STATE COUNCIL OF TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA

TEACHING AND EVALUATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES

DISCIPLINE: METALLURGY ENGINEERING						**SEMESTER: 3RD**						
SL NO	**SUBJECT CODE**	**SUBJECT**	**PERIODS**			**EVALUATION SCHEME**						
			L	**T**	**P**	**INTERNAL EXAM**			**END SEM EXAM**	**TERM WORK**	**PRACTICAL EXAM**	**TOTAL MARKS**
						TA	**CT**	**Total**				
THEORY												
1.	MTT 301	ELEMENTARY MECHANICAL ENGINEERING	4	-	-	10	20	30	70			100
2.	ETT 321	APPLIED ELECTRONICS AND CONTROL	4	-	-	10	20	30	70			100
3.	MTT 302	MINERAL DRESSING	5	-	-	10	20	30	70			100
4.	MTT 303	FUELS & REFRACTORIES	4	-	-	10	20	30	70			100
5.	MTT 304	MATERIAL TESTING	4	-	-	10	20	30	70			100
PRACTICAL/TERM WORK												
6.	MTP 301	MATERIAL TESTING LAB.	-	-	6	-	-		-	50	50	100
7.	MTP 302	MINERAL PROCESSING LAB	-	-	6	-	-		-	50	50	100
8.	ETP 331	APPLIED ELECTRONICS AND CONTROL LAB	-	-	6	-	-		-	25	25	50
GRAND TOTAL			**21**		**18**	**40**	**100**	**150**	**350**	**125**	**125**	**750**

Total Contact hours per week: 39
Abbreviations: L-Lecture, T-Tutorial, P-Practical, TA- Teacher's Assessment, CT- Class test
Minimum Pass Mark in each Theory Subject is 35% and in Practical subject is 50%

ELEMENTARY MECHANICAL ENGINEERING

Name of the Course: **Diploma in Metallurgy Engineering**

Course code:	MTT 301	Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Tutorial:	0	Teacher's Assignment:	10
Maximum marks:	100	End Semester Examination:	70

RATIONALE:

Metallurgical Engineering is intimately related with certain areas of mechanical engineering. It is therefore, essential for a metallurgical engineer to have basic knowledge of mechanical engineering.

OBJECTIVES:

On completion of this subject, students will have basic understanding of the major fields of mechanical engineering like Mechanisms, Machines, Thermodynamics and Heat Engines, Machine Tools and Maintenance Engineering.

DISTRIBUTION OF PERIODS	**PERIODS**
Unit - 1 Shear Force and Bending Moment	7
Unit - 2 Simple Mechanism	6
Unit - 3 Belt Rope and Chain Drive	9
Unit - 4 Heat and Work	6
Unit - 5 Steam Generator	7
Unit - 6 I. C. Engine	7
Unit - 7 R. A. C.	9
Unit – 8 Machine and Machine Tools	9
TOTAL:	**60**

COURSE CONTENTS:

1.0 SHEAR FORCE AND BENDING MOMENT

1.1 Define shear force and bending moment

1.2 Construct shear force and bending moment diagram of cantilevers, simple supported beam with point load and uniformly distributed load.

1.3 Determine stress and deflections of loaded beams

2.0 SIMPLE MECHANISM

2.1 Define machine, mechanism, kinematics, link, kinematics pair, kinematics chain

2.2 Illustrate four – bar linkage, crank – connecting rod, quick return mechanism

2.3 Understand function of a cam and cam follower

3.0 BELT ROPE AND CHAIN DRIVE

3.1 Determine the length of open belt drive

3.2 Determine the ratio of tensions and power transmitted by belt drive

3.3 Discuss advantage of rope and chain drive

3.4 State working principle of simple breaks and dynamo meters

3.5 Define and classify bearings (bush and anti-friction)
3.6 Explain function of fly wheel and governors

4.0 HEAT AND WORK

4.1 Define heat and work and derive inter – relationship
4.2 Determine work done by compression and expansion of gases
4.3 Explain properties of steam (sensible, latent heat & dryness fraction)
4.4 Discuss use of steam tables.

