

The Mining Engineering is one of the main branches of engineering situated amidst the century-old Kolar Gold Mines. Asia's largest mines, like Kudremukh Iron Ore and Neyveli Lignite, are situated at a distance less than 250 Kilometres. The Mining Engineering department has well-established labs and has an underground mine model, the only one of its kind in the State.

The department has a strong industry-institution interaction to enable exposure to the latest technological trends for students and teachers and to impart practical training at HGML, NMDC, etc.

National Institute of Rock Mechanics (NIRM) a research institute extends thefacility for the training of students in various project works. Recent additions to the laboratory include a sophisticated electronics survey station and electronic precision level. The department also has a computer laboratory for data processing.

Principal's Message

Dear Readers,

I am delighted to welcome you to the lastest issue of "Emerald" student's Technical Magazine, a new technical publication that showcases the latest developments and innovations in mining engineering. This magazine is an initiative of our Mining Engineering Department, which is one of the leading departments in our college and in our region.

I would like to congratulate and appreciate the efforts of Dr. Manas Mukhopadhyay, Head of the Department, and his editorial team for this magazine. They have done a commendable job in bringing out this issue, which features articles on topics such as mining practices, mineral production, mine environmental management, mine design optimization and more. The magazine also highlights some of the achievements and activities of our students, faculty, alumni and industry partners in mining engineering.

I hope you enjoy reading this magazine and find it informative and inspiring. I urge you to keep learning and exploring new horizons in your field. Mining engineering is a vital discipline that contributes to our national security and economic growth. You have a great opportunity and responsibility to make a positive impact on our society and our environment through your work.

Dr. Syed Ariff
Principal
Dr. T. Thimmaiah Institute of Technology, KGF

HOD's Message

Dear Readers,

I am delighted to welcome you to the third issue of "Emerald" Technical Magazine, a student-led publication that showcases the latest developments and innovations in mining field. This magazine is a platform for our students, faculty, alumni and industry partners to share their insights, experiences and achievements in mining engineering.

In this issue, you will find articles on topics such as mining practices, mineral production, mine environmental management, mine design optimization and more. You will also learn about some of the exciting projects and activities that our department is involved in, such as research collaborations, student competitions, outreach programs and alumni events.

I would like to thank the editorial team for their hard work and dedication in preparing this magazine. I would also like to thank all the authors who contributed their valuable content to this issue. Without their efforts, this magazine would not have been possible.

I hope you enjoy reading this magazine and find it informative and inspiring. I look forward to hearing your feedback and suggestions for future issues. Together, we can make this magazine a success and a source of pride for our department and our profession.

Sincerely,

Dr. Manas Mukhopadhyay

Head, Department of Mining Engineering

Chief Editor's Message

Dear Readers,

Welcome to the present issue of the "Emerald" Student Technical Magazine of Department of Mining Engineering, a publication dedicated to showcasing the latest research, innovations and achievements in the field of mining engineering. This magazine is created by and for students who are passionate about mining and its applications in various sectors of society. Our goal is to provide a platform for students to share their ideas, insights and experiences with their peers, professors and industry professionals. We hope that this magazine will inspire, inform and connect students who are interested in mining engineering and related disciplines.

In this issue, you will find articles on topics such as mining practices, mineral production, mine environmental management, mine design optimization and more. You will also learn about some of the exciting projects and activities that our department is involved in, such as research collaborations, student competitions, outreach programs and alumni events.

We would like to thank all the contributors, reviewers and advisors who made this issue possible. We are grateful for your support and encouragement.

We invite you to join us in this exciting journey of exploring the world of mining engineering. If you have any feedback, suggestions or questions, please feel free to contact us at hod.min@drttit.edu.in. We look forward to hearing from you and seeing your contributions in future issues.

Dr. Manjunath A.
Chief Editor

Student Editor's Message

Dear Readers,

Welcome to the third issue of "Emerald" student technical magazine of Department of Mining Engineering, a publication created by and for the students of this field. Our goal is to showcase the latest research, innovations, and achievements in mining engineering, as well as to provide a platform for sharing ideas, opinions, and experiences among our peers.

We hope that this magazine will inspire you to pursue your academic and professional interests, as well as to connect with other students who share your passion for mining engineering. In this issue, you will find articles on topics such as mining practices, geotechnical engineering, mineral processing, and more. You will also find interviews with faculty members, alumni, and industry experts who offer their insights and advice on various aspects of mining engineering.

