



ज्ञान-विज्ञान विमुक्तये

सचिव

Secretary



सत्यमेव जयते



भारत 2023 INDIA

विश्वविद्यालय अनुदान आयोग
University Grants Commission
(शिक्षा मंत्रालय, भारत सरकार)
(Ministry of Education, Govt. of India)

D.O.No.2-67/2023(CPP-II)

14th November, 2023/ 23 कार्तिक, 1945

Subject: Announcement by Ministry of Mines inviting Science and Technology Project Proposals for grant-in-aid on Satyabhama Portal for 2023-24.

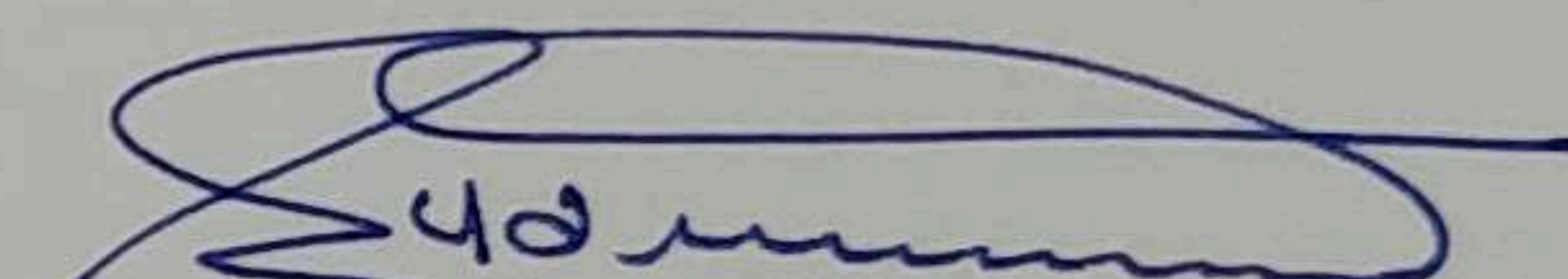
Respected Madam/Sir,

As you are aware, every year the Ministry of Mines invites the project proposals for grant-in-aid under the Science & Technology Scheme from Research and Development Institutions, Laboratories, Public Sector Undertakings (PSUs) and Academic Institutions in thrust areas having direct bearing on mineral sector, applied and sustainable aspect of mining and industrial applications. The received project proposals pass through a 3- tier process which includes (i) scrutiny of project proposals by a Scrutiny Committee, (ii) presentation of project proposals before Project Evaluation and Review Committee (PERC) and (iii) approval by Standing Scientific Advisory Group (SSAG). The 'Announcement' made by the Ministry of Mines inviting Science and Technology project proposals, is enclosed. Project Proposal are required to be submitted online on the SATYABHAMA Portal (research.mines.gov.in). **The last date for receipt of project proposals in the Ministry is 4th December, 2023.**

The Higher Education Institutions are requested to bring it to the notice of all concerned to take benefit of the scheme and give wide publicity to the announcement made by the Ministry of Mines.

With kind regards,

Yours sincerely,


(Sudeep Singh Jain)

Encl: As above

To

**The Vice-Chancellors of all Universities
The Principals of all Colleges/Institutes**

वसुधैव कुटुम्बकम्

ONE EARTH • ONE FAMILY • ONE FUTURE

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ANNOUNCEMENT

Dated: 4th November, 2023

No. Met4-14/8/2023
Government of India
Ministry of Mines

Invites Science and Technology Project Proposals

Projects are invited from Academic Institutions, Universities, National Institutes and R&D Institution recognized by the Department of Scientific and Industrial Research, Government of India, for up to 3 years duration on the following topics of directed R&D and in the following thrust areas which have direct bearing on mineral sector, applied and sustainable aspect of mining and industrial applications:

2. TOPICS FOR DIRECTED R&D

A. Critical metals

Gallium	<ul style="list-style-type: none">● Gallium recovery from Bayer Liquor: Extraction of Gallium from Bayer Liquor (mgpl level to gpl) and development of agents and chemicals for extraction of Ga and extraction.
Niobium, Tantalum	<ul style="list-style-type: none">● Recovery of Nb/Ta from primary ore.
Niobium, Tantalum	<ul style="list-style-type: none">● Recovery of Nb/Ta from tin slag: Development of process / technology for extraction of Nb & Ta from tin slag
PGE	<ul style="list-style-type: none">● Extraction of PGE/ Nickel from Ultrabasic rock.
Nickel & Lithium	<ul style="list-style-type: none">● Recovery of Li/Ni from waste battery: Cost effective process and technology for recovery of Nickel and Lithium from scrap battery
Lithium	<ul style="list-style-type: none">● Recovery of Li from new deposits: Process flow sheets for Li beneficiation to be developed for new GSI finds and from Brine / salt beds.
Tungsten	<ul style="list-style-type: none">● Recovery of W from tool waste/ BGML dumps: Development of process and technology for recovery of Tungsten from tool waste and BGML mill dumps
Germanium	<ul style="list-style-type: none">● Recovery of Ge from Pb-ZN circuit: Process development for recovery of Germanium from lead-Zinc circuit. E-waste is another source, for Ge recovery.
Selenium and Tellurium	<ul style="list-style-type: none">● Recovery Se /Te from anode slimes: Process / technology development for recovery of Se &Te from copper anode slimes
Indium	<ul style="list-style-type: none">● Recovery of Indium from the sphalerite ore.

B. Rare Earth

- **Solvent extraction Chemicals:** Development of chemicals with higher separation ratios to reduce the number of stages in separation of Rare Earths chloride solutions (100-250gpl)
- **Chemicals for ion-exchange columns:** Development of new chemicals with higher selectivity and separation factors for Ion-Exchange columns for RE ion extraction.
- **Film Chromatography:** Development of high Speed Film Chromatography solutions for Individual RE metal separations and speciality chemicals for Film chromatography separation of individual RE metals.
- **REE recovery from khondalite:** Process design for treatment and process for extraction of REE and metal values from Khondalite or similar low value minerals.
Beneficiation of lean / scattered strategic minerals: Development of mining techniques such as In-situ leaching and Electro-kinetic mining to be taken up for exploitation of lean and scattered strategic mineral occurrences. These advanced mining techniques eliminates excavation of large mass of earth's surface and sub-surface.
- **Recovery of REEs from e-waste:** Integrated technology development for recycling of e-waste to recover critical elements such as Li, rare-earths, Co, Ni, etc. (Urban Mining)

