

LIST OF ONGOING S&T PROJECTS (As on 16.01.2026)

Sl. No.	Name of the project, Implementing Agency(s) & Objective(s)	Date of Start	Date of Completion	Approved Outlay (Rs.in lakh)
1	2	3	4	5
1.	<p>Development and Field Trial of 500 T Capacity SAGES-III for Use with Continuous Miners (Phase-III) [Project code: MT-171]</p> <p>Implementing Agency: IIT-ISM, Dhanbad, SECL, Bilaspur, M/s Andhra Pradesh Heavy Machinery & Engineering Limited (APHMEL), Vijayawada and M/s Jaya Bharat Equipment Pvt. Ltd. (JBEPL), Hyderabad</p> <p>Objectives:</p> <ul style="list-style-type: none"> • To design, develop and manufacture of 4 nos. of 500 t capacity Self Advancing Goaf Edge Supports (SAGES) compatible with continuous miners in extraction of coal pillars and field trial of developed SAGES in depillaring operation with continuous miner at one of the underground mines of SECL • To study the techno-economic of deployed SAGES (500 T) with Continuous miner. 	01.05.2019	31.12.2025 (6 months' Time Extension sought)	396.69 IIT-ISM- 85.69 APHMEL- 311.00

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1	2	3	4	5
2.	<p>Establishment of Geo-thermal energy (20KW Cap) power generation Pilot Project at Manuguru area of SCCL Command area based on closed loop Binary Organic Rankine Cycle Process technology [Project code: CE-33]</p> <p>Implementing Agency: Singareni Collieries Company Ltd, Kothagudem and Shiram Institute for Industrial Research (SIIR), New Delhi</p> <p>Objectives:</p> <ul style="list-style-type: none"> • To establish indigenous 20 KW first Pilot Demonstration unit in India based on closed loop Binary Organic Rankine Cycle (ORC) process technology to produce clean, reliable and efficient electricity using Geothermal fluid as heat source at Manuguru, Telangana. • To standardize and optimize the power generation cost using geothermal source independently or in combination to ensure uninterrupted power supply for commercial viability. • To indigenize the process and establish model for scaling up. 	01.06.2021	28.02.2026	236.51 SCCL, Kothagudem: Nil SIIR, New Delhi: 236.51

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3.	<p>Recycling Coal Mine Overburden to Reuse as a Value Added Building Material to Promote a Circular Economy [Project Code- EE-53]</p> <p>Implementing Agencies: – Jawaharlal Nehru Aluminum Research Development and Design Centre (JNARDDC), Nagpur, BIT, Mesra, Visvesvaraya National Institute of Technology Nagpur (VNIT), Nagpur, and CMPDI, Ranchi</p> <p>Objectives:</p> <ul style="list-style-type: none"> • To develop mix designs from Coal Mine Overburden (CMO) in homogenized slurry form for making building elements by heat treatment and geopolymers processes. • To develop coal mine overburden as a value-added building material in manufacturing different structural (JNARDDC & VNIT) and non-structural (BIT, Mesra & CMPDIL) elements in the construction industry. • Design development of modular construction elements complying with physicomechanical, structural, non-structural, and functional requirements as per the standards. • To analyse the strength of the developed material both structural and non-structural as per the standards and codes. • To demonstrate the developed technology/know-how and to evaluate the performance concerning the base case for speed, cost & energy efficiency of the system for urban & rural housing, EWS mass housing, and rehabilitated housing needs 	01.09.2023	30.11.2025 (4 months' Time Extension)	285.92 JNARDDC– 67.38 VNIT, Nagpur – 37.64 BIT, Mesra – 124.44 CMPDI, Ranchi – 56.46