We invite you to read, enjoy, and learn from this magazine, and to share your feedback and suggestions with us. We also encourage you to contribute to future issues by submitting your own articles, projects, or reviews. Together, we can make this magazine a valuable resource and a vibrant community for all mining engineering students.

ANSHADH
Head, Student editorial Members
3rd year, Mining Engg. Student

Student Editorial Members

RAVI SHARKAR
3rd Year Mining

PURUSHOTHAMAN V
4th Year Mining

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Technical Tips

Artificial Intelligence (AI) in Mining Industry
by
- Dr. Manjunath A.

Artificial intelligence (AI): This technology allows miners to leverage machine learning, data analytics, and natural language processing to automate and enhance various aspects of their operations. AI helps miners in several ways, such as:

- Exploration: AI can help miners discover new mineral deposits by analyzing large amounts of data from various sources, such as satellite imagery, geological maps, geochemical samples, and historical records. AI can also help miners optimize exploration strategies by predicting the best locations to drill or sample.

- Drilling and blasting: AI can help miners improve drilling and blasting performance by optimizing parameters such as hole diameter, depth, spacing, angle, explosive type, and charge. AI can also help miners monitor drilling and blasting activities by detecting anomalies, deviations, or hazards.

- Ore sorting and processing: AI can help miners increase ore quality and recovery by sorting ore based on characteristics such as color, shape, size, density, or mineral content. AI can also help miners optimize processing parameters such as grinding size, flotation time, leaching temperature, or reagent dosage.

- Maintenance and logistics: AI can help miners reduce equipment downtime and costs by predicting and preventing failures, scheduling maintenance activities, and optimizing spare parts inventory. AI can also help miners improve logistics efficiency by optimizing routes, schedules, and loads for trucks, trains, or conveyors.

Student Projects

"Investigation of Presence of Hazardous Gases Near Excavation Zone for Safe Working Environment"

Karthik P, Purushothaman V, Sasikumar R, and Thirunavukkarasu M
Under the Guidance of Prof. Paul Prasanna Kumar S

Abstract

Today safety of miners is a major challenge. The mining industry is known worldwide for its highly risk and hazardous working environment. Thousands of workers lost their lives during the excavation and this is a very big issue in mines. The main problems encountered in mines are due to presence of toxic and flammable gases present in mine air, increase in temperature, humidity and effect of dust on workers this puts a lot of pressure on mining industry. These effects are not sensed by the workers. To increase the productivity and reduce the cost of mining along with consideration of safety of workers, and innovative approach is required. This paper deals with the real time monitoring system for mine safety using wireless sensors. This system will give the early warning, which will be helpful to all miners present inside the mines to save their life before any casualty occurs. This system uses ARDUINO MEGA 2560 microcontroller with respective sensors to detect and alert hazardous gas, temperature and humidity to workers. The real-time gas monitoring system was successfully tested and communication from underground to the surface was established using wireless LoRa WAN.

Keywords: Safety, Risk and Hazardous, Toxic and Flammable Gases, Humidity, Temperature, Real Time Monitoring System, Microcontroller, Wireless Communication.

"Investigation of Various Factors Affecting Effectiveness of Fatigue Management System in Indian Mines"

Ishappa, Kiran Kumar Emmi S, Kumar Maruthi S and Mruthyunjay Kumar S B

Under the Guidance of Dr Manjunath A.

Abstract

Fatigue is recognized as a high potential risk for accidents and therefore an assessment of work fatigue is required. The purpose of this study is to describe the overall work fatigue and fatigue management system using ESS scale for the fatigue rating and parameters-based questions to determine the fatigue management system for workers in mining areas. This study used a descriptive method to describe the overall assessment of work fatigue and fatigue management system. The study was divided into three groups i.e., administrative level, operator level, and workers level, the questions were in the form of question and interview based which helped workers also understand the questions. The overall results obtained showed that there is slight chance of fatigue and fatigue management system to be average, but when considered individually the operator level and workers level showed that the fatigue to be considered and fatigue management system to be poor. The overall fatigue and fatigue management system can be improved by focusing on the work load and creating awareness.

