Summary Report

About Department/Center/School: The Department of Mining Engineering at Indian Institute of Technology was started in 1956, at the instance of the Government of India with the approval of the Planning Commission, All-India Council of Technical Education and the Board of Governors of the Institute. It has played a yeoman role in the introduction of modern Mining Engineering curriculum in India. Within a few years, the Department took upon itself the leadership role in the development of modern and board-based Mining Engineering curricula balancing the scientific advancement and the needs of industries.

The Department pioneered in offering various subjects to students including rock mechanics, geo-statistics, GIS & remote sensing, GPS, reliability and quality engineering, safety engineering, environmental science and technology, industrial management, operations research, numerical methods, computer programming and network applications, and it makes continuous efforts to absorb and disseminate new concepts. The faculties are actively involved in sponsored research and industrial consultancy. The Department has produced the largest number of quality textbooks and monographs for mining and allied fields in India. A number of continuing education programs for industry executives and teachers are offered on a regular basis.

1. Academic Programs (Range of Degrees and Disciplines):

i) ***B.Tech (Hons.)*** *– 4 years' duration*
ii) ***Dual Degree*** *(B.Tech (Hons.)+M.Tech in Mining Engineering) – 5 years' duration*
iii) ***Dual Degree*** *(B.Tech (Hons.)+M.Tech in Mine Safety Engineering) – 5 years' duration*
iv) ***M.Tech+Ph.D*** *in Mining Engineering – 2 years' M. Tech followed by an optional enrolment in the Ph.D progrmme*
v) ***Ph.D*** *in Mining Engineering*

2. Major 4-5 Thrust Areas of Research: *i)* ***Rock Mechanics & Ground control****, (ii)* ***Surface & Subsurface Environment,*** *(iii)* ***Safety & Systems Engineering, and (iv) Advanced Surveying & Geoinformatics***

3. Curriculum and Courses & Teaching Environment

Items	**Ratio/ Number**	**Items**	**Number/%**
Teacher-student Ratio	1:20	Average No. of students motivated (%) to opt of careers Eng/ Tech. Sectors UG/PG/PhD	200/25/15
No. of Faculty members as on today	16 (One on lien and another on visiting faculty)	Average No. of students motivated (%) to opt of careers in Science sectors UG/PG/PhD	0/0/2
Average No. of Tutorial Assignments	20	No. of teaching labs	17
No. of UG/DD students	298/37	Average No. of students per	77

		experiments in core courses	
No. of PG students/PhD students	22/28	No. of Students' workshops/``Tinkering'' Labs	20
Average no. of tutors with more than 100 students	NIL	No. of new courses introduced	5
Average Students placements (%) (UG/DD/PG)	91/93/100	No. of New program introduced	NIL
No of major curriculum review in both UG & PG level	1	Undergraduate Vs PhD strength expressed as Percentage	10%
No of UG lab (teaching labs) developed/set-ups	14	No of PG/research labs developed/new set up	4
No of E class rooms	5	No. of lab classes per week	7
Average No. of Course done per student for B. Tech/DD/M. Tech/Ph.D	54/64/20/4	No. of core/elective/seminar/projects subjects taken for B. Tech, DD, and M. Tech respectively	43/09/00/02 46/14/00/04 12/06/02/02

1. Research and Development & its Environment

Items	**Number**	**Item**	**Number**	**Items**	**Number**
Total No. of Publications in Journals (2008-13)	163	Average no. of citation per paper based on Scopus data	---	No of large interdisciplinary research projects	03
Total No. of Publications in Conference & Symposium	91	Average Journal publication per year	33	Number of Int. conf./workshops attended by students	25
Total No of Books & e-books published	15	h-Index of the department since 2008/overall h-index in Scopus	---	No. of PDF hired in the department	00
Total No of Edited Conference Proceedings/book chapters	**10**	Number of papers with citation more that the average no. of citation of the Journals	---	No. of international Students as PhDs/PDFs	00
Total No. of Technology Developed/transferred	2	No. of recognitions & Awards, fellows etc to faculty/students (provide break up if necessary)	43/1	No. of International visiting researchers/adjunct faculty stayed here for at least a week	02/0
Total No. of Patents Filed/Obtained	2/1	Average Retention(%) of Young faculty for at least 10 years	100	No. of short courses/workshops /conf. organized with international participations	0/0/6
Total No. of Copyright Filed/Obtained	2/2	No. of Sponsored research Project /fund(lakh) generated from non-internal source	55/2000	Average No. of PhD granted per year	04