5.0 STEAM GENERATOR

5.1 Explain the mechanism of the boiler
5.2 Define fire tube, water tube, crank, crank shaft
5.3 Define IHP, BHP and mechanical efficiency
5.4 Define and classify steam turbines (impulse and reaction type)

6.0 I. C. ENGINE

6.1 Define and classify internal combustion (I.C.) engine
6.2 Explain Otto and Diesel cycles
6.3 Explain and compare 2 stroke and 4 stroke and I.C. engine
6.4 Define IHP, BHP and mechanical efficiency of I.C. engines

7.0 R. A. C.

7.1 Define Refrigeration and Air – conditioning and state various application
7.2 Explain simple vapour compression refrigeration system
7.3 Explain function and working principle of a gas compressor
7.4 State types of refrigerants and explain their properties
7.5 Describe the basic concept of air – conditioning with reference to a room air conditioner

8.0 MACHINE AND MACHINE TOOLS

8.1 Define machine tools
8.2 Describe different machine tools and their functions (lathe, drill, shaper, milling machine and grinding machine)
8.3 Describe types of maintenance (breakdown, preventive, planned)

Learning Resources:

Text Books

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	R. S. Khurmi	Applied Mechanics	
2	P. L. Ballenny	Engineering Thermodynamics	
3	P. L. Ballenny	Refrigeration and Air – Conditioning	Khanna Publication
4	R. S. Khurmi	Theory of Machine	S Chand
5	O. P. Khanna	Industrial Engineering and Management	Dhanpatrai
6	Hazra Chaudhury	Elements of Workshop Technology (Vol . I & II)	Media Promoters & Publications

APPLIED ELECTRONICS AND CONTROL

Name of the Course: Diploma in Metallurgy Engineering

Course code:	ETT 321	Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Tutorial:	0	Teacher's Assignment:	10
Maximum marks:	100	End Semester Examination:	70

RATIONALE:

This state of the metallurgical plants and equipment require a precision control over all the process parameters. So most of the metallurgical equipments are equipped with electronics sensor and control systems. A little malfunctioning of these electronics sensor may lead to deliver a futile situation and result in the worthless products. Hence it has become essential to acquire basic knowledge about all these electronic control systems. This paper will enlighten the student of the III semester diploma about the principle, working and uses of electronic sensors and devices.

OBJECTIVES:

On completion of course the student will be able to develop understanding and uses of

1. Special semiconductor devices
2. Opto- electronics devices
3. Regulated power supply
4. Principle of digital electronics
5. Sensors and transducers
6. Microprocessor
7. PLC

DISTRIBUTION OF PERIODS			**PERIODS**
Unit - 1	Special semiconductor devices		6
Unit - 2	Opto - electronics devices		3
Unit - 3	Regulated power supply		9
Unit - 4	Principle of digital electronics		8
Unit - 5	Sensors and transducers		15
Unit - 6	Microprocessor		12
Unit - 7	PLC		7
		TOTAL:	60

COURSE CONTENT

UNIT-1 Special Semiconductor Devices

Explain characteristics and principle of operation and applications of

1.1 FET

1.2 MOSFET

1.3 UJT
1.4 SCR
1.5 TRIAC
1.6 DIAC

UNIT-2 Opto – Electronics Devices

Explain the operation and use of

2.1 LED
2.2 LCD
2.3 Opto – Coupler
2.4 LASER

UNIT-3 Regulated Power Supply

1.1 Explain the function of ordinary DC power supplier
1.2 Classified different unit of DC series voltage regulators
- 1.2.1 Sampling Units
- 1.2.2 Reference Units
- 1.2.3 Comprising Units
- 1.2.4 Amplifier units
- 1.2.5 Control units
- 1.2.6 Complete series and shunt voltage regulator

1.3 Explain the operation of switching mode power supply (AC, DC)

UNIT-4 Principles of Digital Electronics

1.1 Explain types of Flip-Flop and its use
1.2 Describe briefly about memory element
1.3 Explain the function of shift registers
1.4 Describe the function and use of MOD-10 and ring counter

UNIT - 5 Sensors and Transducers :

5.1 Describe sensors for sensing pressure, temperature, moisture, humidity, flow, level
1) Explain temperature measurement using resistance, thermometer, thermocouple, thermister.
2) Explain pressure measurement using manometer, U-tube, Elastic type, pressure gauge (Bourdon tube, diaphragm, bellows etc.)
3) Classification of flow – meter, variable heat flow meter, principle of operation, advantage and disadvantage of orifice plate, venture tube, nozzles.