C. Recycling / Circular Economy

- **Laser Induced Brake Down Spectroscopy:** Development of a low cost automated system able to separate aluminium alloys using laser-induced plasma to analyze the composition of materials for rapid and accurate sorting and identification of metals in complex mixtures.
- **Artificial intelligence and Machine learning:** Development of metal scrap sorting technology based on color and shape-based which utilizes advanced imaging and computer vision techniques to identify and classify metal scraps
- **Electrochemical process:** Development of process / technology for metal recovery from e-waste which uses less solvent (minimal reagent) and shows convenient and precise control, reduced energy consumption, and low environmental impact
- **Hydrometallurgical process:** Development of technology for metal scrap recycling including selective leaching, solvent extraction, ion exchange resins, etc
- **Internet of Things (IoT) and sensor-based technologies:** Development of processes for metal recycling to enable real-time monitoring, optimize resource allocation, and improve overall operational efficiency
- **Collaborative robotics:** Development of robots also known as cobots, use cameras, robotic arms, grippers, and conveyor systems to lift, move, and stack materials as needed, and can perform a wide range of tasks such as material handling, assembly, inspection, and maintenance alongside human workers.
- **Heavy Media Separation:** Development of technology for scrap sorting based on density difference with higher separation efficiencies

D. Energy Efficiency

- **Energy recovery systems:** Designing of low cost heat exchangers or regenerative burners, which can support metal recycling industry for effectively tackling energy losses by capturing and repurposing waste heat generated during the recycling process. Through this approach, the industry can optimize energy utilization and minimize wastage, contributing to improved energy efficiency and sustainability in metal recycling practices.
- **Hydrogen Production by dross:** Process / Technology development for production of hydrogen from dross
- **Energy Efficiency of Anodes:** Development of new material for enhancement of energy efficiency of carbon anode for aluminium production with low carbon footprint (development of materials)
- **Energy Efficient pit furnace:** Design and development of pit furnaces with energy efficiency of more than 40%

E. New Material / Processes

- **Vapor technology for extraction of Nickel/ PGE etc.**
- **Atomised Ferro-silicon powder:** Development of ferro silicon powder for heavy media separation of metal scrap
- **High Conductivity copper:** Development of copper wire with more than 98% conductivity from armature & EoL electronics & machinery scrap
- **Coating for copper to prevent oxidation:** Copper gets oxidised during transportation and non-reactive and non-interference coating to be developed for preventing the oxidation.
- **Aluminium Casting Anodising:** Process / Technology for anodising high Si castings (5- 11)%
- **Aluminium casting:** SoPs for obtaining uniform composition while casting molten aluminium
- **Bulk utilisation of secondary dross:** Development of process for converting dross into flux material for steel industry
- **Homogenisation of melt:** Processes/ technology for obtaining uniform melt chemistry
- **Potash Extraction:** Process/ technology for Potash extraction from the nepheline syenite rocks
- **Zinc Recovery:** Development of technology for recovery of Zn from EAF/IF ash
- **Feasibility of economic mining of Rajasthan Potash evaporite basin.**

3. THRUST AREAS OF RESEARCH IN MINES

The broad thrust areas for supporting Research in Mining are given below:

- i. Prospecting/exploration for strategic rare and rare earth minerals.
- ii. Development of new technology for mineral exploration and mining on land and deep sea to locate and exploit new mineral resources.
- iii. Research in mining methods. This includes rock mechanics, mine designing, mining equipment, energy conservation, environmental protection and mine safety.

- iv. Improve efficiency in process, operations, recovery of by-products and reduction in specification and consumption norms.
- v. Research in metallurgy and mineral beneficiation techniques to utilize lower grade and finer size ores.
- vi. Extraction of value added products from mine waste, plant tailings etc.
- vii. Development of new alloys and metal related products, etc.
- viii. Evolve low capital and energy saving processing systems.
- ix. Production of materials of high purity.
- x. Cooperative research among organizations associated with the mineral sector.
- xi. Decarbonisation and development of green technology in mineral based industries
- xii. R&D to establish circular economy and use of recycled materials in mineral based industry
- xiii. Focus on extraction of strategic, critical and REE at elemental level

4. As per guidelines, project proposals should meet following mandatory requirements:

- a. MSME/Industry participation in the form of at least 20% financial contribution (between cash and kind contribution, at least 15% cash contribution).
- b. R & D proposals should be targeting TRL 3 to 7, in the identified thrust areas.
- c. Sample collection and its first level characterization should precede proposal submission.
- d. the institute should have analysis capability or Prior tie-up with other institute in this regard for the intended purpose
- e. In case of CSIR Labs, co-funding from CSIR of at least 25% of the total project cost or total cost of capital equipment, whichever is higher.

5. Scientific and Technical Merit and relevance to Industry: Important instructions:

i. All organization should follow the instructions given below before submitting the project proposals to the Ministry:-

- a. the proposal should be relevant to the overall mandate of mining, exploration, minerals, metals value addition, waste and environmental impact of mining and metallurgical processing
- b. industry inputs and participation
- c. originality in terms of concept, method, innovation, or in application;
- d. development of new methods, synthesis of advanced materials,
- e. process improvements and innovation,
- f. design of apparatus and other research tools,
- g. process development for waste/secondary/low grade materials recovery,
- h. zero waste mining, large data analysis and simulation modeling etc.
- i. nature of study as experimental, modeling/simulation and both
- j. There must be a clear enunciation of objectives and deliverable in the proposal
- k. detailing of research methodology, design of experiments, chosen methods of analysis should be appropriate and valid.
- l. intended/potential application area has to be made clear in the proposal, industry relevant, may include/involve industry participation if appropriate.
- m. potential scalability to pilot plant and later on plant levels
- n. what are the techno economic benefits (at least rough estimates).

ii. Science & Technology (S&T) projects are funded through grant-in-aid by the Ministry of Mines through the process of project evaluation by Project Evaluation and Review Committee (PERC) and recommended projects are approved by the Standing Scientific Advisory Group (SSAG) constituted by the Ministry.

iii. The S&T Guidelines, details of terms and conditions and the prescribed proforma are available at SATYABHAMA Portal which may be accessed at research.mines.gov.in. PIs are requested to go through the S&T guidelines and terms and conditions available on the portal.