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4.	<p>Design and development of an AI-enabled Dust Suppression System for Opencast Mines [Project Code- MT-181]</p> <p>Implementing Agency: Central Mechanical Engineering Research Institute (CMERI), Durgapur, Centre for Development of Advanced Computing (C-DAC), Thiruvananthapuram, Unyrsaha Corporation Lord Tech. (UCLT), Ranchi and ECL, Sanctoria</p> <p>Objectives:</p> <ul style="list-style-type: none"> Design and development of a dust suppression system on a vehicle along with a storage water tank; PTO or electrically operated pump; pipe-valve-nozzle network for spraying the water mixed with special additive in the form of jet or mist; mechanism for collection of waste water and re-use it Development of AI-enabled control system for optimized operation of the water spraying system and sensor suite for collection of environmental data; AI/ML-based optimization algorithm for spraying of water mixed with special additives in the form of jet or mist; control system for operation of the complete system Development of IoT based on-board and remote dashboard for dust-data visualization and monitoring; tracking of the most polluted sites and performance of the system against dust suppression 	08.01.2024	07.01.2026 (6 months' Time Extension sought)	340.84 (CMERI, Durgapur – 139.71, CDAC, Thiruvananthapuram – 151.57, UCLT, Ranchi – 49.56 & ECL, Sanctoria - Nil)

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5.	<p>Development of hard carbons and ultrahigh specific surface area porous activated carbon from coal for energy storage applications [Project Code- CU-61]</p> <p>Implementing Agency: CMERI, Durgapur, Centre for Advanced Studies in Electronics Science and Technology (CASEST), School of Physics, University of Hyderabad, Hyderabad and SCCL, Kothagudem</p> <p>Objectives:</p> <ul style="list-style-type: none"> Production of ultrahigh specific surface area activated carbon ($2000-2500\text{ m}^2\text{ g}^{-1}$) from coal for supercapacitor Fabrication of coal-derived hard carbon anode ($\leq 8\text{ m}^2\text{ g}^{-1}$) for sodium-ion battery Fabrication of high performance supercapacitor ($> 20\text{ Wh kg}^{-1}$) and sodium-ion battery ($> 300\text{ mA h g}^{-1}$) Coal-derived activated carbon for use in electrochemical energy storage applications. Synthesis of activated carbon from various coal types by chemical activation. Li-ion/Na-Ion/Mg Ion Cell Assembly & Li-ion/Na-Ion Battery/Mg Ion Testing. Electrode preparation and electrochemical characterization 	08.01.2024	<p>07.01.2026</p> <p>(6 months' Time Extension sought)</p>	<p>155.62</p> <p>(CMERI: 61.32, UoH: 94.30, SCCL: Nil)</p> <p>[CMERI Contd: Rs. 10.00 lakh, CASEST, UoH Contd: Rs. 16.60 lakh, MoC Contd.: Rs. 129.02 lakh {1st year: Rs. 93.59 lakh, 2nd year: Rs. 35.43 lakh}]</p>

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6.	<p>Development of Indigenous technology for extraction of critical minerals including Rare earth elements from overlying strata of Northeastern coalfields [Project Code- CP- 53]</p> <p>Implementing Agency: Indian Institute of Technology, Guwahati, Panjab University, Chandigarh and NEC, Margherita</p> <p>Objectives:</p> <ul style="list-style-type: none"> Physical separation of critical metals: To develop enrichment technique of critical metals (REEs, Li Sc, Y, Rb, Ni, Sr, V) from non-coal strata by physical separations Ion Exchange Resin separation of critical metals: To develop extraction technique of critical metals (REEs, Li Sc, Y, Rb, Ni, Sr, V) from non-coal strata and Acid mine drainage by Ion-Exchange Resin. Leaching of critical metals. Electro-winning extraction of critical metals 	15.01.2024	14.07.2026	581.05 (IIT, Guwahati – 365.75, PU:215.30, NEC: Nil)

