



CSIR-INSTITUTE OF MINERALS AND MATERIALS TECHNOLOGY
Council of Scientific & Industrial Research
BHUBANESWAR – 751 013

Tel: 0674-2379455/2379441, Fax : 91-674-2567160, E-mail: bibhu@immt.res.in, Website: www.immt.res.in

Application form for admission to
One Year *Post Graduate Diploma in Mineral Engineering*
(Academic Year 2017-18)

DD Particulars

DD No.:Date:.....

Amount:.....Bank:.....

For Office Use

Application No.:.....

Receiving Date:.....

1. Name:

(Full and in Block Letters)

2. Mailing Address:

(In Block letters)

Pin Code:.....

Please paste self signed recent
colour passport size photograph

Fax:

E-mail:

Phone:

3. Permanent Address:

(In Block Letters)

Fax:

E-mail:

Phone:

4. Nationality :

5. i. Date of Birth (dd/mm/yyyy)/...../.....

ii. Age as on 1st June 2017YearsMonths

6. Knowledge in English Language:

Spoken : YES / NO

Written : YES / NO

7. Whether SC/ST/OBC (Non-creamy): Certificate to be attached					
8. Whether Hostel Accommodation Required:					YES / NO
9. Record of Academic/Technical Training: (Commencing from Secondary School Certificate or Equivalent Examination*)					
Examination	School/College/ University	Principal Subjects	Class/ Division	Year of Passing	% marks scored (Grade Points)
* Please enclose attested true copies / photocopies of certificate and marks sheets					
10. GATE / NET Score, if any:					
11. Scholarships / Awards / Prizes etc, if received					
12. Employment Record / Professional Experience*					
Name and address of the Company / Employer	Nature of Business/ Product	Period of Employment		Designation & Responsibilities	
		From	To		
* Please enclose proof of your employment experience					
13. i. Are you sponsored by your Company for this course (If yes, please enclose a certificate from your organization)					YES / NO
ii. Name and address of the Sponsor:					

14. Any other information:

15. List of enclosures:

- | | |
|------|-------|
| i. | v. |
| ii. | vi. |
| iii. | vii. |
| iv. | Viii. |

DECLARATION

I declare that the above information furnished by me is true to the best of my knowledge and belief. If selected, I hereby agree to abide by the Rules and Regulations of the course framed by CSIR-IMMT.

Signature of Candidate

Date:

Place:

Note:

- INCOMPLETE APPLICATION WILL NOT BE ENTERTAINED.
- Last date of receipt of application is 15.06.2017.
- Any change of address, given in col. 2, should at once be communicated to the Program Coordinator, PG Diploma in Mineral Engineering, Mineral Processing Department, CSIR- IMMT Bhubaneswar-751 013, INDIA. (E-mail: bibhu@immt.res.in / skbiswal@immt.res.in)
- The application should be printed, duly filled and sent to the Program Coordinator, PG Diploma in Mineral Engineering, Mineral Processing Department, CSIR- IMMT, Bhubaneswar-751 013, INDIA with application fee and other enclosures. If the application is not received on or before the stipulated date, the application will not be considered.
- Application fee of Rs. 500/- (Rs 250/- for SC/ST under non sponsored category) in the form of **DD** drawn in favour of "**PG Diploma in Mineral Engineering**", payable at Bhubaneswar should be sent along with the application.
- Any legal dispute arising out of the admission to this course will be under the jurisdiction of appropriate courts of Bhubaneswar only.

List of enclosures to be attached:

- Colour photograph (passport size) - 1 no. [in addition to the one on application]
- DD towards application fee.
- Photo copy of certificates and mark sheets from HSC (10th) on wards.
- Sponsorship certificate for sponsored candidate.
- Caste certificate for reserved non-sponsored candidate.

Eligibility

Who can apply:

The candidates working in industries can apply under **Sponsored** category. Those of the applicants who are not employed in industries can apply under **Non-sponsored** category. Applicants under both sponsored and non-sponsored categories have to fulfill the eligibility criteria as regards qualification, experience and age limit. Short listed candidate will be called for interview.

Qualifying Examination:

- First Class B. Tech degree in Mineral/Chemical/Metallurgical/Mechanical Engineering from any recognised University / Institute.

Reservation:

Reservation for SC/ST/OBC/PH etc. will be as per rules in respect of 'non-sponsored' candidates only.

Age:

The age limit for the 'non-sponsored' candidates will be 30 years and there will be no age limit for 'sponsored' candidates. The age relaxation for SC/ST/OBC/PH candidates (only in the 'non-sponsored' category) will be extended as per rules.

Programme Structure

Duration : The PG Diploma programme will be of one year duration, consisting of two semesters. Both theory and practical classes will be taken up during the 1st semester for four courses. Similarly during the 2nd semester, there are two theory classes along the practical classes. The students will be carrying out project work during the 2nd Semester.