No. of Publications per Faculty/Masters/PhD students	15/49/391	No. of Consultancy /fund (lakh) generated from non-internal source	60/400	Average No. of PhD Granted per year per faculty	0.37
No. of Publications per Faculty/Masters/PhD students in Top Ten Journals as Identified by the department	16/1/7	No of Internal and external Collaborations research papers/research projects/PhD students	4/6/5	Patent granted per faculty	0.06
Average No. of Citation per faculty per year	60	No of M. Tech students motivated into pursuing PhD/PhD graduates motivated to pursue career in Academics(abroad or IIT etc)	27/9	Number of articles in collaborations with ten countries*	---
Ranking of the department in terms of average citations per paper within the Institute	---	Ranking of the department in terms of total number of Journal publications within the Institute/publications per faculty	---	No of articles of the dept. contributing towards h-index of the Institute since 2008	--

5.External Stakeholder Engagement and others

Items	**Number**	**Amount Lakh**
No. of PhD/Master students' thesis funded by Industries	12/03	NA
Total number of Industry sponsored projects and its income (Lakh)	100	2100
No. of Curriculum Development Initiative for Industries	02	NA
No of Technology transfer/adopted by Industry/Labs	03	NA
No. of Nationally relevant research projects	70	NA
No of Policy inputs/consultancies provided	60	NA
No. of Research grant and seed money from internal savings of the Institute per young faculty of the department and its total fund	07	30
No. of Community Relevant projects	NIL	NA

6. Vision for the Future (in brief):

(a) Departments/centers/schools should spell out its Mission and Vision Statements, (b) Plans for future to achieve the projected goals and (c) measures adopted towards above.

(a) The Mining Engineering programs at IIT KGP will continue to provide best of the class up-to-date education, training and peer support to its students to be successful in the industry, academia and research of mining and processing of minerals, oil and gas and aggregates. The programs will provide students with quality education, industry-relevant expertise and research capabilities to make creative and sustainable results in the industry, in particular and the country as a whole.

(b) Our vision of global leadership will be achieved through the following core strengths that form the basis of Mining Engineering education and research.

- ***Nurturing talent****: Uncompromising talent, motivation and skill set to face the current and upcoming challenge, through its course curriculum, summer industrial training /internships and field trips. Students receive hands-on experience, which is vital to the practice of the profession.*
- ***Promotion of excellence:*** *The efforts of faculty, staff, alumni, industry partners and related industry to create an environment that promotes excellence in education and research.*
- ***Leadership in research:*** *Department creates opportunities for students to lead GREAT STEP and provides a scope to participate in SME competitions like the mine design, mucking and mine rescue competitions.*

(d) Institute and its departments/centres/ schools should spell out its strategies vision for next decade.

In the coming years the department will try to embrace the related engineering disciplines and would try to integrate them with mining engineering. Department has already initiated mineral processing and petroleum engineering courses to be included as a part of curriculum for the course of mining engineering. There is also a thought to put all the three disciplines in the form of an offering, to be known as geo-resources engineering. These initiatives will not only increase the capacity of the department and enable the department to move into new areas of engineering but also will enhance the carrier opportunities of the students. This is particularly important in view of the increased students intake in the department. The dept has already initiated R&D in these areas and has been in constant contact with many industries to create new opportunities.

Department envisages to become "an international hub for mining education" in the country as well as for international community in general. In this regard, an MoU has signed with University of Wollongong, Australia. Apart from that student exchange programmes are going on with an South Korean University. Department wishes to attract number of international research scholars and wishes to offer joint Ph.D. with foreign university of high repute.

The Department also envisages to play an anchoring role in evolving as a center of national agenda on mining pedagogy through various programs with other national and international institutes offering mining and allied engineering.

7. External peer review of the Dept./centre/schools (in brief): (a) Date: in July, 2013.

(b) Name of the Experts involved and their affiliations in short: *(1). Prof. S. P. Banerjee, Ex. Director, ISM, Dhanbad, (2) Dr. D. D. Mishra, Ex-director, CMRI, Dhanbad*

(c) Overall recommendations of the peer review committee: Strengths, weaknesses, suggestions and comments

The peer review committee has appreciated the current initiative of the department in three fronts: i) Quality of teaching curricula ii) broad area of research and consultancy iii) industry relations with continuing education programmes. The specific recommendations are

- *Faculty and staff position needs to be improved; adhoc/ quick hire schemes may be considered.*
- *Interdisciplinary areas such as mineral processing and petroleum engineering may be emphasized.*
- *Laboratories need to be modernized and enlarged; Training to staff to be imparted.*
- *Emphasis may be given to the core mining subjects*
- *Innovation to be encouraged in students*
- *Qualified technical staffs need to be recruited*

(d) Measures adopted/action taken at the department level to address the recommendations of the peer review report:

The faculty members of the department have reviewed the report of the peer review committee and suggest a complete roadmap to take possible course of action to implement the recommendation of the peer committee. The department has started implementing the recommendations of the committee in a phased manner. Mineral processing laboratory has already been setup and a new faculty member in petroleum engineering discipline has been recruited. The department has identified challenge problems to encourage innovation in students and providing working environment on 24x7 bases. The laboratories are being augmented and modernized and are being further augmented and updated.