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7.	<p>Coal Mine Overburden Alkali-activated Composites (CMOAAC) for Pre-Fabricated 3D Volumetric Construction Elements & System thereof (3DVCES) [Project Code- MT-182]</p> <p>Implementing Agency: VNIT, Nagpur, JNARDDC, Nagpur, CMPDI, RI-IV, Nagpur and IIT (BHU), Varanasi</p> <p>Objectives:</p> <ul style="list-style-type: none"> • To review, design and develop the Coal Mine Overburden Alkali Activated Construction Products (CMOAACP) for pre- fabricated 3D elements (unreinforced/reinforced) • Additive Manufacturing (3D Printing) of Viscoelastic Materials from Coal Mine Overburden (CMO) depend on the flow behavior of CMO components at ambient conditions (not under meltflow or higher temperatures) • To develop standardized type designs of toilet units & guard room schemes suiting to socio-cultural requirements in different geo-climatic region to demonstrate the developed technology(ies)/knowhow(s) and to formulate guidelines for construction of mass housing elements ensuring speed, durability, and energy efficiency. • To formulate design of affordable mass housing using geo-polymerized materials from foundation to superstructure considering soil-structure interaction, through experimental and numerical investigation 	15.01.2024	<p>14.01.2026</p> <p>(Time Extension sought till 31-Mar-2026)</p>	<p>259.37</p> <p>(VNIT, Nagpur – 95.80, JNARDDC, Nagpur – 77.45, RI-IV, Nagpur – 23.24, IIT-BHU, Varanasi – 62.88)</p>

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8.	<p>Design and Development of a Model Cargo-Hyperloop using Pipe Following Robot [Project Code- MT-183]</p> <p>Implementing Agency: IIT, Kanpur</p> <p>Objectives:</p> <p>PHASE-I</p> <ul style="list-style-type: none"> Analysis and Design of compressed airflow-powered robotic transportation module. Physics based virtual Simulation of the Cargo Hyperloop Transportation System. <p>PHASE-II</p> <ul style="list-style-type: none"> Development of a proof-of-concept model of a pipe following modular robotic system driven by compressed air in a controlled testbed which can mimic an autonomous cargo system for carrying coal between two destination points. 	15.01.2024	<p>14.01.2026</p> <p>(Phase-I: 15 months; Phase-II:9 months)</p> <p>(6 months' Time Extensi on sought)</p>	<p>219.63</p> <p>IIT, Kanpur– 219.63</p> <p>(Phase-I: 109.34; Phase-II: 110.29)</p>

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9.	<p>Development of an Indigenous Ground Vibration Monitoring and Analysis System using IoT Enabled Devices and AI-ML Techniques [Project Code- MT-184]</p> <p>Implementing Agency: CMPDI, Ranchi, IIT, Kharagpur, NCL, Singrauli & SCCL, Kothagudem</p> <p>Objectives:</p> <ul style="list-style-type: none"> Development of indigenous IoT enabled continuous monitoring system for measuring ground vibrations, peak particle velocity (PPV), peak particle accelerations (PPA) and damage frequency in an opencast mine. A blasting dashboard will be developed for easy access/query of geometry of the blast design, information of explosives and the measured vibration data. The dashboard will be designed to display the timing delays of each blast hole, as well as identify any delays below 8 milliseconds between successive blast holes. In the event of such a delay, the dashboard will indicate an error in the delay sequence and provide an alert to adjust the delay sequence for improved fragmentation and reduced ground vibrations. 	01.03.2024	28.02.2026 (9 months' time extension sought)	Rs. 209.77 lakh (CMPDI: Rs. 61.36 lakh, IIT, KGP: Rs. 148.41 lakh, NCL, Singrauli : Nil, and SCCL, Kothagudem: Nil)

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	<ul style="list-style-type: none"> The dashboard will include a feature that allows access to blast fragmentation analysis software, which is used for the purpose of analyzing the fragmentation of blasted material. The compliance of vibration and air-overpressure intensity levels with the impact assessment on the nearby surface structures. Effect of dominant frequency and peak intensities on surface structures due to cyclical blast vibrations conducted at different elevations (benches). <p>Classification and comparison of blast and traffic-induced vibration signatures (such as PPV, frequency, PPA, and duration of vibration) using AI-ML techniques</p>			