1.2 Describe the function of Limit Switch, Proximity, Switch, Alarm annunciation and its use

UNIT - 6 Microprocessor

6.1 Describe introduction to Intel 8085
6.2 Explain register organization of 8085
6.3 State instruction Sets of 8085
6.4 Describe assembly language concepts

6.5 Explain preparation small programmes using 8085

i) Data Bus
ii) Address Bus
iii) Control Bus
iv) Interrupt Time
v) Multi – Planning busses

UNIT - 7 PLC

7.1 Explain basic structure and operation of PLC
7.2 Describe simple ladder logic
7.3 Right simple ladder programme (implement only OR,AND,NOR &NAND logic)

Learning Resources:

Text Books

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	J Millman, Christos C. Halkius	Integrated Electronics, Analog and digital systems	Tata McGraw Hill
2	Motor Shed	Electronic Devices and Circuit	PHI
3	G. K. Mithal	Electronic Devices and Circuits	Kalyani Publishers
4	Rashid	Power Electronics	PHI
5	Doughlas V Hall	Digital circuits and system	Tata McGraw Hill
6	R K Gour	Digital Electronics	Dhanpatrai
7	Mano	Digital System Design	
8	Gaonkar	Microprocessor	
9	B. Ram	Microprocessor	Dhanpatrai
10	Paul B. Zaber	Industrial Electronics	
11	S. Khedhar	Mechanical Measurement & Measuring Circuit	
12	Nakara Choudhary	Instrumentation	Tata McGraw Hill
13	S. N. Biswas	Industrial Electronics	Dhanpatrai
14	R. K. Jain	Mechanical and Industrial Measuring Circuit	Khanna Publishers
15	Fibrace	Industrial Instrumentation	
16	A. K. Sawhney	Electrical and Electronic Instrumentation	Dhanpatrai
17	G. K. Mithal	Industrial Electronics	Khanna Publishers
18	P. C. Sen	Thyristors	

MINERAL DRESSING

Name of the Course: Diploma in Metallurgy Engineering

Course code:	MTT 302	Semester	3rd
Total Period:	75	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Tutorial:	1P/week	Teacher's Assignment:	10
Maximum marks:	100	End Semester Examination:	70

RATIONALE:

Ores and minerals are the sources of all metals and alloys. Ores and minerals, as available in nature are mixed with various other substances and of odd sizes which are not suitable for various extraction processed. Useable quality and size of ores / minerals are obtained by different process called mineral dressing. Thus this subject is of great important in the study of metallurgy.

OBJECTIVES:

After the completion of the course students should have the idea about the following:

2. Ores and minerals of the metals and their resources.
3. Size reduction operation of the minerals
4. Concentration methods based on the different physical and chemical / surface properties of ores.

TOPIC WISE DISTRIBUTION OF PERIODS

SL.NO.	TOPIC	PERIODS
1.	Various Mineral Resources in India	3
2.	Crushing	25
3.	Grinding	7
4.	Laboratory Sizing	6
5.	Industrial Screening Classification	6
6.	Gravity Concentration	8
7.	Heavy Media Separation	6
8.	Flotation	8
9.	Magnetic and Electrostatic Separators	6
	Total:	75

COURSE CONTENT:

1.0 List various mineral resources in India

2.0 Unit Operations : Ore dressing :

- 2.1 Explain the Scope and Objectives of ore dressing
- 2.2 Explain the different physical & chemical properties of ores with their application to mineral dressing
- 2.3 Describe crushing operations
- 2.4 Explain the types of crushers : Blake and Dodge jaw crushers
- 2.5 Describe capacity and reduction ratio of crusher

2.6 Explain angle of nip of a crusher
2.7 Explain in details gyratory and roll crushers
2.8 Explain the principle of operation of gyratory and roll crushers

3.0 Grindings :

3.1 Classify different types of grinding equipment : ball mill
3.2 Explain the ball mill operations
3.3 State the difference between open circuit and close circuit grinding
3.4 State the difference between dry grinding and wet grinding

4.0 Laboratory Sizing Technique :

4.1 Explain the methods of size analysis
4.2 Describe different types of standard screens with screening techniques
4.3 Explain in details Rotap sieve shaker