International faculty of high repute will be shortly joining the department as adjunct faculty members and will be associated with teaching of UG/PG subjects as well as in research activities. A faculty from USA with Full-Bright Scholarship will spend one semester in the department.

7. Strengths, Weaknesses, Opportunities & Threats (SWOT) Analysis of the Department

STRENGTHS √ Highly qualified faculty with international exposure √ Involvement of faculty in high volume sponsored research and consulting projects √ Very good linkages with industry √ Good quality students √ Department producing maximum number of Ph.Ds in the country who are serving as faculty members in other Institutes of the country/abroad √ Good facilities for computational and laboratory infrastructures √ Alumni are in Senior/influential positions √ Very good placement record √ Periodic updating of curriculum √ Highest number of conferences and continuing education programmes organized on regular basis **WEAKNESSES** √ Inadequate number of faculty in terms of low teacher-student ratio √ Extremely insufficient technical staffs to handle laboratory classes with large number of students √ In-adequate sophisticated equipment and labs in the areas of emerging technologies & cutting edge disciplines for post graduate teaching and research	**OPPORTUNITIES** √ Good demand of minerals and coal enhances the opportunity of student employment √ Lack of qualified faculty in other Institutes opens opportunity of PhD students for teaching positions √ Establishment of more centres of excellence and advanced studies √ To innovate new products/processes/designs and acquire patents √ Possibility of more international and national collaborations and joint ventures √ Good industry-IIT partnership opens up possibility for sponsoring chair professorships, centre of excellence, collaborative programs √Collaborative works with world class class universities/ industries of international repute. **THREATS** √ Possibility of degradation of quality of teaching due to large number of students √ Constrain in laboratory equipment with multiple sets to cater the needs of large number of students √ Students generally prefer white color job causing less visibility of our graduates in mining and allied industry

***Ten countries: US, UK, Germany, Japan, Canada, France, Italy, Australia, Singapore, S. Korea**

Important Highlights

Milestones

The Department of Mining Engineering at Indian Institute of Technology was started in 1956, at the instance of the Government of India with the approval of the Planning Commission, All-India Council of Technical Education and the Board of Governors of the Institute. It has played a yeoman role in the introduction of modern Mining Engineering curriculum in India. Within a few years, the Department took upon itself the leadership role in the development of modern and board-based Mining Engineering curricula balancing the scientific advancement and the needs of industries.

The Department has recently introduced two new dual degree program entitled 'Mining Engineering & Mine safety engineering' to cope up with the challenges of advances in mining and safety issues. The Department pioneered in offering to students including rock mechanics, geo-statistics, GIS & remote sensing, GPS, reliability and quality engineering, safety engineering, environmental science and technology, industrial management, operations research, numerical methods, computer programming and network applications, and it makes continuous efforts to absorb and disseminate new concepts. The faculties are actively involved in sponsored research and industrial consultancy. The Department has produced the largest number ofquality textbooks and monographs for mining and allied fields in India. A number of continuing education programs for industry executives and teachers are offered on a regular basis.

State of the art facilities for research have been created over the years in the areas of rock mechanicssubsurface aerodynamics, environmental quality assessment fires and explosions, and numerical modeling. The tradition of inter-departmental research operation at IIT significantly enriches the M. Tech and Ph.D program of the Department. The Department has awarded more number of Doctoral degrees in mining engineering compared to any other Institution in India.

The Department will strive to remain, in the future as well, in the forefront of science and technology related to mining and natural resources engineering.

Department's Current Academic Courses

Undergraduate Studies

1. A four-yearB. Tech (Hons.) degree in Mining Engineering.

2. Two five-year dual degree programs leading to B. Tech (Hons) and M.Tech with a specialization in Mining Engineering and Mine Safety Engineering

Graduate Studies

1. **A two-year** M. Tech degree in Mining Engineering
2. **A two-year postgraduate program** leading to M.S degree in Mining Engineering

Ph.D Studies

- **A research Program** of about three to four years leading to Ph.D in Mining Engineering.