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10.	<p>Payload monitoring of loading equipment (Hydraulic Excavators) displayed in operator's cabin [Project Code- MT- 185]</p> <p>Implementing Agency: Gainwell Commosales Private Limited (GCPL), Kolkata, Eastern Coalfields Limited, Sanctoria</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Accurate weighing of the loading material • Optimize the loading performance such as cycle time, working hour • Real-Time Data Reporting: Capture and transmit the KPIs in real-time displayed on the dashboard. 	01.08.2024	31.07.2026	266.34 (GCPL – 266.34 ECL-Nil)

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1	2	3	4	5
11.	<p>Technology to Detect the Effect of Blasting on Propagation of Cracks in Structures [Project Code- MT-186]</p> <p>Implementing Agency: Indian Institute of Technology (Banaras Hindu University), Varanasi, Techno Wave Solutions Private Limited (TWSPL), Ranchi, NCL, Singrauli</p> <p>Objectives:</p> <ul style="list-style-type: none"> Develop a universal blast damage prediction model for building crack prediction, incorporating all relevant input parameters through machine learning techniques. Design a user-friendly map-enabled interface and an online adaptable system to facilitate the practical application of the model for building damage prediction. 	01.08.2024	31.07.2026	116.79 lakh [(IIT (BHU) - 80.27 lakh, TWSPL, Ranchi – 36.52 lakh NCL, Singrauli - Nil)]

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12.	<p>Coal Derived Value-Added Carbonaceous Nanomaterials for Energy Harvesting and Gas Detection-Based Sensor Applications [Project Code- CU-62]</p> <p>Implementing Agencies: Central Mechanical Engineering Research Institute, Durgapur, Bharat Coking Coal Limited, Dhanbad</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Process technology establishment for porous activated carbon and CNT production derived from coal samples. • Use of porous carbon/CNT-based nanocomposites as mechanical energy harvesters and conversion into electrical energy in the form of sensors. • Use of porous carbon/CNT-based nanocomposites in developing CO gas sensors 	01.08.2024	31.07.2026	Rs. 189.54 lakh (CMERI- 189.54 lakh BCCL, Dhanbad - Nil)

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1	2	3	4	5
13.	<p>AI-ML cloud-based real-time comprehensive autonomous system for monitoring & suppression of dust particles & hazardous gases in coal mines using UAV [Project Code- EE- 54]</p> <p>Implementing Agencies: Jaypee Institute of Information Technology (JIIT), Noida, GarudaUAV Soft Solutions Private Limited (GSSPL), Noida, MCL, Sambalpur</p> <p>Objectives:</p> <ul style="list-style-type: none"> Minimizing human intervention: Implementing automation, Internet of Things (IoT), and remote-controlled systems to reduce the need for human involvement in hazardous or repetitive tasks. Mitigating environmental impact: Focus on reducing air pollution and greenhouse gas emissions related to coal mining operations. Promoting sustainable practices: Encourage the adoption of environmentally friendly techniques and technologies to minimize the negative impact of coal mining on the environment and surrounding communities. 	01.08.2024	31.07.2026 (Termination to be deliberated in the next SSRC Meeting)	Rs. 146.90 lakh (JIIT, Noida - 146.90 lakh, GSSPL, Noida – Nil MCL, Sambalpur - Nil)

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1	2	3	4	5
14.	<p>Development of a novel NDT instrument using 3d Asymmentric Giant Magnetoimpedance Sensors for coal mines [Project Code- MT-187]</p> <p>Implementing Agencies: Centre for Advanced Studies in Electronics Science and Technology (CASEST), School of Physics, University of Hyderabad, Hyderabad, Gandhi Institute of Technology and Management (GITAM), Visakhapatnam, SCCL, Kothagudem and M/s Ananth Technologies Pvt. Ltd., Hyderabad</p> <p>Objectives:</p> <ul style="list-style-type: none"> Simulate 3d sensor and eddy current analysis using Ansys Maxwell software Develop a single 3d circular magnetic sensor Use the eddy current method to detect and fabricate a complete electronic circuit 	01.08.2024	31.07.2026	91.77 lakh (CASEST, University of Hyderabad - Rs. 91.77 lakh, GITAM, Visakhapatnam – Nil and SCCL, Kothagudem – Nil)