iv. Project proposals are required to be submitted online on the SATYABHAMA Portal only (research.mines.gov.in) by **04.12.2023**. A [User Manual](#) is also available on the Portal where the stepwise procedures for submission of project proposals have been highlighted. Also, a soft copy of the project proposal generated from the Portal in PDF format needs to be sent to the e-mail: met4-mines@gov.in. The PIs who have registered themselves on SATYABHAMA Portal earlier need not register again and can use the same credentials for logging into the portal for project submission. The PIs need not send the hard copy of project proposals. Project proposals submitted in physical mode will not be accepted. The PIs of those projects, which are shortlisted shall be directed to present their proposal either physically (in Delhi or in any other city in India) or through video conferencing, which will be communicated to them. The timelines are as under:

Details	Date
Beginning of PI Registration and Project Submission on SATYABHAMA Portal	4.11.2023
Last date of receipt of proposals	4.12.2023
Conduct of PERC Meeting	11.12.2023
Conduct of SSAG Meeting	18.12.2023

v. The Grants-in-aid will be governed by the S&T Guidelines of the Ministry of Mines, Government of India's terms and conditions as amended from time to time. The head of the institute may please ensure that no utilization certificate under any project under the S&T Programme Scheme of Ministry of Mines being implemented by their institute is pending for more than one year, for consideration of their project proposals.

vi. For further queries, please email us at: met4-mines@gov.in.



Ministry of Mines
Government of India

GUIDELINES FOR SUPPORT TO MINING RESEARCH

August, 2023

CONTENTS

1. Introduction
2. Vision, Mission and Objectives of R&D Scheme
3. Thrust Areas of Research in Mines
4. Scope and Coverage of Research Grants
5. Who are eligible
6. Procedure for Invitation, Submission, Appraisal, Monitoring and Review of Research Proposals
7. Independent Evaluation
8. Standing Scientific Advisory Group (SSAG) on S&T Projects
9. Norms of Funding
10. Maintaining a website of Research Projects and Dissemination of Research Findings

Annexure and Appendices

- | | |
|--------------|---|
| Annexure I | Terms and Conditions Governing the Research Grants |
| Annexure II | Covering Letter for applying for research grants |
| Annexure III | Application Proforma for Grant for Research Project |
| Annexure IV | Endorsement from Head of the Institution |
| Annexure V | Technology Readiness Levels (TRLs) |

- | | |
|--------------|--------------------------------------|
| Appendix-I | Expenditure Statement |
| Appendix-II | Pro forma for Annual Progress Report |
| Appendix-III | Pro forma for Final Technical Report |

GUIDELINES FOR SUPPORT TO RESEARCH IN THE MINING & MINERAL SECTOR

1. INTRODUCTION

The need for a strong Science and Technology (S&T) base for mining Research and Development (R&D) is well recognized. Research in Mines is an essential prerequisite for generating reliable data and new R&D knowledge relevant to Indian conditions for ensuring sustainable development.

Since 1978, the Ministry of Mines has been funding research through grant-in-aid projects to many research institutions in different areas under the broad ambit of Mines protection and management. The Ministry has taken a number of new initiatives to strengthen scientific research in the area of mining sciences.

These Guidelines seek to provide renewed scientific impetus to address the emerging mining challenges, broaden the participation of stakeholders, introduce the concept of cost-sharing and make the research in Mines more productive, with an emphasis on outputs and outcomes. The Guidelines set forth the objectives and thrust areas of research, procedure for invitation and processing of research proposals for funding support, norms for funding, conditions of support and participation of public and private sectors in mutually agreed bilateral, multilateral, cross-sectoral and inter-institutional projects. Special attention has been given to, dissemination of research findings and scaling up of the leads, which are generated through research projects and are of societal relevance.

Further, through these Guidelines all research undertaken in the Ministry is centralized in the S&T (Met.IV) Division of the Ministry through a Standing Scientific Advisory Group (SSAG), an apex committee on research in mines chaired by the Secretary (MoM). The SSAG would be supported by Project Evaluation and Review Committee (PERC). The PERC would be involved in appraising, monitoring, reviewing and recommending the research proposals for final approval and sanction by the Apex Committee.

The SSAG would provide the final sanction and approval of the recommended research projects, provide an overall direction to the research efforts of the Ministry, ensure synergy and linkages among the various arms of the Ministry and provide guidance for scaling up significant leads generated through research projects supported by the Ministry.

These Guidelines will also be applicable to other research programmes of the Ministry where specific guidelines for the purpose do not exist.

2. VISION, MISSION AND OBJECTIVES OF THE R&D SCHEMES

Vision

Promote applied research in geosciences, mineral exploration, mining and allied areas, mineral processing, optimum utilization and conservation of the mineral resources of the country, for the benefit of the nation and its people.

Mission

To plan, support and coordinate mining, mineral and metal based research in public interest for enhancing the understanding of the mines and geology, and devising strategies and solutions for conservation and mining protection and management.

Objectives

- 1 To generate information and knowledge required for developing strategies, techniques and methodologies for better mine management
- 2 To find practical solutions to problems of mining and management (e.g. management of mining leases, conservation of mineral resources, solving of strata control problems in mines, regeneration of degraded areas etc.)
- 3 To build endogenous capacities and strengthen scientific manpower in multidisciplinary and emerging areas of mining
- 4 To promote development of infrastructure facilities, where necessary, for undertaking mining research
- 5 To generate, document and analyze information for taking policy decisions relating to the mineral resources
- 6 To support basic research which leads to applied research in the area of mining with the aim of development of management and policy interventions
- 7 To facilitate database management at one single point in the Ministry
- 8 To promote applied research in the areas of minerals upgradation, conservation, utilisation including waste management and new & strategic minerals, metals and materials development.
- 9 To motivate scientists & technologists for applying their expertise to the problems of the Mining Sector
- 10 To promote research, development and adoption of Science & Technology for improving quality of life of populace in Mining districts of the country.
- 11 To develop new/improve existing technology to improve the diversity of the local economy, utilization of local resources and to upgrade the skills of miners in the country.
- 12 To selectively promote the general capability in the relevant areas of science & technology by supporting need based R&D projects.
- 13 To encourage young scientists/inventors for pursuing innovative research ideas which have direct relevance to the development of the sector.

