CURRICULLUM OF 3RD SEMESTER

For

DIPLOMA IN AIRCRAFT MAINTENANCE ENGINEERING

(Effective FROM 2021-22 Sessions)

STATE COUNCIL FOR TECHNICAL EDUCATION & VOCATIONAL TRAINING,

ODISHA, BHUBANESWAR

STATE COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING, ODISHA									
TEACHING AND EVALUATION SCHEME FOR 3rd Semester (AME)(wef 2019-20)									
Subject Number	Subject Code	Subject	Periods/week			Evaluation Scheme			
			L	T	P	Internal Assessment/ Sessional	End Sem Exams	Exams (Hours)	Total
		Theory							
Th.1		Production Technology	4		-	20	80	3	100
Th.2		Strength of Material	4		-	20	80	3	100
Th.3		Engineering. Material	4		-	20	80	3	100
Th.4		Thermal Engineering-I	4			20	80	3	100
Th.5		Environmental studies	4			20	80	3	100
		Total	20			100	400	-	500
		Practical							
Pr.1		Mechanical Engg. Drawing	-	-	6	25	50	3	75
Pr.2		Mechanical Engg. Lab-I	-	-	4	25	50	3	75
Pr.3		Workshop-II	-	-	6	50	50	4	100
Pr.4									
		Student Centred Activities(SCA)		-	3	-	-	-	-
		Total	-	-	*19*	*100*	*150*	-	*250*
		Grand Total	**20**	**-**	**19**	**200**	**550**	**-**	**750**
Abbreviations: L-Lecturer, T-Tutorial, P-Practical . Each class is of minimum 55 minutes duration									
Minimum Pass Mark in each Theory subject is 35% and in each Practical subject is 50% and in Aggregate is 40%									
SCA shall comprise of Extension Lectures/ Personality Development/ Environmental issues /Quiz /Hobbies/ Field visits/ cultural activities/Library studies/Classes on MOOCS/SWAYAM etc. ,Seminar and SCA shall be conducted in a section.									
There shall be 1 Internal Assessment done for each of the Theory Subject. Sessional Marks shall be total of the performance of individual different jobs/ experiments in a subject throughout the semester									

Th-1 PRODUCTION TECHNOLOGY

Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/W	I.A	20
Maximum marks:	100	End Semester Examination:	80

Rationale:

Production Technology involves a working knowledge in the field of product design, product development and rapid part production. It deals with the production methodology and its management to make a complete analysis on the products.

Course Objectives:

At the end of the course the students will be able to

1. Understand the different components and processes involved in press tool operation.
2. Understand how to minimize the job setting and tool setting times in mass production.
3. Understand the industrial requirements of fabrication systems.
4. Understand the manufacturing processes like casting and powder metallurgy.

Chapter wise distribution of periods

Sl. No.	Topic	Periods
01	Metal Forming Processes	07.
02	Welding	16
03	Casting	16
04	Powder Metallurgy	07
05	Press Work	07
06	Jigs and fixtures	07
07	**Total Period:**	60

1.0 Metal Forming Processes

1.1 Define Extrusion. Classify it.
1.2 Explain direct, indirect and impact extrusion process.
1.3 Define rolling. Classify it.
1.4 Differentiate between cold rolling and hot rolling process.
1.5 List the different types of rolling mills used in Rolling process.

2.0 Welding

2.1 Define welding and classify various welding processes.
2.2 Explain fluxes used in welding.
2.3 Explain Oxy-acetylene welding process.
2.4 Explain various types of flames used in Oxy-acetylene welding process.
2.5 Explain Arc welding process.
2.6 Specify arc welding electrodes.
2.7 Define resistance welding and classify it.
2.8 Describe various resistance welding processes such as butt welding, spot welding, flash welding, projection welding and seam welding.
2.9 Explain TIG and MIG welding process
2.10 State different welding defects with causes and remedies.

3.0 Casting

3.1 Define Casting and Classify the various Casting processes.
3.2 Explain the procedure of Sand mould casting.
3.3 Explain different types of molding sands with their composition and properties.
3.4 Classify different pattern and state various pattern allowances.

3.5 Classify core.
3.6 Describe construction and working of cupola and crucible furnace.
3.7 Explain die casting method.
3.8 Explain centrifugal casting such as true centrifugal casting, centrifuging with advantages, limitation and area of application.
3.9 Explain various casting defects with their causes and remedies.