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1	2	3	4	5
15.	<p>Reusability assessment of Coal Tailing Extracts (CTE) for large-scale geotechnical fill applications [Project code: CU-63]</p> <p>Implementing Agency: Indian Institute of Technology, Dharwad BCCL, Dhanbad</p> <p>Objectives:</p> <ul style="list-style-type: none"> The major objective of the study is to evaluate the suitability of coal tailing extracts (CTE) as backfill materials in geotechnical structures. In order to qualify as the engineered fill, CTE should satisfy two different criteria, namely, strength criteria and drainage criteria. Both the aforesaid criteria will be assessed using various laboratory tests. To explore the possibilities of enhancing the strength properties of CTE by using the geogrid reinforcements. To perform various laboratory tests to compare and quantify the effect of geogrids. To perform finite element simulation of the prototype Mechanical Stabilized Earth (MSE) wall with CTE backfill to assess the practical performance. To investigate the possibilities of utilizing CTE as a soil conditioner. 	01.12.2024	30.11.2026	Rs. 27.74 lakh (IIT, Dharwad - Rs. 27.74 lakh, University of Agricultural Sciences, Dharwad – Nil and BCCL, Dhanbad - Nil

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1	2	3	4	5
16.	<p>Coal to Chemical Sensors: Conversion of low-grade coal to carbon dots-based smart sensing strips for on-site monitoring of heavy metals in water bodies around the coal fields [Project code: CU-64]</p> <p>Implementing Agency: National Institute of Technology (NIT), Srinagar, National Institute of Technology (NIT), Jamshedpur, BCCL, Dhanbad</p> <p>Objectives:</p> <ul style="list-style-type: none"> Collection of low-grade coal from coal fields and optimization of experimental conditions for converting it into fluorescent carbon dots, ensuring desirable properties for heavy metal detection. Surface functionalization of the prepared carbon dots to develop selective sensors. Characterization of their size, shape, surface morphology and stability. To Confirm the sensor's efficiency by selective and sensitive detection of desired heavy metals (Al, Fe, Mn, Ni, Pb, and Cu) at the laboratory level. Development of carbon dot-based sensing strips at field trials to assess their applicability for the detection of heavy metals in water samples of water bodies around the coal fields (Jharia and other coal fields of BCCL) 	01.04.2025	31.03.2027	<p>Rs. 53.21 lakh (NIT, Srinagar – Rs. 53.21 lakh, NIT, Jamshedpur – Nil and BCCL, Dhanbad – Nil)</p> <p>(Change of implementing agency to be deliberated in next TSC)</p>

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1	2	3	4	5
17.	<p>Development of Value-Added Abrasion Resistant Ceramic Tiles and Insulation Refractories using Coal Mine Overburden [Project code: MT-188]</p> <p>Implementing Agency: Government College of Engineering and Ceramic Technology, Kolkata, SCCL, Kothagudem and ECL, Sanctoria</p>	01.04.2025	31.03.2027	<p>Rs. 111.67 lakh</p> <p>(Govt. College of Engineering and Ceramic Technology (GCECT), Kolkata - Rs. 111.67 lakh, SCCL, Kothagudem –Nil and ECL, Sanctoria - Nil)</p>
	<p>Objectives:</p> <ul style="list-style-type: none"> Development of value-added low cost high performance abrasion resistant ceramics tiles using coal mine overburden (OB) having application potentialities in different sections of iron and steel industry, cement industries, mining industries as well as in the thermal power plants. The targeted specifications of the fabricated coal mine over burden (OB)based abrasion resistant ceramic tiles are as Apparent porosity ~0, Bulk density >3.0 g/cc, Hardness ~8, Modulus of Rupture (MOR) >400 kg/cm² , Cold Compressive Strength (CCS) >6000 kg/cm² , Acceptable chemical resistant properties, Abrasion loss, 60mm³. Development of low cost value-added high performance insulation refractories using coal mine overburden clay suitable for application in kiln, furnaces, incineration chimney etc. 			