3. THRUST AREAS OF RESEARCH IN MINES

The broad thrust areas for supporting Research in Mining are given below:

- i. Prospecting/ exploration of strategic, rare and rare earth minerals.
- ii. Development of new technology for mineral exploration and mining on land and deep sea to locate and exploit new mineral resources.
- iii. Research in mining methods. This includes rock mechanics, mine designing, mining equipments, energy conservation, environmental protection including developments in treatment of pollutants and mine safety.
- iv. Improve efficiency in process, operations, utilisation of wastes and by-products and reduction in specific consumption norms.
- v. Research in metallurgy and mineral beneficiation techniques to utilize lower grade and finer size ores.
- vi. Extraction of value added products from mine waste, plant tailings etc.
- vii. Development of new alloys, composites and metal related products, etc.
- viii. Evolve low capital and energy saving processing systems.
- ix. Production of materials of high purity and technology for products which are imported.
- x. Cooperative research among organizations associated with the mineral sector including industry participation and institutes collaboration
- xi. Decarbonisation and development of green technology in mineral based industries
- xii. R&D to establish circular economy and use of recycled materials in mineral based industry
- xiii. Focus on extraction of strategic, critical and REE at elemental level

The Ministry may also support new, creative, innovative and original proposals from researchers in areas which may be outside the identified thrust areas but have direct bearing on mining. The grants to such proposals would not exceed 10% of the total allocation of the R&D Scheme. Proposals co-sponsored or co-financed by industry, private and/or public sector organizations for solving region-and location-specific mining problems will be given priority.

Specific thrust areas would be identified and prioritized by the SSAG. Ministry of Mines will be at liberty to call for proposals on specific topics for directed R&D or on thrust areas mentioned in the guidelines, on the recommendation of SSAG.

4. SCOPE AND COVERAGE OF RESEARCH GRANTS

A grant for a research project is provided to the Principal Investigator through his/her concerned institution to cover the following:

- (i) Salaries/allowances for research associates/research consultants and supporting staff. The Principal Investigator (or any of the other investigator) who is employed and already receives a salary will not be paid any salary or honorarium out of the funds sanctioned for the project.
- (ii) Acquisition of equipment not available in the institution or not available for dedicated use in the Project and expendable items, laboratory supplies and expenses for other project-related activities.
- (iii) Cost of internal travel.
- (iv) Contingency grants.
- (v) Any other expenditure which is considered appropriate depending upon the requirements of a specific proposal, with approval of the Ministry. The terms and conditions governing the Research Grants are given at Annexure I.

5. Who are eligible:

Academic institutions, universities, national institutes, and R&D institutions recognised with the Department of Scientific and Industrial Research, Government of India.

6. PROCEDURE FOR INVITATION, SUBMISSION, APPRAISAL, MONITORING AND REVIEW OF RESEARCH PROPOSALS

(i). Inviting Proposals

Proposals will be invited by the Ministry on SATYABHAMA Portal (research.mines.gov.in) through a transparent procedure of an open advertisement, based on the identified thrust areas of the Ministry of Mines. Selection among the proposals received will be made competitively based on their technical soundness, including research credentials of the team and envisaged outcomes of research.

Mandatory requirements of the proposals include:

- a. MSME/Industry participation in the form of at least 20% financial contribution (between cash and kind contribution, at least 15% cash contribution).
- b. R & D proposals should be targeting TRL 3 to 7, in the identified thrust areas (Refer Annexure V for TRLs)
- c. Sample collection and its first level characterization should precede proposal submission.
- d. the institute should have analysis capability or Prior tie-up with other institute in this regard
- e. In case of CSIR Labs, co-funding from CSIR of at least 25% of the total project cost or total cost of capital equipment, whichever is higher.

(ii). Submission of proposals

Proposals should be submitted only on SATYABHAMA Portal (research.mines.gov.in) in response to the advertisement given by the Ministry. The proposals should be submitted to the Ministry on or before the indicated last date of submission in the advertisement.

Proposals prepared by the Principal Investigator (PI) should be forwarded by the Head of the Institution. In case a research proposal involves a network of research institutions, the PI would identify the Lead Investigator from each of the participating Institutions with the approval of the Heads of these Institutions.

If the project is a joint venture, then it should be explicitly mentioned. In case of the involvement of public and/or private sector the details of work, cost and benefit (IPR, the Patent, etc.) sharing arrangements are to be clearly spelt out in the proposal. The SSAG will decide the detailed modalities in this regard.

The applications should clearly identify the research questions, methodologies involved and data sources. It should identify the complete team of Investigators and provide their detailed resumes highlighting their academic backgrounds and publication records. It should also specify the additional personnel support required, both scientific and support staff. It should provide a detailed break-up of the costs consistent with the Funding Norms as given in Section 9. It should detail the equipment that are specially required for the project. The project should provide timelines and milestones and expected outputs and outcomes.

(iii). Preliminary Scrutiny

Proposals received would be duly acknowledged. The proposals would be examined by the Internal Screening Committee of Metal-IV Section, Ministry of Mines to determine whether they fulfill all terms and conditions. Weak, diffused, repetitive and/or

superfluous proposal(s) could be rejected at this stage.

(iv). Appraisal by Project Evaluation and Review Committee (PERC)

The proposals received would be evaluated by PERC. The PERC would be chaired by the Economic Adviser/ Joint Secretary concerned, with subject experts as members. The PERC would be constituted by the Ministry every 3 years to appraise, recommend, monitor and review the research proposals for funding under the S&T Scheme.

The appraisal/evaluation of research projects by the committee members of the PERC would be undertaken only if they have no conflict of interest, whatsoever.

The PERC would evaluate and scrutinize the proposals with respect to originality of the proposal, scientific and technical soundness, including assessment of objectives and methodology, expected outcomes and outputs and practical utility of the research outputs.

The PERC would also evaluate the research proposal from a financial angle, which would include the scrutiny of the proposed budgetary requirements and the component-wise analysis of the costing of the project. The Committee would assess whether the budgetary requirements are commensurate with the work to be carried out. This would also include scrutinizing and evaluating the requirement of the research and technical staff and the necessity for the equipment proposed in the project. The PERC would identify and clearly list the expected outcomes of the projects it recommends for sanction of grant-in-aid. The PERC should, inter alia, assess the following:

- i. Alignment with priorities/needs of Ministry/Thrust Areas
- ii. Relevance of the objectives and feasibility of the methodology
- iii. Expected and other physical outcomes of the project
- iv. Component-wise analysis of the costing of the project
- v. No duplication with existing work/ongoing projects

The conditions relating to the availability of the report in public domain, patent- related conditions, revenue generation issues, etc. would be determined by the PERC before recommending the project.

In case of research projects proposals that are of more than Rs 50 lakhs, an empaneled institutional reviewer (subject to availability) may be used by PERC, if it so decides.

The PERC may draw up an indicative Project Evaluation Matrix based on the above parameters for evaluating the projects.