Keywords: Fatigue, Fatigue Management System, Job Levels, Questionnaire

Student Projects

"Development of Predictive Model for Powder Factor in Surface Mines Vis-À-Vis Ariyalur Limestone Sector, Tamil Nadu, India"

Lokesh P., Manoharan S., Sunil U S. and Venkatesh E
Under the Guidance of Dr. Raja S.

Abstract

Production plays a prominent role in any extraction or excavation carried out with respect to surface mine. Many factors influence the production in mines, like the powder factor, rock fragmentation, type and number of machinery, working method, etc. Among them, the powder factor plays a significant role in production in surface mines. As every miner knows, if the powder factor decreases, the production and productivity of the mine will also decrease. Several factors influence the powder factor of surface mines. They are burden, spacing, stemming, sub-drilling, hole depth, number of holes, bulk density, bench height, the maximum charge per delay and type of explosive. Based on the literature, many authors have developed and contributed to improve the powder factor of the surface mine, but all the contributions are generic, not case-specific or not under particular geological conditions. Hence, an empirical formula is developed in this project to predict the powder factor for site-specific conditions considering vis-à-vis Ariyalur Limestone Sector, Tamil Nadu, India.

Keywords: Powder Factor, Surface Mines, Ariyalur Sector, Production, Productivity.

Student Achievements

Mr. Micah John Simeon J, Mr. Harikiran and Mr. Ashley John Paul of 8th Semester has won the First price in Dr.TTIT Project Expo 2022 conducted by Dr.TTIT Institution's Innovation Council on 29th June 2022 for the project titled "Development of sensor based jacket for monitoring and analysing the effect of vibration on musculoskeletal system in the dumper operator"
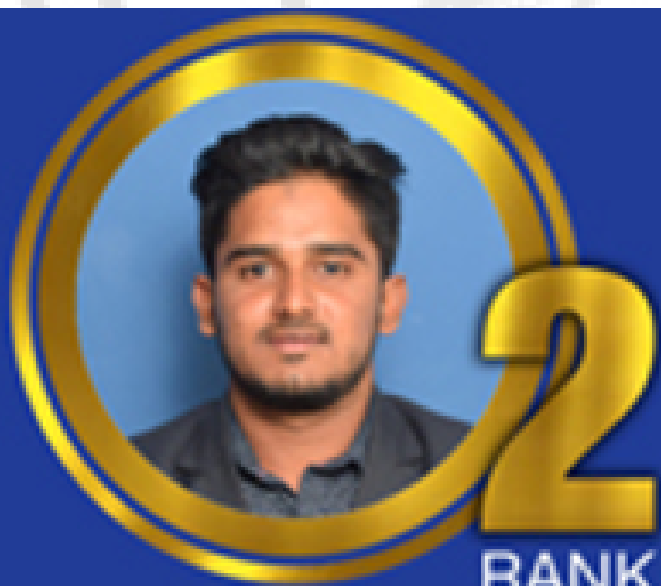
Student Achievements
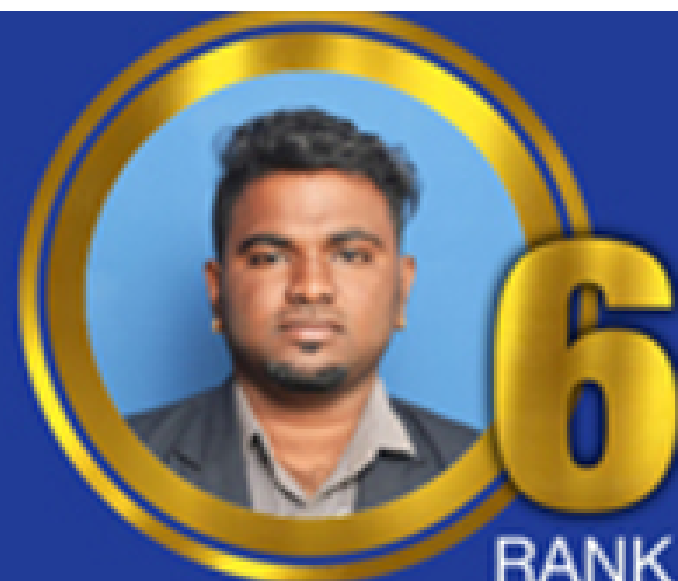
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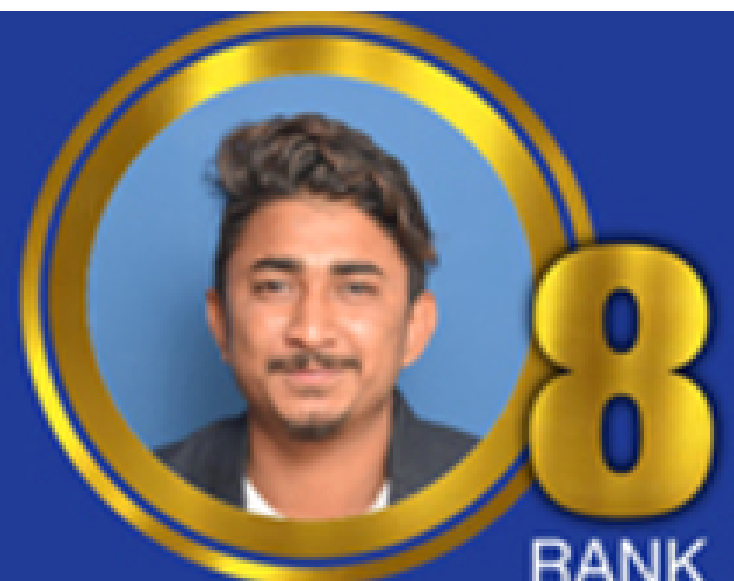