- The targeted specifications of the fabricated coal mine over burden clay-based insulation refractories are as Apparent porosity >60 %, Bulk density 20 kg/cm² , Thermal conductivity < 1.0 Wm-1K -1 etc.
- Development of value-added low cost high performance abrasion resistant ceramics tiles using Clay of SCCL which is being generated during processing of OB to Sand production plant of SCCL, Kothagudem having application potentialities in different sections of iron and steel industry, cement industries, mining industries as well as in the thermal power plants
- The targeted specifications of the fabricated Clay of SCCL based abrasion resistant ceramic tiles are as Apparent porosity ~0, Bulk density >3.0 g/cc, Hardness ~8, Modulus of Rupture (MOR) >350 kg/cm² , Cold Compressive Strength (CCS) >5000 kg/cm² , Acceptable chemical resistant properties, Abrasion loss , 60mm³.

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18.	<p>CO₂ Methanation over Green Bifunctional Metallic Catalyst to maximize the CH₄ production with stability [Project code: CE-37]</p> <p>Implementing Agency: CIMFR Dhanbad, SRM, Noida</p> <p>Objectives:</p> <p>a. SRM, Noida</p> <ul style="list-style-type: none"> • Development of bimetallic bifunctional mixed oxide catalysts for CO₂ methanation. • Effect of metallic nano particles distribution over support and rich surface oxygen over high surface area catalyst. • Effect of particle size on deactivation of catalyst with long time on stream. <p>b. CSIR-CIMFR</p> <ul style="list-style-type: none"> • Performance evaluation of the catalysts towards CO₂ Methanation and process parameter optimization • Performance evaluation of the potential catalysts in higher scale • Studies on regeneration and reuse of the catalyst 	01.07.2025	30.06.2027	<p>Rs. 90.27 lakh</p> <p>(CIMFR Dhanbad- Rs. 36.48 lakh and SRM, Noida -Rs. 53.79 lakh)</p>

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19.	<p>An AI Enabled Platform for Diagnosis, Prognosis and Health Management of Mining Electrical Systems: A Case Study on the Drag Line. [Project code: MT-189]</p> <p>Implementing Agency: IIT Kharagpur & NCL Singrauli.</p> <p>Objectives:</p> <p>Modelling: Conducting a comprehensive study of the system and creating a detailed model for the system on the basis of electromagnetics, thermal, strain-field and statistical models to generate data.</p> <p>Hardware Design: Design and implementation of the sensors and the communication network and deploying a signal processing strategy to gather and analyze data from the system.</p> <ul style="list-style-type: none"> Software Design: Developing AI and machine learning algorithms for event detection, diagnosis, prognosis and RUL prediction of faults" 	15.10.2025	14.10.2027	Rs. 340.38 lakh (IIT Kharagpur- Rs. 340.38 lakh & NCL, Singrauli-Nil)

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20.	<p>Design and development of low-cost indigenous imaging RADAR system for automatic slope monitoring and failure prediction in opencast coal mines [Project code: MT-190]</p> <p>Implementing Agency: NIT, Rourkela, CMPDI, Ranchi, IIT Kharagpur, Vellore Institute of Technology (VIT), MCL Sambalpur</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Design and development of low-cost RADAR system for land deformation data acquisition. • Development of MIMO-SAR imaging system for pixel level deformation measurement and visualization. • Development of long-short-term-memory (LSTM)-based deep learning model for early prediction of deformation level and slope failure. 	15.10.2025	14.04.2028	Rs. 361.46 lakh (NIT, Rourkela- Rs. 299.21 lakh, IIT, Kharagpur- Rs. 22.13 lakh, CMPDI, Ranchi- Rs. 40.12 lakh, VIT, Chennai – Nil & MCL, Sambalpur- Nil)