4.0 Powder Metallurgy

4.1 Define powder metallurgy process.
4.2 State advantages of powder metallurgy technology technique
4.3 Describe the methods of producing components by powder metallurgy technique.
4.4 Explain sintering.
4.5 Economics of powder metallurgy.

5.0 Press Work

5.1 Describe Press Works: blanking, piercing and trimming.
5.2 List various types of die and punch 7
5.3 Explain simple, Compound & Progressive dies
5.4 Describe the various advantages & disadvantages of above dies

6.0 Jigs and fixtures

6.1 Define jigs and fixtures
6.2 State advantages of using jigs and fixtures
6.3 State the principle of locations
6.4 Describe the methods of location with respect to 3-2-1 point location of rectangular jig
6.5 List various types of jig and fixtures.

Syllabus coverage up to internal examination-chapters 1,2,3&4.

Learning Resources

Sl. No.	Author	Title of the book	Publisher
01	O.P. Khanna	Production Technology, Vol- I& II	Dhanpat Rai Publication
02	B.S Raghuwanshi	Workshop technology, Vol- I& II	Dhanpat Rai & Co
03	P.N. Rao	Manufacturing technology, Vol- I&II	TMH
04	P.C.Sharma	Manufacturing technology, Vol- I	S. Chand

Th-2STRENGTH OFMATERIAL

Name of the Course: Diploma in **MECHANICAL ENGINEERING**			
Coursecode:		Semester	3rd
TotalPeriod:	60	Examination	3 hrs
Theoryperiods:	4 P/W	I.A TEST	20
Maximummarks:	100	End Semester Examination:	80

Rationale:

Strength of material deals with the internal behaviors of solid bodies under the action of external force. The subject focuses on mechanical properties of material analysis of stress, strain and deformations. Therefore it is an important basic subject of students for Mechanical and Automobile Engg.

COURSE OBJECTIVES:

Students will develop ability towards

- Determination of stress, strain under uniaxial loading (due to static or impact load and temperature) in simple and single core composite bars.
- Determination of stress, strain and change in geometrical parameters of cylindrical and spherical shells due to pressure
- Realization of shear stress besides normal stress and computation of resultant stress in two dimensional objects.
- Drawing bending moment and shear force diagram and locating points in a beam where the effect is maximum or minimum.
- Determination of bending stress and torsional shear stress in simple cases
- Understanding of critical load in slender columns thus realizing combined effect of axial and bending load.

Chapter wise distribution of periods

Sl. No.	Topic	Periods
01	Simple Stress & Strain	10
02	Thin cylindrical and spherical shell under internal pressure	08
03	Two dimensional stress systems	10
04	Bending moment& shear force	10
05	Theory of simple bending	10
06	Combined direct & Bending stresses	06
07	Torsion	06
	Total Period:	60

1.0 Simple stress& strain

1.1 Types of load, stresses & strains,(Axial and tangential) Hooke's law, Young's modulus, bulk modulus, modulus of rigidity, Poisson's ratio, derive the relation between three elastic constants,

1.2 Principle of super position, stresses in composite section

1.3 Temperature stress, determine the temperature stress in composite bar (single core)

1.4 Strain energy and resilience, Stress due to gradually applied, suddenly applied and impact load

1.5 Simple problems on above.

2.0 Thin cylinder and spherical shell under internal pressure

2.1 Definition of hoop and longitudinal stress, strain

2.2 Derivation of hoop stress, longitudinal stress, hoop strain, longitudinal strain and volumetric strain

2.3 Computation of the change in length, diameter and volume

2.4 Simple problems on above

3.0 Two dimensional stress systems

3.1 Determination of normal stress, shear stress and resultant stress on oblique plane

3.2 Location of principal plane and computation of principal stress

3.3 Location of principal plane and computation of principal stress and Maximum shear stress using Mohr's circle

4.0 Bending moment& shear force

4.1 Types of beam and load

4.2 Concepts of Shear force and bending moment

4.3 Shear Force and Bending moment diagram and its salient features illustration in cantilever beam, simply supported beam and over hanging beam under point load and uniformly distributed load