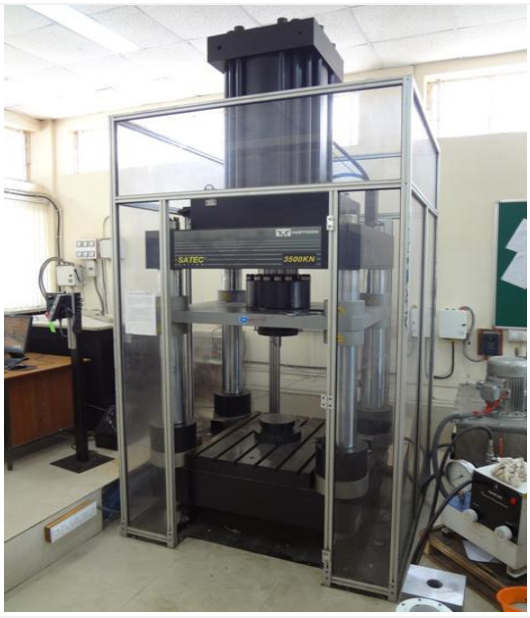
Continuing Education Program

Department offers on- & off- campus short-term course for industry, AICTE and other sponsored candidates on a regular basis in the fields of geo-mechanics, safety,Disaster & environment management, remote sensing, geo-statistics, virtual reality applications, total quality management and mine closure planning

Research and Development

The Department has a very vibrant research and development program supported by 12 different laboratories. Some of the current thrust areas of research studies in progress are:

1. Rock Mechanics and Ground Control
2. Sub-surface ventilation
3. Environment and Safety
4. Risk analysis and Safety management in the Indian mining industries.
5. Mine closure studies using remote sensing and GIS
6. Mineral Beneficiation
7. Mine instrumentation



Industrial Consultancy Partners

Coal India Limited (CIL)
Central Mine Planning &Design Institute Ltd
Hindustan Copper Limited(HCL)
Hindustan Zinc Limited (HZL)
Hutti Gold Mines Limited (HGML)
GujuratAmbuja Cement (GAC)
Indian Bureau of Mines (IBM)
India Metal & Ferroalloys Limited (IMFA)
Mahanadi Coalfields Limited (MCL)
Orissa Mining Corporation (OMC)
Singareni Collieries Company Ltd (SCCL)
South Eastern Coalfields Limited (SECL)
Steel Authority of India Limited (SAIL)
Tata Iron & Steel Company (TISCO)
Uranium Corporation of India Limited (UCIL)
Tata Power

Achievements (Last Five Years)

No. of Publication in Journals conference 163
Publications in conference 91
No. of Books Published 18
No. of Ph.D Thesis 10
No. of Projects 150
Fund From Research Projects(crore) 41.00
No. of Conferences/ Seminar organization 2
No. of Fellows of National Institutions 3
Awards and Distinctions for Faculty 40

Faculty Awards:

National Mineral Award
Dr. J Coggin Brown Memorial (Gold) medal
Hindustan Zinc Medal
John Dunn Medal
Mining Engineering Award
Fellow of National Academy of Engineers
SukumarRakshit Award
Smt. BalaTandon Award
National Design Award
MGMI Institutute's Gold. Silver and Bronze Medals for papers
M.L Rungta Award (Gold Medal)
Dr. D. N. Thakur Award (Gold Medal)
Roberton Medal
BHU gold medal

Books Published

Principle of Rock Drilling, Oxford & IBH Publishing Co Pvt. Ltd. New Delhi, 1998, Simultaneously Published by A.A. Balkema, Netherland,1999
Mine Management Legislation and General Safety (Coal) (2nd Edition), Lovely Prakashan, Dhanbad, 2000
Modern Coal Mining technology, Lovely Prakashan, Dhanbad-2008
Explosives and Blasting Practices in Mines, (2nd edition) Lovely Prakashan, Dhanbad, 2001
Quality Control and Management: Methods and Practices in the Mineral Industry, Allied Publishers Limited New Delhi,2001
Environmental Pollution Research, APH Publishing, New Delhi, 2001
Mines Safety and Legislation, , Lovely Prakashan, Dhanbad, 2002
Maintenance Engineering and Management, Prentice hall of India Pvt. Limited,2002
Principle of Mine Planning, Allied Publishers Limited, New Delhi, 2003,2007
Disruptive Innovation: Strategies for Enterprises Growth, Viva Books, New Delhi, 2005
Finite Element Method: Concepts and Application in Geo-Mechanics, Prentice hall of India Pvt. Limited,2002
Combustion Quality of Coal and Lignite, Wide Publication, Kolkata 2008

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