5.0 Industrial Screening :

5.1 Explain the principle of screening
5.2 Classify types of screening
5.3 Explain the effectiveness, capacity, efficiency of Industrial screens
5.4 Explain different types of classifiers and their applications

6.0 Gravity Concentration :

6.1 Describe the general principles of flowing film concentration
6.2 Describe in details the operations and application of wilfley table
6.3 Define jigging
6.4 Describe the factors affecting stratification in jigs
6.5 Explain the types of jigs and their uses

7.0 Heavy Media Separations :

7.1 Explain the fundamental principle of heavy media separations
7.2 Explain the different industrial process using heavy liquid and heavy suspensions, Du - Pont process, chance process

8.0 Flotation :

8.1 Define are froth and skin flotation
8.2 Explain the elementary principle of froth flotation
8.3 Explain the practical utility of frother, collector, modifier, activators, depressant (without physic – chemical Principle)
8.4 Describe the application with practical examples of froth flotation process
8.5 Describe different types of flotation cells

9.0 Magnetic & Electrostatic Separator :

9.1 Explain the principles of magnetic and Electrostatic separator with their application to mineral dressing

Learning Resources:

Text Books

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	Gaudin A. M	Principle of Mineral Dressing	Tata McGraw Hill
2	H. S. Roy, Shridhar & Abrahom	Non – Ferrous Metallurgy	EWP
3	A. E. Taggart	Hand book of Mineral / dressing Ores & Minerals	
4	B. A. Wills	Mineral Processing Technology	
5	C.Mohapatra,JJTP,Bhubaneswar	Fundamentals of Mineral Dressing	JJTP

FUELS AND REFRACTORIES

Name of the Course: Diploma in Metallurgy Engineering

Course code:	MTT 303	Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Tutorial:	0	Teacher's Assignment:	10
Maximum marks:	100	End Semester Examination:	70

RATIONALE:

For different metallurgical processes starting from extraction of metals from ores down to shaping and treating of metals, heating is an essential operation for which fuel is used. To allow all these thermal processes in a furnace, use of refractory is a must to contain heat and protect the furnace structure. Study of fuels and refractories is thus a very important topic in Metallurgy.

OBJECTIVES:

After completion of this subject students will have knowledge about solid, liquid and gaseous fuels. He will acquire idea about the manufacturing process and uses of the above fuels. They will also acquire idea about Refractories as these Refractories are essential for metallurgical furnaces. On completion of study the students will have knowledge about fuels and refractories.

TOPIC WISE DISTRIBUTION OF PERIODS

SL.NO.	TOPIC	PERIODS
1.	Fuels	4
2.	Solid Fuels	12
3.	Liquid Fuels	10
4.	Gaseous Fuels	10
5.	Combustion	8
6.	Refractories	8
7.	Special Refractories	3
8.	Selection of Refractories	5
	Total:	60

COURSE CONTENT

1.0 Fuels :

- 1.1 Define the Fuel
- 1.2 Classify the types of fuel
- 1.3 State the importance of Solid, Liquid and Gaseous fuels

2.0 Solid Fuels :

- 2.1 COAL :
  - I. Explain the origin of coal
  - II. State the composition of coal
  - III. Discuss the characteristics and significance of constituents
  - IV. Distinguish between proximate and ultimate analysis

V. Define the calorific value of coal

2.2 COKE :

II. Discuss the scope and objectives of carbonization of coal
III. Explain the carbonization of coal
IV. Differentiate between high temperature carbonization and low temperature carbonization
V. State the merits and demerits of H.T.C and L.T.C
VI. Discuss the criteria of selection of metallurgical coal

2.3 Coke Testing

I. Define and explain shatter and mecum index

3.0 Liquid Fuels

I. Explain origin and constitution of petroleum
II. Discuss the properties of petroleum products
III. Discuss the distillation process of crude petroleum
IV. Explain the production and uses of coal tar.

3.1 Testing of liquid Fuels:

I. Define specific gravity, viscosity, flash point, cloud point & pour point, aniline point, octane number and cetane number.
II. Discuss the methods of testing of following properties:

Specific gravity, viscosity, flash point, cloud point and pour point

4.0 Gaseous Fuels

Explain the production and utilization of following gaseous fuels:
Methane, water gas, producer gas, carbureted water gas, coke oven gas, blast furnace gas, natural gas, mixed gas.