5.0 Theory of simple bending

5.1 Assumptions in the theory of bending,

5.2 Bending equation, Moment of resistance, Section modulus& neutral axis.

5.3 Solve simple problems.

6.0 Combined direct & bending stresses

6.1 Define column

6.2 Axial load, Eccentric load on column,

6.3 Direct stresses, Bending stresses, Maximum& Minimum stresses. Numerical problems on above.

6.4 Buckling load computation using Euler's formula (no derivation) in Columns with various end conditions

7.0 Torsion

7.0 Assumption of pure torsion

7.1 The torsion equation for solid and hollow circular shaft

7.2 Comparison between solid and hollow shaft subjected to pure torsion

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	S Ramamrutham	Strength of Materials	Dhanpat Rai
02	R K Rajput	Strength of Materials	S.Chand
03	R.S khurmi	Strength of Materials	S.Chand
04	G H Ryder	Strength of Materials	Mcmillon and co. lmtd
05	S Timoshenko and D H Young	Strength of Materials	TMH

ENGINEERING MATERIALS (THEORY-3)

Name of the Course: Diploma in **MECHANICAL ENGINEERING**			
Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/week	IA	20
Maximum marks:	100	End Semester Examination:	80

RATIONALE:

Entire field of engineering deals with use of host of materials for making objects for human need. These materials include wide spectrum of element, metals, alloys and compounds with diverse properties. It is imperative that an engineer from any field should have a good knowledge of such materials and their properties.

COURSE OBJECTIVES:

After completion of the course students will have the ability of

- Realizing material requirements
- Realizing application area of ferrous, non ferrous and alloys
- Comprehending micro-structural changes during iron-carbon phase transformation process
- Comprehending effect of heat treatment and its effect towards change in material properties
- Comprehending continuity during evolution in engineering materials and development of modern engineering materials.

Chapter wise distribution of periods

Sl. No.	Topic	Periods
01	Engineering materials and their properties	05
02	Ferrous Materials and alloy	05
03	Iron – Carbon system	08
04	Crystal imperfections	10
05	Heat Treatment	10
06	Non-ferrous alloys	10
07	Bearing Material	03
08	Spring materials	03
09	Polymers	03
10	Composites and Ceramics	03
11	**Total Period:**	60

Course Content:

1.0 Engineering materials and their properties

1.1 Material classification into ferrous and non ferrous category and alloys
1.2 Properties of Materials: Physical , Chemical and Mechanical
1.3 Performance requirements
1.4 Material reliability and safety

2.0 Ferrous Materials and alloys

2.1 Characteristics and application of ferrous materials
2.2 Classification, composition and application of low carbon steel, medium carbon steel and High carbon steel
2.3 Alloy steel: Low alloy steel, high alloy steel, tool steel and stainless steel
2.4 Tool steel: Effect of various alloying elements such as Cr, Mn, Ni, V, Mo,

3.0 Iron – Carbon system

3.1 Concept of phase diagram and cooling curves

3.2 Features of Iron-Carbon diagram with salient micro-constituents of Iron and Steel

4.0 Crystal imperfections

4.1 Crystal defines, classification of crystals, ideal crystal and crystal imperfections

4.2 Classification of imperfection: Point defects, line defects, surface defects and volume defects

4.3 Types and causes of point defects: Vacancies, Interstitials and impurities

4.4 Types and causes of line defects: Edge dislocation and screw dislocation

4.5 Effect of imperfection on material properties

4.6 Deformation by slip and twinning

4.7 Effect of deformation on material properties

5.0 Heat Treatment

5.1 Purpose of Heat treatment

5.2 Process of heat treatment: Annealing, normalizing, hardening, tampering, stress relieving measures

5.3 Surface hardening: Carburizing and Nitriding

5.4 Effect of heat treatment on properties of steel

5.5 Hardenability of steel

6.0 Non-ferrous alloys

6.1 Aluminium alloys: Composition, property and usage of Duralmin, y- alloy.

6.2 Copper alloys: Composition, property and usage of Copper-Aluminium, Copper-Tin, Babbit, Phosperous bronze, brass, Copper- Nickel

6.3 Predominating elements of lead alloys, Zinc alloys and Nickel alloys

6.4 Low alloy materials like P-91, P-22 for power plants and other high temperature services. High alloy materials like stainless steel grades of duplex, super duplex materials etc.