(v). Approval and Sanction of research projects by the Ministry

It would be the endeavour of the Ministry to complete the project appraisal cycle in three to six months from the date of receipt of the proposal. Based upon the recommendations of the PERC, the SSAG in the Ministry would examine the recommended cases for approval and financial sanction.

(vi). Monitoring and Review

The monitoring and review of physical and financial progress of projects sanctioned by the Ministry will be carried out by the PERC at least once in a particular financial year.

The draft final Report will be peer reviewed by an expert member of the PERC or an empaneled Expert Peer Reviewer or institution of repute as decided by PERC. An Expert Peer Reviewer, whenever engaged, would be provided honorarium for the purpose as per rates prescribed by the Government.

(vii). Acceptance of the Final Technical Report

The Principal Investigator will circulate the Final Technical Report (FTR) to the PERC. The PI will also make a presentation before the PERC. Based on the recommendation of the PERC, the SSAG would undertake the final acceptance of the FTR and, thereafter, the final settlement of accounts and closure of the project would be done.

7. Independent Evaluation

The Ministry may engage independent evaluation and assessment agencies for the evaluation of the S&T scheme against the physical outputs and final outcomes of the Scheme and to suggest improvements/modifications for effective implementation of the Scheme.

8. Standing Scientific Advisory Group (SSAG) on S&T Projects in Mining Sector

An SSAG Committee on S & T projects in Mining Sector will be constituted by the Ministry to, inter alia, provide overall direction to the research endeavors of the Ministry, ensure synergy and linkages in the research efforts of various autonomous bodies of the Ministry and avoid duplication of efforts among them, serve as a think tank acting as a symbiotic link/bridge/conduit between research findings and their implementation by research managers and other stakeholders. The SSAG will be reconstituted every 3 years as per requirement, by the Ministry.

Terms of Reference of SSAG

- (a) To finalize the project proposals recommended by PERC.
- (b) To consider recommendations of PERC on promotion of R&D for the mineral sector.
- (c) To consider R&D issues relating to acquisition of technology assets in relation to mineral and mining sector.
- (d) To consider strategies for coordination and strengthening of research organisations in the sector and for their better coordination.
- (e) To consider HR development strategies for the sector to promote R&D.
- (f) Identify the most important challenges before the country in the mining and mineral sector that can be addressed through suitable and appropriate technologies.
- (g) Identify key technologies both legacy and emerging that are most relevant to the country's needs and challenges.
- (h) Advise the Government on suitable policies and strategies for effective, secure and context-sensitive exploitation of latest and appropriate technologies.
- (i) Advise the Government on priorities and strategies for research in such key technologies across sectors.
- (j) Maintain an updated map of technology and technology products available and being developed across India.
- (k) Develop indigenization roadmap for selected key technologies.

- (l) Encourage all Ministries/ Departments, State /Union Territory Government to develop in-house expertise in policy and use emerging technologies such as Data Science and Artificial Intelligence and to this end develop and approach to training and capacity building.
- (m) Formulate policies for sustainability of public sector technology at Public Sector Undertakings/ Laboratories while encouraging cross-sector collaborations and research alliances with Universities and Private Companies.
- (n) Formulate standards and common vocabulary to apply in vetting of proposals for R&D
- (o) Guide policy formulation in the development and use of technologies that emanate from multiple disciplines of science and engineering.
- (p) Develop a long-term technology roadmap and lay down a plan for indigenization of key technologies.
- (q) Monitor technology development of relevance to the mining and mineral sector, develop perspective plans on the technology requirements as well as plan adoption and adaption of globally available new and emerging technologies.
- (r) Guide policy making and render advice to promote Private Sector and global investment in R&D as well as in education and skills related to emerging technologies, including through challenge route to develop technologies for particularly identified problems.

9. NORMS OF FUNDING

Norms for Funding Research Projects	
Consultants/ Staff	As per host institution rules
Equipment/ Instruments required for the Project (as per Section 4 above)	On competitive bidding/ tender basis in accordance with host institution norms
Travel/Consumables Expendables/other project charges	On case-to-case basis depending on the nature and extent of field work involved
Contingency	5% of the total Project cost for Projects upto 50 lakhs. The quantum will be decided on a case-to-case basis for Projects costing > 50 lakhs.

10. MAINTAINING A WEBSITE OF RESEARCH PROJECTS AND DISSEMINATION OF RESEARCH FINDINGS

Ministry of Mines has created SATYABHAMA Portal (research.mines.gov.in) for the Science and Technology Programme Scheme of Ministry of Mines. This portal will include a directory of projects with their outcomes, quantum of funds granted and their executive summaries. This library would be made available 'online' for use by all stakeholders.

Unless restricted by SSAG, for reasons including IPR issues, wide dissemination of research findings would be encouraged. Apart from professional journals/books, final technical reports of completed projects may be disseminated through one or more of the following channels:

- Website of the Ministry and SATYABHAMA Portal (research.mines.gov.in)
- Websites of GSI, IBM
- Websites of PSUs related to Mining Sector
- Websites of Autonomous Institutes under Ministry of Mines
- Professional Workshops/Seminars/Brainstorming meets
- Circulation to identified Organisations

ANNEXURES

*Annexure I***TERMS AND CONDITIONS FOR S & T PROJECTS****(A) Release of Grants and Financial Management**

- 1 A Project will normally be sanctioned for a maximum period of three years.
- 2 The grants for the project are released on the basis of yearly requirements taking note of the progress and expenditure incurred. The first sanction order indicates the budgetary allocation for the duration of the project under various heads like Equipment, Manpower, Travel, Consumable, Contingency etc.
- 3 The expenditure will be incurred within the ambit of the sanctioned amounts under the heads and in normal circumstances, inter alia, diversion of funds from non-recurring head i.e. Equipment to recurring head like Manpower, Consumable etc. is not allowed. However, reallocation/ re-appropriation of grants under different heads will require prior approval of the MoM through the Institute.
- 4 The Equipment sanctioned for the project should be procured at the earliest, to avoid any cost escalation. The PI and the implementing Institute should complete all formalities for placing the order so that there is no delay in procuring the equipment.
- 5 The subsequent installment of grant would be released annually on the basis of expenditure incurred in the previous financial year and expected expenditure in that year. Request for release of the next installments should be accompanied by the following documents:
 - a) Utilisation Certificate (as per Form GFR 12-A) and Statement of Expenditure (Appendix-1) for the previous financial year (in original or copy if sent earlier);
 - b) Latest authenticated Statement of Expenditure including Committed Expenditure, for expenditure since 1st April of that financial year till the previous month
 - c) Annual Progress Report, if not sent earlier.
6. The Statement of Accounts and the Utilisation Certificates are financial year wise and are to be submitted within a period of 3 months from the 31st of March of that year.

