Scheme of Teaching and Examinations for
I Semester DIPLOMA in Electrical/Mechanical/CSE (Group-I)

THEORY

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION – SCHEME					
			Periods per Week	Periods in one Session (Year)	Hours of Exam.	Terminal Exam. (A) Marks	Final Exam. (B) Marks	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
1.	Engineering Mathematics-I	01101	06	60	03	20	80	100	26	36
2.	Engineering Physics	01102	04	50	03	20	80	100	26	36
3.	Engineering Chemistry	01103	04	50	03	20	80	100	26	36
4.	Elementary Mechanical Engineering & Engg. Material	01104	04	60	03	20	80	100	26	36
5.	Language & Communication Skill	01105	04	60	03	20	80	100	26	36
			22		Total:-			**500**		

PRACTICAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION – SCHEME					
			Periods per Week	Periods in one Session (Year)	Hours of Exam.	Marks Internal Exam. (A)	Marks External Exam. (B)	Total Marks (A+B)	Pass Marks Final Exam.	Pass Marks in the Subject
6.	Engineering Physics Lab.	01106	04	50	03	10	40	50	16	21
7.	Engineering Chemistry Lab	01107	04	50	03	10	40	50	16	21
8.	Workshop Practice.	01108	12	120	06	10	40	50	16	21
			20				Total:-	**150**		

SESSIONAL

Sr. No.	SUBJECTS	SUBJECT CODE	TEACHING SCHEME		EXAMINATION – SCHEME			
			Periods per week	Periods in one Session (Year)	Marks of Internal Examiner (X)	Marks of External Examiner (Y)	Total Marks (X+Y)	Pass Marks in the Subject
9.	Workshop Practice.	01109	-		40	60	100	50
	Total:-						**100**	
Total Periods per week			**42**		**Total Marks = 750**			

ENGINEERING MATHEMATICS-I

Subject Code	Theory			No of Period in one session : 60		
	No. of Periods Per Week			Full Marks	:	100
01101/ 02201	L	T	P/S	Annual Exam.	:	80
	06	—	—	Internal Exam.	:	20

Rationale:

The Subject Engineering Mathematics is being introduced into the Diploma Course to provide mathematical background to the students so that they can be able to grasp the engineering subjects properly. This course will enable them to analyse and understand the engineering problems scientifically based on Mathematics.

The subject is divided into two papers, viz. Engineering Mathematics - I and Engineering Mathematics - II. The paper Engineering Mathematics - I consists of the following:

1. Algebra
2. Trigonometry
3. Co-ordinate Geometry

The details are given in the curriculum:

Objectives:

By covering the course in Engineering Mathematics - I, the students will be able to:

- Know Sequence & Series, Permutations and Combinations, Binomial Theorem, Determinates and Matrices, Properties of Triangles, Solution of Trigonometrical equations, Inverse Circular functions, complex quantities, co-ordinate systems, equations of lines, circles, equations of lines in three dimensions, equation of plane,
- Understand their engineering applications.
- Solve related simple numerical problems which will enable them to understand the subject.

S.No.	Topics	Periods
01	Algebra - Sequence & Series - Principle of Mathematical Induction - Permutation and Combination - Binomial Theorem - Determinants and Their Properties - Matrix Algebra - Complex Number	(30)
02	Trigonometry - Trigonometrical ratios of compound angles up to conditional Trigo nometrical Identities - Properties of Triangle - Logarithm - Solution of Triangles & General Value - Inverse Circular Function	(15)
03	Co-ordinate Geometry - Two dimensional : upto equation of circles - Three dimensional: upto straight line	(15)

CONTENTS:

TOPIC: 01 - ALGEBRA:

		Periods
01.01	Sequence & Series: Arithmetic Progression (A.P.), Simple examples of A.P., Geometrical Progression (G.P.), Sum to infinity of a G.P., Sum of Squares and cubes of a naturals, idea of Harmonic Progression (H.P.), Relation between Arithmetic mean, Geometrical Mean and Harmonic mean. Insertions of AMs, GMs & HMs between two numbers.	**[08]**
01.02	Principle of Mathematical Induction	**[02]**
01.03	Permutations & Combinations: Introduction, Fundamental Principle of counting; The Factorial; Permutations, Simple practical problems on permutation; Combinations; simple practical problems on combinations.	**[04]**
01.04	Binomial Theorem: Binomial Theorem for positive Index, Some applications of Binomial Theorem for any Index, Idea of Exponential and Logarithmic Series. (Simple Problem).	**[04]**
01.05	Determinates: Determinants and their fundamental properties, simple problem, Difference between determinant and a matrix.	**[02]**

01.06	Matrices: - Different types of Matrices - Algebra of Matrices - Transpose, Adjoint & Inverse of Matrices - Solution of linear simultaneous equations by matrix method	**[04]**
01.07	Complex Numbers: Idea of a complex number, its geometrical representation, Modulus and Amplitude, Conjugate of a Complex number, Addition & Subtraction of a complex number with geometric notation, Multiplication and Division of one complex number by another with geometric representation. Idea of DeMoivre's Theorem, Roots of a Complex and Cube root of unity.	**[04]**
01.08	Number System: Binary, octal, Decimal & Hexadecimal system. Radix conversion. Idea of Boolean Algebra	**[02]**