7.0 Bearing Material

7.1 Classification, composition, properties and uses of Copper base, Tin Base, Lead base, Cadmium base bearing materials

8.0 Spring materials

8.1 Classification, composition, properties and uses of Iron-base and Copper base spring material

9.0 Polymers

9.1 Properties and application of thermosetting and thermoplastic polymers

9.2 Properties of elastomers

10.0 Composites and Ceramics

10.1 Classification, composition, properties and uses of particulate based and fiber reinforced composites

10.2 Classification and uses of ceramics

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	O P Khanna	A Textbook of Material Science and Metallurgy	Dhantpat Rai
02	R K Rajput	Engineering materials and Metallurgy	S.Chand
03	S K Hazra choudhry	Material science & process	Imdian Book Distrubuting

(THEORY-4) THERMAL ENGINEERING-I

Name of the Course: Diploma in **MECHANICAL ENGINEERING**			
Course code:		Semester	3rd
Total Period:	60	Examination	3 hrs
Theory periods:	4 P/week	Class Test:	20
Maximum marks:	100	End Semester Examination:	80

RATIONALE:

Thermal Engineering is the field of applied science which deals with energy possessed by heated gases and the laws which give the conversion of this energy into mechanical energy and vice versa

COURSE OBJECTIVES:

After the completion of the course the students will develop ability towards.

- Comprehending significance of thermodynamics properties in order to analyze a thermodynamics system.
- Comprehending & applying first & second law of thermodynamics in closed & open system.
- Comprehending & applying gas laws applicable to perfect gas in order to determine thermodynamic properties.
- Comprehending the concept of I.C engine and gas power cycle & computing work done & efficiency thereof.

Chapter wise distribution of periods

Sl. No.	Topic	Periods
01	Thermodynamic concept & Terminology	12
02	Laws of Thermodynamics	12
03	Properties Processes of perfect gas	10
04	Internal combustion engine	08
05	Air Standard Cycle	10
06	Fuels and Combustion	08
07	**Total Period:**	60

1. **Thermodynamic concept & Terminology**
   - 1.1 Thermodynamic Systems(closed,open,isolated)
   - 1.2 Thermodynamic properties of a system (pressure, volume, temperature, entropy, enthalpy, Internal energy and units of measurement).
   - 1.3 Intensive and extensive properties
   - 1.4 Define thermodynamic processes, path,cycle , state, path function, point function.
   - 1.5 Thermodynamic Equilibrium.
   - 1.6 Quasi-static Process.
   - 1.7 Conceptual explanation of energy and its sources
   - 1.8 Work , heat and comparison between the two.
   - 1.9 Mechanical Equivalent of Heat.
   - 1.10 Work transfer, Displacement work

2. **Laws of Thermodynamics**
   - 2.1 State & explain Zeroth law of thermodynamics.
   - 2.2 State & explain First law of thermodynamics.
   - 2.3 Limitations of First law of thermodynamics
   - 2.4Application of First law of Thermodynamics (steady flow energy equation and its application to turbine and compressor)
   - 2.4 Second law of thermodynamics (Claucius & Kelvin Plank statements).
   - 2.5 Application of second law in heat engine, heat pump, refrigerator & determination of efficiencies & C.O.P (solve simple numerical)

3. Properties Processes of perfect gas

3.1 Laws of perfect gas:
Boyle's law, Charle's law, Avogadro's law, Dalton's law of partial pressure, Guy lussac law, General gas equation, characteristic gas constant, Universal gas constant.

3.2 Explain specific heat of gas (Cp and Cv)

3.3 Relation between Cp & Cv.

3.4 Enthalpy of a gas.

3.5 Work done during a non- flow process.

3.6 Application of first law of thermodynamics to various non flow process (Isothermal, Isobaric, Isentropic and polytrophic process)

3.6 Solve simple problems on above.

3.7 Free expansion & throttling process.

4. Internal combustion engine

4.1 Explain & classify I.C engine.

4.2 Terminology of I.C Engine such as bore, dead centers, stroke volume, piston speed &RPM.

4.3 Explain the working principle of 2-stroke & 4- stroke engine C.I & S.I engine.

4.4 Differentiate between 2-stroke & 4- stroke engine C.I & S.I engine.

5. Gas Power Cycle

5.1 Carnot cycle

5.2 Otto cycle.

5.3 Diesel cycle.

5.4 Dual cycle.

5.5 Solve simple numerical.

6. **Fuels and Combustion**

6.1 Define Fuel.

6.2 Types of fuel.

6.3 Application of different types of fuel.

6.4 Heating values of fuel.

6.5 Quality of I.C engine fuels Octane number, Cetane number.

Learning resources:

Sl. No.	Author	Title of the book	Publisher
01	R.S. Khurmi	Thermal Engineering	S.Chand
02	A.R.Basu	Thermal Engineering	Dhanpat Rai
03	A.S. Sarao	Thermal Engineering	Satya Prakash
04	P.K.Nag	Engineering Thermodynamics	TMH
05	Mahesh M Rathore	Thermal Engineering	TMH

Th-5 ENVIRONMENTALSTUDIES()

(Common to all Branches of Engg.)