1st Semester:

Theory:

Subject Code	Subject Title
ME-01	Characterisation of Ores & Minerals and Environmental Studies
ME-02	Comminution, Classification
ME-03	Separation Processes
ME-04	Surface Phenomena & its Application

Practical Classes on the above Subjects

2nd Semester:

Theory:

Subject Code	Subject Title
ME-05	Agglomeration and Direct Reduction of Iron Ore
ME-06	Design, Simulation and Optimisation of Mineral Processing Plants

Practical Classes on the above Subjects

Project Work & Project Report Submission

Fees Structure

Course Fee:

Non-Sponsored Student : Rs. 40,000/- each; to be deposited in two equal installments- 1st installment at the time of admission and 2nd installment at the time 2nd semester registration.

Sponsored Student: Rs. 60,000/- each to be deposited in two equal installments- 1st installment at the time of admission and 2nd installment at the time 2nd semester registration.

The additional expenses on food and accommodation will be borne by the students.

Caution Money:

Library Caution Money : Rs. 3,000/- each to be deposited at the time of admission, which will be refunded after adjusting the damage / loss to library property, if any.

Hostel Caution Money : Rs. 4,000/- each to be deposited at the time of admission if the student desires to avail hostel accommodation. The caution money will be refunded after adjusting the damage / loss to hostel property, if any.

Room Rent:

Room rent per student : Rs 700/- per month

Each student has to pay the room rent @ Rs. 700/- per month. The room rent for the 1st semester will be collected at the time of admission and for the 2nd semester at the time of payment of 2nd installment for both non-sponsored and sponsored students.

The above Fee Structure may be changed in time to time by Management.

Accomodation

Accommodation arrangement for the students:



Students admitted to PG Diploma program, may be provided bachelor accommodation in specially renovated hostel blocks. Each student will be allotted one single room in a 2-roomed unit thus two students will be accommodated in one 2-roomed unit. No students will be allowed to keep their families or friends in the rooms allotted. Each student will be provided one steel cot, one chair, one table and one steel almirah with ward robe.

It is not permitted to use electric heater, refrigerator and any such energy consuming appliances in the hostel. Cooking of food items is not permitted inside the hostel premises.

Room Rent:

The room rent per student will be inclusive of room charge, electricity charge and internet charge.

Caution Money:

Each student has to deposit Hostel Caution Money at the time of admission if he / she desires to avail hostel accommodation. The caution money will be refunded after the completion of the programme. In case the student brings any damage to the hostel property, the caution money will be adjusted for repair and the balance amount will be refunded.

Food Arrangement for the Students:

The students may take their breakfast and lunch etc. in the Institute's Canteen.

LAN facilities:

LAN facilities shall be provided to each room in the hostel to provide internet connectivity.

Syllabus of PG Diploma in Mineral Engineering

ME-01 Characterisation of Ores & Minerals and Environmental Studies 3-0-1-4

Mineral Resources: A general recapitulation of mineral resources of India: Geographical distribution and reserves, Mining methods used. Demand, production and employment pattern need and relevance of their beneficiation.

Mineral Optics: Petrological Microscope, its parts and function, Properties of minerals under plane polarized light and in crossed nicols, Behaviour of light in thin sections of rock forming minerals, Pleochroism, birefringence, extinction angles, interference colour.

Mineral Chemistry & Geochemistry: Electron Microprobe Analysis: Principle and technique, Geochemical differentiation and classification of elements, Atomic substitution, isomorphism, polymorphism, geochemical cycle.

Ore Minerals: Definition of ore, gangue, tenor and grade, Liberation study of ore & minerals, Methods of physical and mineralogical characterisation.

Chemical and Instrumental Analysis: Wet assaying of ores of iron, copper, lead, zinc and manganese, Complexometric methods (EDTA titration) of analysis of lime stone/dolomite, Principle of dry assaying process, fire assay methods of gold and silver, Proximate and ultimate analysis of coal, Instrumental methods of investigation: X-ray, DTA/GTA, Spectrometry-atomic absorption, flame photometry, UV,IR spectrophotometry and colorimetry, ICP.

Air and Noise Pollution:

Generation of dust, noise and vibration and associated problems, Methods of abatement of dust and noise pollution.

Water Pollution Problem and Control:

Discharge of effluents to running streams and consequent health hazard, Waste water treatment.

Solid waste utilisation:

Removal of harmful elements from waste for recycling, utilisation and value addition of these wastes, vegetation and cosmetic treatment.

ME-02 Comminution and Classification 3-0-1-4

Crushing; Fundamentals of size reduction, comminution laws, drop shatter tests and shatter index, single particle breakage and packed bed breakage. Primary and secondary crushing - Jaw, Gyratory, Cone, Roll crushers, Hammer mills and Rotary breakers, High compression rolls; their design construction operation maintenance and performance aspects.

Grinding; Grinding mill principles, design constructions and their operations, Mill liners. Open and closed circuit grinding, Ball mill, Rod mill, Pebble mill and Autogenous mills.

Application of these mills for specific processing requirements, Effect of these process parameters on mill performance. Fluid energy mills, Effect of size on liberation, Different methods of particle size analysis and graphical representation. Modelling of comminution process. Recent developments in comminution energy reduction.