In the case of collaborative research carried out by a network of institutions, the Coordinating Institution would be responsible for the submission of the Utilization Certificate and Expenditure Statement and Progress Reports covering all the partners. The authorities of the institution(s) where research activities are to be carried out would receive the grants and be responsible for their disbursement, administration and maintenance of accounts.

7. Any unspent amount out of the grant given by the Ministry for a particular project would be required to be surrendered to the MoM, along with interest earned.

8. The grantee organization should maintain separate audited accounts for the project. If it is found expedient to keep a part or whole of the grant in a bank account earning interest, the interest earned should be reported to the Ministry of Mines and would be required to be surrendered to the MoM.
9. The institute will not entrust the implementation of the work for which the grant is being sanctioned to another institution nor will it divert the grant to other institute as assistance. In case the Institute is not able to implement the project, it should refund to this Department the entire grant or the balance grant at the earliest.
10. For permanent and semi-permanent assets acquired solely or mainly out of the grant, an audited record in the form of a Register shall be maintained by the grantee. The grant should not be utilized for construction of any buildings.
11. All the assets acquired with the grant will be the property of the Government of India and without the prior sanction of the MoM should not be disposed of or encumbered or utilized for any purposes other than those for which the grant has been sanctioned.

(B) Progress Monitoring and Evaluation

12. The PI through the implementing Institute will furnish yearly progress reports of the work done on the project as per proforma given in Appendix II to Metal 4 Section by email for an Annual Review of the project. The PI may be required to make a presentation on the progress of work carried out in the project to the PERC from time to time.
13. The MoM can depute empanelled Expert Peer Reviewers/scientists/specialists/finance persons/staff of the Ministry to visit the grantee organization periodically for reviewing the progress of the work and for suggesting such measures as to ensure early realization of the objectives of the project. Full facilities are to be provided by the grantee organization to the visiting scientists/ specialists.
14. An extension of upto a maximum period of two years may be granted to Research Projects in deserving cases. Any request for an extension of the Project should be sent by the PI to the Ministry at least three months before the closing date. The PI should not make any expenditure after the closing date without specific approval of the Ministry or till the extension is conveyed to him. The request for extension of time and additional funds, if any, will need to be approved by the SSAG on the recommendation of PERC, based on the justification provided.
15. The project will become operative with effect from the date of receipt of the First Demand Draft or through ECS by the grantee organization. The date of receipt of the Demand Draft will be intimated by the Principal Investigator to the Ministry.
16. The duration of the project includes the period for the submission of the Final Technical Report (FTR) but excludes the time taken by the peer reviewer. No additional time will be provided by the Ministry for the submission of FTR. The submission of the FTR, complete in all respects, within the project duration is essential. The PI will submit Final Technical Report to the Ministry in the prescribed pro forma

given in Appendix III. The following procedure will be adopted for acceptance of the FTR of research projects:

- i) The Principal Investigator will submit draft FTR to the PERC for peer review.
- ii) The FTR, after incorporating suggestions of peer reviewer, will be circulated by the Principal Investigator to the PERC members. The PI will also make a presentation before the PERC of the FTR. PI may be called upon to make a presentation before the SSAG, if required.
- iii) Based on the recommendation of the PERC, the SSAG would consider the final acceptance of the FTR, after which the final settlement of accounts and closure of the project would be done.

17. On completion of the project, the PI through the Institute should send the following documents to this Department :

- a) Project Completion Report as per prescribed Proforma (Appendix-III)
- b) Consolidated audited statement of expenditure and utilization certificates;
- c) List of assets/ equipment in the prescribed format; and
- d) DD/ cheque for any un-spent amount with the Institute and interest earned

18. PI will take all necessary steps to disseminate the outputs and outcomes of the project as decided by the SSAG.

19. The Ministry may in discretion publish all or any part of the report in any of its publication or on its website.

20. The following measures are proposed in case the PI fails to submit the FTR:

- i) A minimum of 10% of the remaining project outlay would be released only after the submission of a copy of the FTR, complete in all respects.
- ii) The PI and the institution which do not submit the FTR even six months after the end of the scheduled time period or have not applied for extension of time by then, would not be funded by the Ministry in the future.
- iii) The Head of the Institution (Vice-Chancellor/Registrar/Director) where the PI is located should be intimated regarding the non-submission of the FTR and the decision of Government to suspend future funding to the institution.
- iv) A list of such PIs and Institutions would be circulated among all government agencies that fund research.

(C) Other Terms & Conditions

21. Project funds will be granted to credible research institutions and not directly to the Project proponents (PI), i.e. grants will be made available to the institutions with whom the PI is affiliated.

22. The approved grant should be exclusively spent on the project for which it has been sanctioned within the stipulated time period. Industry, public and private sector organizations can co-sponsor a project on mutually agreeable terms, which can be formalized through an agreed MoU with the Ministry of Mines (MoM). In the project wholly sponsored by the Ministry, the grantee organization is not permitted to seek or utilize funds from any other organization (Government, semi-government, autonomous or private) for the same research project.
23. At the conclusion of the project, the Government of India will be free to sell or otherwise dispose of assets, which are the property of the Government of India. The grantee organization shall render to the Government of India necessary facilities for arranging the sale of these assets. The Government of India has the discretion to gift the assets to the grantee organization, if the Government of India considers it appropriate.
24. All equipment and stores purchased out of the grant would remain with the institution concerned unless otherwise specified in the sanction.
25. The Comptroller and Auditor General of India at his discretion shall have the right of access to the books and accounts of the grantee organization for the grants received from the Government of India.
26. All accounts in respect of the project will be subject to audit by the institution auditors.
27. The implementing institution and the PI have the responsibility for completion of the Project and to achieve the expected outcomes and deliverables of the Research Project.
28. In case, the PI leaves the institute on account of superannuation/unforeseen circumstances, the responsibility for the completion of the Project may be entrusted, at no extra cost, to another equally qualified investigator by the Head of the Institution with the approval of the Ministry. In case the PI is shifting to another institution due to a new appointment/transfer/long-term deputation, the project could be transferred to that institution with mutual consent of both the institutions and with the approval of the Ministry.
29. Those institutions/individual PIs which/who do not render accounts/submit physical progress reports against the released grants will be blacklisted by the Ministry after ensuring an adequate dialogue, both in speech and writing, by the Ministry with the authorities of the concerned defaulting institution/individual.
30. The MoM reserves the right to terminate the grant at any stage if convinced that the grant has not been properly utilized or appropriate progress is not being made. Upon such termination, full audited accounts will have to be submitted and a refund of all unspent balances will have to be made promptly to the Ministry.
31. In case of a violation of any of these conditions of the grant or in case of closure or dissolution of the organization, the government may take possession of all the

assets of the organization acquired out of Government grants and use them in any manner deemed appropriate or to recover from the organization the value of such assets at its discretion.