1 RANK
PURUSHOTHAMAN V

2 RANK
ANEES A

5 RANK
NITHIN M S

6 RANK
ARVIND KUMAR V

8 RANK
SHOHEB M

Faculty Achievements

Dr Raja, has successfully completed his Ph.D from IIT (ISM) Dhanbad for thesis titled " Investigation of Coal Bump Hazard in Bord and Pillar Workings of underground Coal Mines on 5th Sep, 2022.

Department Event

Faculty Development Program

on

"Rock Mechanics Application in Mining and Allied Industries"
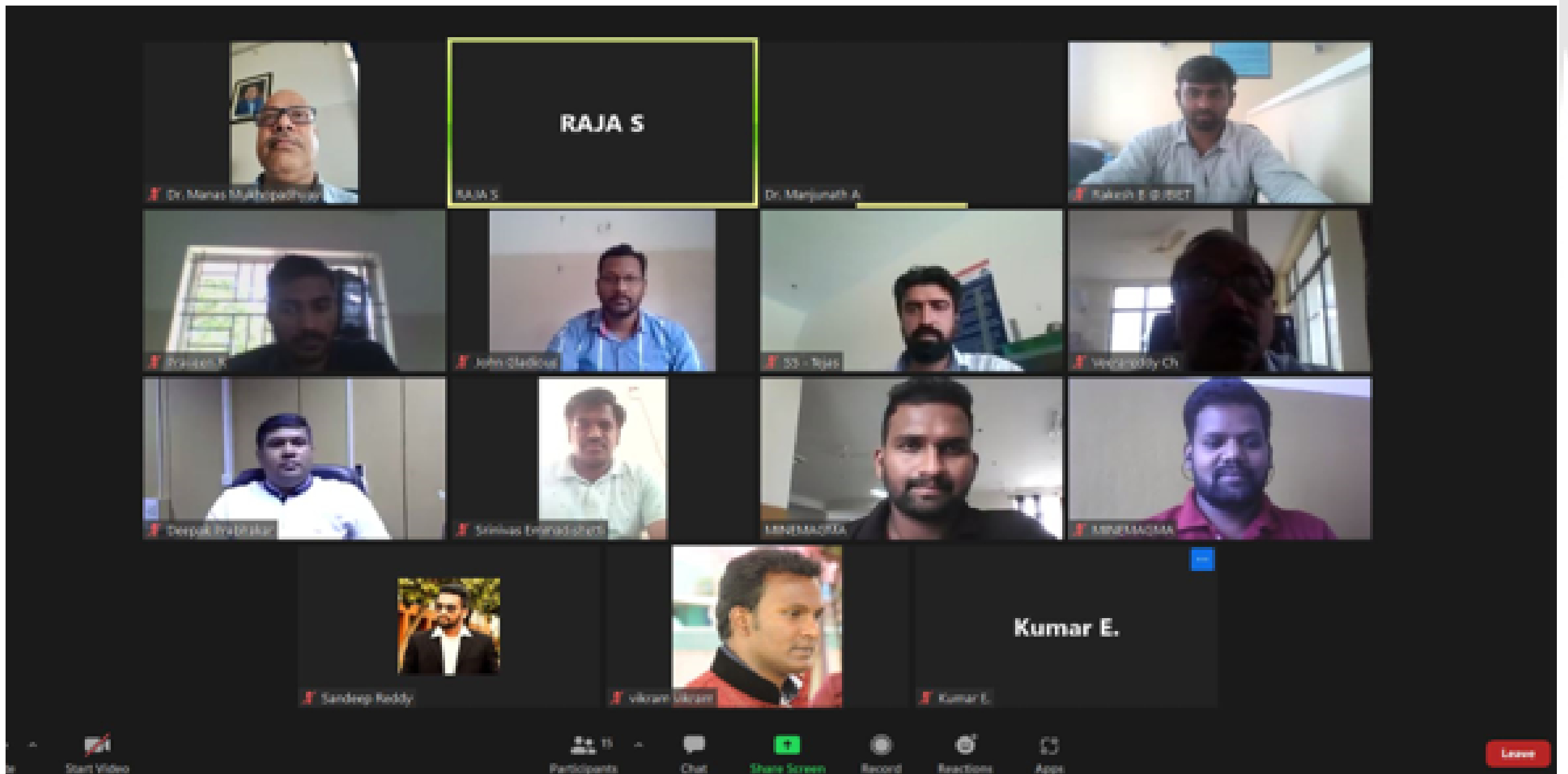
during