Subject Code:

Period/Week:0 4 TotalMarks: 100

TotalPeriods: 60 TheoryEnd Exams:80,I.A TEST. 20

Rationale:

MECHANICAL ENGINEERING DRAWING
(PRACTICAL-1)

Name of the Course: Diploma in **MECHANICAL ENGINEERING**			
Course code:	MEP 301	Semester	3rd
Total Period:	90	Examination	4 hrs
Theory periods:	6 P/week	Term Work:	50
Maximum marks:	150	End Semester Examination:	100

Course objectives

Students will develop ability towards

- Recognizing significance of standardized representations
- Comprehending role of various fastening elements and offer engineering drawing thereof in manual mode
- Comprehending geometrical constraints and function of components in assemblies such as bearings and screw jack
- Comprehending functional requirement of major components and offer engineering drawing in manual mode thereof

Chapter	Contents	Hours
1.0	**Revision of Engineering Drawing of 1st Year**	**5**
2.0	**Draw plan, elevation and side view of different machine elements & their isometric view(Minimum 5 Drawings).**	**10**
3.0	**Engineering drawing of Fastening elements in first angle orthographic Projection** 3.1 Bolt, nut and threads 3.2 Cotter joint 3.3 Knuckle joint	**25**
4.0	**Details to assembly** 4.1 Rigid pedestal bearing 4.2 Foot step bearing 4.3 Simple Screw jack	**20**
5.0	**Assembly to details** 5.1 Connecting rod of IC Engine 5.2 Boiler safety valve 5.3 Spring loaded valve 5.4 Hydraulic non return valve 5.5 Flat belt pulley	**30**

Learning Resources:

Text Books:	Author Name	Name of the Book	Publisher Name
	N D Bhatt	Machine Drawing	Charotar
	T Jones	Machine Drawing	Kalyani
	R K Dhawan	Machine Drawing	S.Chand
	T. Jeypooven	Emgg. Graphics using Autocad	

MECHANICAL ENGINEERING LABORTORY (PRACTICAL-2)

Name of the Course: Diploma in **MECHANICAL ENGINEERING**			
Course code:	MEP 302	Semester	3rd
Total Period:	90	Examination	3 hrs
Lab. periods:	6 P/week	Term Work	25
Maximum marks:	100	End Semester Examination:	75

Course Objectives

Students will develop ability towards

- Conducting experimentations to determine properties of a solid material subject to uni axial loading and impact
- Conducting experimentations towards determining characteristics of a fuel
- Study of equipment employing using fuels

1. Strength of Materials and thermal Laboratory

1.1 Determine end reactions in a simply supported beam using parallel force apparatus.

1.2 Determination of Young's modulus using Searl's apparatus

1.3 Determination of torsional rigidity of the shaft using torsion testing machine

1.4 Determination of salient points (Young's modulus, yield point, fracture point) from stress- strain curve using Universal Testing Machine

1.5 Determination of hardness number by Rockwell/Vickers hardness testing machine

1.6 Determination of toughness using Impact testing machine (Charpy/Izod)

1.7 Determination of Flash point and fire point

1.8 Joule's experiment

WORKSHOP PRACTICE-II (PRACTICAL-3)

Name of the Course: Diploma in **MECHANICAL ENGINEERING**			
Course code:	MEP 303	Semester	3rd
Total Period:	105	Examination	4 hrs
Lab. periods:	7 P/week	Term Work	25
Maximum marks:	100	End Semester Examination:	75

Course Objectives

Students will develop an ability towards

- Practicing fitting, carpentry, smithy and machining
- Understanding the tools and equipment used in the practices
- Realize the time and resource utilization in the practices

1. Fitting practices

1.1 Preparation of caliper
1.2 Preparation of try square
1.3 Preparation of hammer, square , Hexagonal

2. Smithy Practices

2.1 Preparation of door ring with hook
2.2 Preparation of hexagonal head bolt
2.3 Preparation of octagonal flat chisel

3 Carpentry Practices

3.1 Cutting of slot, botch, mortise and Tenon Joint
3.2 Preparation of single dove tail joint

4 Welding Practice

4.1 Lap & Butt Joint using Arc Welding
4.2 Lap Joint using Gas Welding
4.3 Joining Two non-ferrous parts through TIG/MIG

List of Equipment of Mechanical Engg. Laboratory

Sl No	Name of The Equipment	Quantity
1	Parallel force apparatus	2 Nos.
2	Searle's apparatus	2 Nos.
3	Torsion testing Machine	1 Nos.
4	Digital universal testing machine	1 Nos.
5	Hardness Testing Machine	1 Nos.
6	Impact testing machine	1 Nos.
7	Flash point and fire point apparatus	1 Nos.
8	Joules apparatus	1 Nos.