32. IPR Issues

- (i) The Institution undertaking the project may apply for a patent of any process/product developed under the S&T project with prior approval of Ministry of Mines. Ministry of Mines may impose such conditions as it may deem fit.
- (ii) While applying for the patents, the Institution/Undertaking the project should clearly mention the name of the S&T project under which various processes/products were developed and the fact that funds for the development, for which patent is proposed to be taken were provided by the Ministry of Mines.
- (iii) Ministry of Mines and government agencies shall not be charged any royalty on the use of process, product etc., on which patent has been taken out as above.
- (iv) Unless there are IPR issues, Investigators who wish to publish papers based on the research work done under the Project or to present such papers at conferences need to duly inform the MoM and should acknowledge the financial support received from the Ministry. Three copies of the publications/ papers shall be sent to the Ministry.

33. The staff that may be employed for the project by the grantee organization are not to be treated as employees of the Government of India and the deployment of such staff at the time of completion or termination of the project will not be the concern/responsibility of the Government of India. The staff appointed for the research project will be subject to the administrative control as applicable at the institute where they are engaged.

34. The selection and appointment of Scientists/Support Staff/Consultants for the project may be made by the Principal/Lead Investigator following the procedures of the concerned Institutions for periods not exceeding the sanctioned duration of the project. The qualification and experience should be as per the host institution norms.

Annexure-II

**COVERING LETTER FOR APPLYING FOR RESEARCH GRANTS
(physically signed copy to be uploaded)**

To
The Director (Technical)
Ministry of Mines Shastri
Bhavan
New Delhi-110 003

Sir,

1 A research project titled
“
_____” is forwarded herewith.

2 It is certified that the same project or project with similar objectives hasnot been submitted to any other funding agency by the Investigator.

3 We have carefully read the terms and conditions of sanctioning theproject and agree to abide by them.

4 The organization will provide all necessary infrastructural facilities (both laboratory and administrative) if the project is sanctioned.

5 The organization is fully responsible in regard to matters pertaining to theproject.

6 Certified that the equipment proposed in the project proposal are not available in the Department/Institution or are available in the Department/Institution but not available for dedicated project use.

Yours faithfully,

(Principal Investigator)

Date.....

Place.....

(Registrar/Director/Head of theInstitution)

*Annexure-III***DETAILS OF INFORMATION REQUIRED TO BE FILLED/ UPLOADED
ON SATYABHAMA PORTAL FOR SUBMITTING APPLICATION FOR
GRANT FOR RESEARCH PROJECT**

(To be filled in by the Principal Investigator)

A DETAILS OF S&T PROJECT PROPOSAL

1. Title of the project.
2. Name(s) and address of the PIs and implementing Institutions and their affiliations.

B The detailed project proposal should consist of the following :

Part I - An Abstract, not exceeding one page, describing the background, objectives, methodology and figures of year-wise budget and keywords

Part II - Should contain the following:

- a) Brief description of the subject: including work done in India and elsewhere
- b) Detailed literature survey
- c) Objectives
- d) Detailed methodology
- e) Year-wise work plan spelling out clearly area of work and responsibilities of participating Institutions(s) in case of joint projects with participation of more than one institute.
- f) Institutions if any already engaged in similar work and linkage proposed/established with them.
- g) Minimum required tenure of the project
- h) Practical relevance/utility of the project
- i) Expected outcomes of the project
- j) Agencies which can utilize the results of the project
- k) Component-wise justification of the costing of the project
- l) Cost-benefit analysis in terms of physical outputs and mining benefits
- m) Statement of originality and certification on no duplication with existing work/ongoing projects
- n) PERT chart for Action Plan with milestones for project period. Mechanism for monitoring progress of the project.

Part III - Biographical Sketch of the investigator(s) detailing research credentials and research papers published in the area of the proposed research project

Part IV – (a) Facilities (equipment/instruments) available at institution(s)/ organization(s) for carrying out the project.
 (b) List of all equipment required showing equipment available, equipment to be purchased out of the project funds.

Part V -Project budget in the prescribed format

(physically signed copy also to be uploaded) Project

Title :

Major Category :

Sub domain:

PI and Institution

Contact Details : (Email & Mobile No.)

Co-PI

Contact Details: (Email & Mobile No.)

PROJECT BUDGET

Budget Summary (*)

		I Yr	II Yr	III Yr	Total
	CAPITAL (A)				
	Non CAPITAL (B)				
	Institution O/H (C)				
	Total Recurring (B + C)				
	TOTAL A + B + C				

(*) If more than one institution is involved, the budget summary has to be submitted separately for each institution.

BUDGET BREAK-UP**A. Capital Expenditure (**)**

S No	Equipment Description	I Yr	II Yr	IIIIYr	Total

(**) Capital Expenditure includes the following:

- (i) Bought out new equipments
- (ii) up gradation of existing equipments
- (iii) design and system integration of new equipments
- (iv) spares for existing equipments
- (v) Engineering software and its AMC

Any repairs etc to the existing capital equipment should be under repairs and fabrication given in B(iv) Other Projects.

B. Recurring (Non Capital) Expenditure

	Item Description	I Yr	II Yr	III Yr	Total
B(i)	Human Resource (JRF, SRF, RA, consultant only)				
B(ii)	Expendables/Consumables				
B(iii)	Travel				
B(iv)	Other Project Costs (a) Fabrication, Operational Job works, Field work, AMCs, Repairs & Maintenance etc				
	Other Project Cost (b) Testing charges (external paid out only);				
	Other Project Cost (c) ...pl any specify				
	Other Project Cost (d)pl any specify				
B(v)	Contingency				
B(vi)	Dissemination of Research (workshops, publications ..)				
	TOTAL (Recurring)				

C. Institution O/H

	C Institution O/H	I Yr	II Yr	III Yr	Total
	1% (A) Capital PLUS5% (B) Recurring				

(Signature of PI)

Name &
Designation :

16. Recommendations of Head of Institution

Note:-

- (i) All expenditure towards the project to be included
- (ii) Staff salaries and expenses of routine nature not directly related to the project shall not be charged to Ministry of Mines as project cost.
- (iii) Project are for 3 year duration, extendable by not more than 2 years subject to prior concurrence of the Ministry of Mines
- (ii) In case of variation of cost, revised estimate on proforma will be supplied at the commencement of the financial year, giving reasons

(Signature of Head of Institution)

Name &
Designation :

Annexure IV

**ENDORSEMENT FROM THE HEAD OF THE
INSTITUTION
(To be printed on letter head & physically signed copy to be uploaded)**

Title of the Project:

1 The Institute certifies the participation of _____ as the Principal Investigator and _____ as the Principal Co-investigator for the project and that in the unforeseen event of discontinuance by the Principal Investigator, the Principal Co-investigator will assume the responsibility of the fruitful completion of the project (with due information to the MoM).