21st March – 26th March, 2022

Figure: Participants in Online Mode

A faculty development programme was organised on "Rock Mechanics Application in Mining and Allied Industries" from 21st -26th March, 2022. The resource persons were Dr. S. Jayanthu, Professor, NIT Rourkela, Dr. Pratik Dutta, Professor, IIEST, Shibpur, Mr. Kumaresh A, Deputy Mines Manager, Hutti Gold Mines Limited, Dr. P. K. Mandal, Chief Scientist, CSIR-CMIFR, Dhanbad, Dr. Syed Ariff, Professor, Dept. of Civil Engineering, Dr. TTIT, KGF, and Dr. Arka Jyoti Das, Scientist, CSIR-CMIFR, Dhanbad. There were 30 participants who attended online sessions of the FDP from different parts of India. The resource persons have given online lectures on current trends in rock mechanics application in trans-disciplinary engineering fields. The lectures were well received and appreciated by the participants.

Department Event

Industrial Visit

to

"Chigargunta-Bisanatham, BGML mining area at KGF"

on

23 April, 2022

Figure: Mining Department Students visited Chigargunta-Bisanatham, KGF

Department of Mining Engineering arranged one day industrial visit to Chigargunta-Bisanatham, BGML mining area at KGF for 6th semester students on 23rd April, 2022. Objective of the visit was to provide closer look into Mine Machineries link winding system, haulage system and surface layout at Chigargunta-Bisanatham, KGF.

Mining News

1. Centre Working on enhancing Mines sector output in GDP to 2.5% by 2030.
2. Coal Ministry to e-auction 10 reserves on Sep 13 for commercial Mining.
3. Chhattisgarh govt. chalks out strategy for exploring rich minerals.
4. Rajasthan announces amnesty scheme for mining leases upto Mar 31, 2021.

-refer MEAI Journal for more information related to above news

Department Vision

"To excel in education, training and leadership skills to prepare the students for sustainable development of mining industries."

Department Mission

1. To provide a conducive environment in which students think, learn, conduct, innovate and apply.

2. To impart quality education for meeting the needs of the mining engineering profession and society, and achieve excellence through creative teaching learning and research.

3. To inculcate the spirit of sustainable development and conservation of natural resources through the advancement of technology in the exploration and production of minerals with due regard to health, safety and environment.

PEOs

1. Graduates shall have the ability to solve complex problems of mining by the application of sound engineering principles in their professional careers.

2. Graduates shall have the spirit of teamwork and inculcate the habit of lifelong learning for achieving professional excellence.

3. Graduates shall have in-depth knowledge in the entire value chain of the profession starting from exploration to beneficiation of mineral deposits in a coordinated manner.