5.0 Combustion

I. Discuss the elementary principle of combustion, Hess's law of constant heat summation, Kirchoff's law.
II. Work out simple combustion calculation.

6.0 Refractories :

I. Classify different types of Refractories basing on acid, base and neutral
II. Explain the desirable properties of Refractories in details
III. Discuss the raw – materials, methods of manufacturing and properties of silica, fire clay, magnesia, dolomite, chrome magnesite, graphite and magnesia carbon bricks.

7.0 Special Refractories

Discuss about the special refractories like high alumina, mullite, SIC, Zirconia

8.0 Give criteria for selection and types of refractories selected for blast furnace, L.D., open hearth, arc furnace, ladle, soaking pit, coke oven, reheating furnaces, copper smelting flash and reverberatory furnaces.

Learinig Resourses:

Text Books

Sl.No	**Name of Authors**	**Title of the Book**	**Name of the publisher**
1	Cheisty	Refractories	
2	M. L. Mishra	Refractories	
3	Gill Christ	Refractories	
4	Samir Sankar	Fuels & Combustion	
5	Himus	Fuels	

MATERIAL TESTING

Name of the Course: Diploma in Metallurgy Engineering

Course code:	MTT 304	Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4P/week	Class Test:	20
Tutorial:	0	Teacher's Assignment:	10
Maximum marks:	100	End Semester Examination:	70

RATIONALE:

Selection and use of various metals and alloys depend on their mechanical properties. Mechanical properties largely depend on various metallurgical processes these materials undergo. It is important for a metallurgical engineer to understand and measure these mechanical properties.

OBJECTIVES:

On completion of course the student will have thorough knowledge and basic skill of measuring different mechanical strengths like tensile strength, fatigue strength, creep strength, impact strength and also different hardness values. They will also have knowledge about different non- destructive test, pyrometers, thermocouples etc.

TOPIC WISE DISTRIBUTION OF PERIODS

SL.NO.	TOPIC	PERIODS
1.	Hardness Test	10
2.	Tensile Test	10
3.	Impact Test	6
4.	Fatigue Test	8
5.	Creep Test	6
6.	Non – destructive Testing	14
7.	Temperature Measurement and Calibration	6
	Total:	60

COURSE CONTENT:

1.0 Hardness Test

- 1.1 Explain and derive expressions for Brinell, Vickers and Rockwell hardness test
- 1.2 Discuss rebound hardness with reference to shore's Scleroscope.
- 1.3 Describe scratch hardness and explain mho's scale.
- 1.4 Discuss the imperical relationship of hardness with strength.

2.0 Tensile Test :

- 2.1 Draw and explain stress-strain curve
- 2.2 Explain modulus of elasticity, proof stress
- 2.3 Discuss with sketch about yield point phenomenon.
- 2.4 Explain true stress and true strain curve.
- 2.5 Define ductility and toughness

3.0 Impact Test:

3.1 Define impact strength

3.2 Discuss about Charpy and Izod impact tests

3.3 Discuss about transition temperature and ductility, brittle fracture

4.0 Fatigue Test:

4.1 Explain different stress cycles

4.2 Describe S.N curve and endurance limit

4.3 Explain the procedure of fatigue testing and fatigue testing machine

4.4 Mention different metallurgical factors that affect fatigue behavior

5.0 Creep Test:

5.1 Define creep and its importance

5.2 Discuss engineering creep curve, constant stress creep curve and Andrade concept

5.3 Explain equicohesive temperature

5.4 State various factors that affect creep

5.5 Describe creep testing machine

5.6 Describe stress rupture test

6.0 Non – destructive Testing:

6.1 Discuss the scope and elementary idea about different NDT and their significance

6.2 Give brief description of the following NDT

(a) Visual testing

(b) Leakage test

(c) Magnetic particle testing

(d) Dye penetration test

(e) Acoustic methods and ultrasonic testing

(f) Eddy current testing

(g) X – ray diffraction

7.0 Temperature Measurement and Calibration:

7.1 Analysis the basic principle of pyrometry

7.2 Explain different types of pyrometer and thermocouples.

Learning Resources:

Text Books

Sl.No	Name of Authors	Title of the Book	Name of the publisher
1	Surya Narayan	Testing of Metallic Material	
2	Deiter	Mechanical Metallurgy	Tata McGraw Hill
3	Avner	Introduction to Physical Metallurgy	Tata McGraw Hill
4	BD Culity	X – ray diffraction	
5	V. T. Cherepis & A. K. Mallick	Experimental Technique in Physical Metallurgy	
6	C.Mohapatra	Mechanical Testing Of Enginering Materials	JJTP,Bhubaneswar

APPLIED ELECTRONICS AND CONTROL LABORATORY

Name of the Course: Diploma in Metallurgy Engineering

Course code:	ETP 321	Semester	3rd
Total Period:	90	Examination	4 hrs
Lab. periods:	6 P / week	Term Work	25
Maximum marks:	50	End Semester Examination:	25

(Student are required to perform at least five experiments)

1.1 Implementation of AND, OR, NAND, NOR, XOR, NOT gate and verification of truth table
1.2 Verification of R-S flip- flop and J-K flip-flops
1.3 Verification of performance of Mod-10 Counter
1.4 4-bit up/ down counters
1.5 Study of 8085 based Microprocessor kit
1.6 Simple programs using 8085 Microprocessor kit
1.7 Study the performance of electronic on-off temperature controller

MATERIAL TESTING LABORATORY

Name of the Course: **Diploma in Metallurgy Engineering**

Course code:	ETP 301	Semester	3rd
Total Period:	90	Examination	4 hrs
Lab. periods:	6 P / week	Term Work	50
Maximum marks:	100	End Semester Examination:	50

(Student are required to perform atleast seven experiments)

1. Study the operation of different hardness testers such as Brinell, Rockwell & Vickers hardness testers.
2. Determination of BHN of metals & alloys
3. Determination of VHN of metals & alloys
4. Determination of RB & RC hardness values for metals & alloys
5. Study of Microhardness tester.
6. Study the operation of impact tester
7. Determination of impact value of a steel specimen by Charpy & Izod machine
8. Study of fatigue testing machine and determination of fatigue limits
9. Study of U.T.M. & determination of tensile & compression strength values.
10. Study the operation of NDT equipment such as ultrasonic flow detector & magnetic crack detector
11. Inspection of defects by above equipment (UFD or MCD)
12. Measurement of temperature by pyrometer & thermo-couples

LIST OF EQUIPMENTS:

1. Brinell hardness tester ---------- 02nos.
2. Rockwell hardness tester ---------- 02nos.
3. Vickers hardness tester ---------- 02nos.
4. Charpy impact tester ---------- 02nos.
5. Izod impact tester ---------- 01nos.
6. Fatigue testing m/c ---------- 01nos.
7. Universal testing m/c ---------- 01nos.
8. Magnetic particle tester kit ---------- 01nos.
9. Ultrasonic flow detector ---------- 01nos.
10. Optical pyrometer ---------- 02nos.
11. Thermocouple (with accessories potentio meter) -------- 02nos.

12. Microhardness Tester ---------- 1 no

RECOMMENDED BOOKS

1. Testing of Engineering Materials
2. Practical Experimental Metallurgy by Rawlings

MINERAL PROCESSING LABORATOTY

Name of the Course: Diploma in Metallurgy Engineering

Course code:	MTP 302	Semester	3rd
Total Period:	90	Examination	4 hrs
Lab. periods:	6 P / week	Term Work	50
Maximum marks:	100	End Semester Examination:	50

11.1 Crushing:
- (i) Reduction Ratio
- (ii) Determination of capacity

11.2 Grinding:
- (i) Grinding Index
- (ii) Performance of Ball Mill

11.3 Screening & size analysis
11.4 jigging
11.5 Fabling
11.6 Flotation
11.7 Magnetic separation
11.8 Electrostatic separation

LIST OF EQUIPMENT:

1. Jaw crusher----------01no.
2. Ball mill with media ----------01no.
3. Sieve shaker with set of sieves ---------01set.
4. Jigging m/c ----------01no.
5. Wilfley table ----------01no.
6. Flotation cell ----------01no.
7. Magnetic separator ----------01no.
8. Electrostatic separator ----------01no.
9. Disc Pellettizer ---------- 01no
10. Pulverizer ----------01no.