2 Certified that the equipment and other basic facilities mentioned in part IV of Appendix II and such other administrative facilities as per terms and conditions of the grant, will be extended to the investigator(s) throughout the duration of the project.

3 The Institute assures to undertake the financial and other management responsibilities of the project.

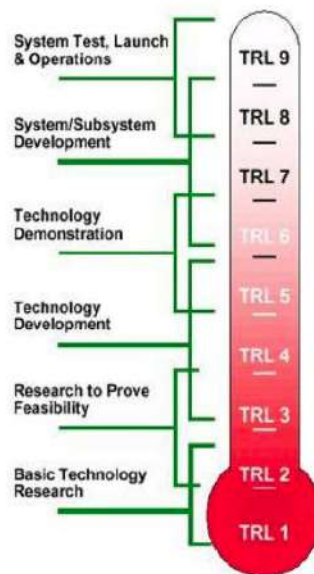
Date:

Place:

Name and Signature of the
Head of the Institution

*Annexure V***TECHNOLOGY READINESS LEVELS (TRLs)**

Technology readiness levels (TRLs) is a measure of estimating technology maturity of core technologies in a program during the selection process and in subsequent monitoring and evaluation phases until these technologies, or products utilizing them, attain market readiness. Originally introduced by NASA, the TRL scale is a metric with nine technology readiness levels for describing the maturity of a technology from ideation stage (TRL-1) to highest degree of application/commercial readiness (TRL-9). Levels in between covers establishment of proof of concepts, prototype developments, functional validations from models to real operational environments and clearances of mandatory regulatory barriers between levels towards market introduction of these technologies/products.



APPENDICES

*Appendix I***EXPENDITURE STATEMENT
Ministry of Mines**

Statement showing the expenditure of the period from.....to

.....

Sanction No. & Date :

- 1 Total outlay of the project: Rs
- 2 Date of Start of the project:
- 3 Duration:
- 4 Date of Completion:
- 5 Amount received during the financial year:
- 6 Unspent amount carried forward from previous financial year: Rs.
- 7 Total amount available for Expenditure (a + b): Rs.

Sl. No.	Budget Head		Amount Received	Total Expenditure	
1	Salaries				
2	Equipment Purchased				
3	Expendables/Consumables				
4	Travel				
5	Contingencies				
6	Other Project Costs, if any (please specify)				
7	Dissemination of Research Work				
8					
9	Accrued bank Interest				
10	Total				
11	Balance, if any.				

Certified that the expenditure of Rs. (Rupees.....)
has been actually incurred on the Project/Scheme for the purpose for which it was
sanctioned.

(Signature of Principal
the Investigator)(Signature of Registrar/
Accounts Officer)(Signature of Head of
Organization)

Appendix II**PROFORMA FOR ANNUAL PROGRESS REPORT****Part-I : Project Particulars**

- 1 Name & Address of the Principal Investigator (PI) :
- 2 Telephone & Fax No. :
- 3 Project Details
 - 3.1 Title
 - 3.2 Sanction Number (Date & Year)
 - 3.3 Date of Start
- 4 Date of completion (expected)
- 5 Financial Details
 - 5.1 Total Outlay
 - 5.2 Amount received so far
 - 5.3 Amount utilized so far
- 6 Projected requirements for the remaining period
- 7 Staff engaged
- 8 Permanent equipment sanctioned/procured
(Please give details such as Name, Model, Accessories, etc. & date on which these were purchased by the Awardee)

Part-II : Scientific components of the project

- 1 Objectives of the project
- 2 Objectives undertaken so far
- 3 Area of work :
 - i) State
 - ii) District
 - iii) Location (Please provide the map, if possible).
- 4 A brief resume of the work done since the inception of the project:
- 5 Methodology followed:
- 6 Achievements & Deficiencies, if any :
(Please enumerate findings in a cogent and concise manner):
- 7 Results of academic importance:
- 8 Results of practical importance:
- 9 Publications/Patent, if any, based on the data of the project: (Attach photocopies)

- i) Statement by the PI with reference to overall performance and attainment of the objectives of the project
- ii) Any other information related to the project work

Signature of the PI

*Appendix III***PROFORMA FOR FINAL TECHNICAL REPORT****Part-I**

- 1 Title of the Project :
- 2 Name of the PI & Address :
- 3 Number & Date of Sanction Letter :
- 4 Duration of the Project
 - 4.1 Date of Commencement
 - 4.2 Date of Completion
- 5 Extension of period
- 6 Budget
 - 6.1 Total amount sanctioned during the entire tenure under different sub-heads :
 - 6.2 Total amount spent during the entire tenure under different sub-heads

	Receipt	Expenditure
1 Salaries		
2 Permanent Equipment		
3 Expendables/Consumables		
4 Travel		
5 Other project costs		
6 Contingencies		
7 Dissemination of Research work		
8 Bank interest, etc.		

Part-II

- 1 Preface :
- 2 Abstract of the Project :
- 3 Highlight of the findings achieved In the Project. :
- 4 Detailed report of work done on the Project. :
 - i) Summary of the objectives
 - ii) Methodology
 - iii) Results, Discussion and Analysis, Tables, charts, Figures, etc
 - vii) Likely impact of the work on the scientific potential of our country.
 - viii) Bibliography
- 5 Executive Summary of the Project (not exceeding 5-6 pages).

Part-III

- 1 Recommendations, including remedial measures relevant to the mining problems if studied under the Project.
- 2 List of research papers published/accepted in journals/Patent filed with the permission of MoM with respect to the research work done under the Project. (Two copies of each of the reprints/accepted Papers also to be enclosed).

Signature of the Principal Investigator

Registrar/Head of the Institution