Classification; Industrial screening; design, selection, operation and maintenance of different types of industrial screens. Dry and wet screening, Pre-scrubbing and other processes to improve screening efficiency.

Hydrocyclone Classification; construction, operation and maintenance application of different types of classifiers, efficiency, solid and water balance calculations.

ME-03

Separation Processes

3-0-1-4

Gravity Concentration Techniques: Basic principles, processes, ore characteristics required for applying gravity separation techniques, main applications and related problems. Concentration criteria for gravity process.

Jigs: Basic principle of Jigging, types of jigs and their relative merits and demerits for beneficiation metallic and non metallic ores. Variables affecting Jigging, Jigging practice and operation.

Spirals: Spiral concentration principles, types of spirals and their main applications.

Shaking Tables: Principle, role of riffles, different types of tables and their applications.

Heavy Media Separators: Principles of heavy media separation, dense medium, types of separators, laboratory heavy liquid test, efficiency of dense medium separator, Organic efficiency.

Advanced Gravity Separators: Multi Gravity Separators (MGS), Floatex Density Separator, Knelson Concentrator, Falcon Concentrator - their mechanism of operation and circuit configurations.

General flowsheets involving gravity separation for different minerals.

Coal preparation techniques for both coking and non coking coals. Washability characteristics. Flowsheets for different coals.

Magnetic and Electrostatic Separation Techniques: Magnetic Separators - principle of magnetic separation, dry magnetic separators, wet high intensity magnetic separators (WHIMS), high gradient magnetic separators (HGMS), super conducting magnetic separators and their applications in mineral industries.

Electrostatic Separators; Principle of electrostatic separation, types of separators and their application.

Flotation: Introduction, principle of flotation, history, flotation science and engineering. Surface chemistry, particle surface and its modification, surface energy of mineral and coal particles, surface activation, solubility of minerals in water, reaction between mineral surface and dissolved components, molecular adsorption, ionic adsorption, specific adsorption, surface wettability and contact angle, zeta potential, adsorption of reagents, floatability test of minerals, mineralization of air bubbles in flotation, formation of gas bubbles on a mineral particles, combined bubble attachment to a mineral surface, bubble-particle interaction, aeration and froth formation, types of froth and stability of froth.

Flotation reagents for minerals and coal: Collector, frother, activator, depressant, dispersant, wetting reagents and pH regulator.

Factors affecting flotation: Effect of mineralogical characteristics, effect of petrography constituents of coal, effect of particle size and shape, effect of pulp density, effect of pulp temperature, effect of composition of process water, effect of reagent dosage, effect of feed rate and effect of slimes.

Flotation kinetics and release analysis.

Flotation practice and machines: Flotation process, pulp preparation, conditioning, aeration, different types of flotation cells, factors affecting the size of the flotation cell, determination of number of cells and size, auxiliary flotation equipment and design of flotation circuit.

Column flotation: Introduction, basic design and operation, effect of design and process variables, advantages over the flotation cell and hydrodynamics study by axial dispersion model.

Rheology: Fundamentals, effect of surface properties, effect of particle and fluid properties, effect of chemical additives and its application.

Flocculation: Mass flocculation, selective flocculation, sedimentation and design of thickener.

Filtration: Principle of filtration, effect of surfactants in filtration process, types of filtration equipment.

Brief introduction on characterisation, beneficiation of Indian iron ores, basic conceptual commercial process flowsheet development, Agglomeration process like briquetting, sintering and pelletisation, brief description on briquetting and sintering

Introduction to pelletization: world scenario, resources and production, deposits, production and demand for iron and steel, Concept of pelletization process: raw materials and their preparation (iron ore, binder, additives, preparation), formation of green pellets, mechanisms of green pellet formation and growth; Pelletization systems: equipments used in pelletizing plants, heating systems, design, technology selection, capacity limitation for different technologies and pellet production; Pelletization kinetics: Effect of water content, bentonite and degree of fineness on pelletization kinetics and physical properties of pellets produced,

granulation time; Heating cycle: Calculation of heat consumption, mathematical calculation based on case studies. Hardening of green pellets: Drying, preheating, induration and cooling; Pellet properties: size, morphology, strength, variables affecting the strength of the pellets, shatter index, tumbler index, abrasion index, porosity and reducibility.

Direct reduction of iron ore pellet: kinetic study at different conditions and quantity of reductants; characterization of metallization of pellets using different techniques. Mathematical calculation on energy consumption based on case studies.

ME-06 Design, Simulation and Optimisation of Mineral Processing Plants 3-0-1-4

Description of beneficiation processes of different types of ores like iron ore, coal, sulphide ores etc.; development of conceptual process flowsheet; material and energy balance. Design of mineral processing equipment: tumbling mill, hydrocyclone, vibrating screen, pump box, flotation cell, flotation column, thickener and filtration unit.

Elementary discussion on simulation and modeling of processes; simulation of the processes using MODSIM, UCMAC simulators, numerical analysis of simulation, sequential method of simulation, practical application of plant optimization.