List of Equipment of Workshop Practice

I – WELDING SHOP

SL. NO.	NAME OF ITEM	QUANTITY
01	OXYGEN CYLINDER	01 No.
02	ACETYLENE CYLINDER	01 No.
03	PRESSURE GAUSES	02 Nos
04	PRESSURE REGULATOR	02 Nos.
05	WELDING TORCH	01 No.
06	GOGGLES	10 Nos.
07	HOSE PIPES	10 Meters
08	AC WELDING TRANSFORMER SET	01 No.
09	CHIPPING BRUSH	02 Nos.
10	WIRE BRUSH	02 Nos.
11	ARC SHIELD (EYE PROTECTOR)	05 Nos.
12	MIG / TIG WELDING MACHINE	01 Nos.

II - CARPENTRYSHOP

SL. NO.	NAME OF ITEM	QUANTITY
01	STEEL RULE (SCALE) 1 Meter	10 Nos.
02	SCRIBER	10 Nos.
03	MARKING GAUGE	05 Nos.
04	MORTISE GAUGE	05 Nos.
05	TRY SQURE	10 Nos.
06	DIVIDERS	10 Nos.
07	RIP SAW	10 Nos.
08	COPING SAW	10 Nos.
09	FIRMAR CHIESEL	10 Nos.
10	GAUGE CHIESEL	02 Nos.
11	IRON JACK PLANE	02 Nos.
12	TRYING PLANE	05 Nos.
13	RASP	05 Nos.
14	HAND DRILL	05 Nos.
15	GIMLET DRILL	02 Nos.
16	CLAMPING VICE	10 Nos.
17	C-CLAMP	05 Nos.
18	CROSS PEAN HAMMER	05 Nos.
19	CLAW HAMMER	10 Nos.
20	MALLET	05 Nos.
21	WOOD WORKING LATHE	01 No.
22	CIRCULAR SAW	01 No.

III - FITTINGSHOP

SL. NO.	NAME OF ITEM	QUANTITY
01	BENCH VICE	20 Nos.
02	PIPE VICE	04 Nos.
03	TRY SQURE	10 Nos.
04	SCRIBER & SUEFACE GAUGE	10 Nos.
05	DOT PUNCH	10 Nos.
06	CENTRE PUNCH	10 Nos.
07	SURFACE PLATE	01 No.
08	ANGLE PLATE	01 No.
09	STEEL RULE	10 Nos.
10	VERNIER CALLIPERS	05 Nos.
11	MICROMETRE	05 Nos.
12	DIVIDERS	10 Nos.
13	OUTSIDE CALLIPERS	10 Nos.
14	INSIDE CALLIPERS	05 Nos.
15	FEELER GAUGE	01 No.
16	VERNIER HEIGHT GAUGE	01 No.
17	HACKSAW (FIXED FRAME)	10 Nos.
18	ROUND FILE	10 Nos.
19	SINGLE CUT FILE	10 Nos.
20	DOUBLE CUT FILE	10 Nos.
21	BALL PEAN HAMMER	05 Nos.
22	TAP WRENCH	01 No.
23	HAND DRILLING M/C	01 No.
24	PORTABLE GRINDER	01 No.

IV- BLACK SMITYSHOP

SL. NO.	NAME OF ITEM	QUANTITY
01	FURNACE OF HEARTH (WITH CENTRE BLOWER)	05 Nos.
02	SHOWEL	05 Nos.
03	POKER	05 Nos.
04	ANVIL	05 Nos.
05	SCEDGE HAMMER	05 Nos.
06	PICK UP TONG	10 Nos.
07	CHIESEL TONG	05 Nos.
08	CLOSE FLAT TONG	05 Nos.
09	PINUR TONG	05 Nos.
10	HOT CHIESEL	05 Nos.
11	COLD CHIESEL	05 Nos.
12	DRIFT	02 Nos.
13	SWAGE BLOCK	01 No.
14	BALL PEAN HAMMER	05 Nos.
15	CROSS PEAN HAMMER	05 Nos.