TOPIC: 02 - TRIGONOMETRY:

02.01	Trigonometrical ratios of Compound angles. Trigonometrical ratios of Multiple sub-multiple angles, transformation formulae & conditional Trigonometrical identities.	**[04]**
02.02	Properties of Triangle: Relations between the side and angles of a triangle. Simple problems based on it.	**[04]**
02.03	Logarithm: Definition, Fundamental Rules and properties of Logarithms.	**[02]**
02.04	General Values and Inverse Functions: Formulae for all angles which have a given Sine, Cosine and Tangent. Formulae for angles both equi-sinal and equi-cosinal Inverse Circular Functions, Solution of Equations expressed in inverse notation.	**[05]**

TOPIC: 03 - CO-ORDINATE GEOMETRY:

03.01	Two Dimensional Co-ordinate Geometry	
03.01.01	Idea of cartesian and polar co-ordinate systems. Relations between them.	**[01]**
03.01.02	Distance between two points, section formula and Area of Triangle. Intelligent questions based on these (cartesian system only), centroid and incentre of a triangle.	**[02]**
03.01.03	Equations of Locus: Equation of a straight line in different forms. Angle between two straight lines and their deduction, equation of circle, simple problem.	**[04]**
03.02	Three Dimensional Co-ordinate Geometry	
03.02.01	Co-ordinates of a point, Distance between two points, Section formula (Cartesian system only)	**[01]**
03.02.02	Direction Cosines, Angle between two lines, Important deductions.	**[02]**
03.02.03	Plane, Projection of the join of two points on a plane, Equation of plane, Angle between two planes, Important deductions.	**[02]**
03.02.04	Equation of a straight line as intersection of two planes, Symmetric form of a straight line, simple problem.	**[03]**

Books Recommended:

Engineering Mathematics - I

1.	Mathematics for Class XI Part I	- NCERT/R. S. Aggawal/R.D.Sharma
2.	Mathematics for Class XI Part II	- NCERT/R. S. Aggawal/R.D.Sharma
3.	Mathematics for Class XII Part I	- NCERT/R. S. Aggawal/R.D.Sharma
4.	Mathematics for Class XII Part II	- NCERT/R. S. Aggawal/R.D.Sharma
5.	Algebra	Dr. K.C. Sinha/ Lalgi Pd./Das & Gupta
6.	Trigonometry	Dr. K.C. Sinha/ Lalgi Pd./Das & Gupta
7.	Co-ordinate geometry	Dr. K.C. Sinha/ Lalgi Pd./Das & Gupta
8.	Solid geometry	Dr. K.C. Sinha/ Lalgi Pd./Das & Gupta

Reference Books:

1.	Engineering Mathematics - Part I & Part II	- H.K. Dass, S. Chand & Co.
2.	Polytechnic Mathematics for Diploma level	- H.K. Dass, S. Chand & Co.

ENGINEERING PHYSICS

Subject Code 01102/ 02202	Theory			No of Period in one session : 50		
	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	04	—	—	Internal Exam.	:	20

Rationale and Objective:

Knowledge of Physics is so interwoven with engineering studies that one can not think of pursuing engineering studies without the knowledge of Physics. Study of Physics is essential for Diploma holders in engineering and technology to develop in them proper understanding of physical phenomenon, scientific temper and engineering aptitude.
The course covers the basic laws and principles of Physics and its applications. The course contents are so chosen that it should be more relevant to the modern development of science to meet the challenge posed by fast-changing technology.
Keeping these objectives in view the subject has been divided into the following topics:

S.No.	Topics	Periods
1.	General Physics	(22)
2.	Heat	(01)
3.	Electrostatics	(03)
4.	Current Electricity & Magnetism	(12)
5.	Modern Physics	(10)
6.	Environment & Safety	(02)
		(50)

Teachers are advised to use the latest technology of teaching (e.g. use of LRs etc.) and make maximum use of demonstration so that the subject will be interesting to the students. The Engineering applications of the principles of physics should be discussed broadly. Use of S.I. units for all measurements and calculations is recommended.

CONTENTS:

TOPIC: 01 - GENERAL PHYSICS: **[22]** Periods

01.01	Units and Dimensions	**[02]**
01.01.01	Units of Fundamental and Derived Physical quantities.	
01.01.02	System of Units - C.G.S., M.K.S., F.P.S. & S.I. System and their full forms (Foot Pound Second)	
01.01.03	Basic & Supplementary Units - Names & Symbols	
01.01.04	Advantages of S.I. System - Comprehensive, Coherent & Rational	
01.01.05	Dimensions & Dimensional formula of simple Physical quantities, Dimensionless quantities.	
01.01.06	Dimensional equations and their uses - Conversion of Units from one system to another, to check correctness of equation, establish relation between different physical quantities.	
01.01.07	Limitations of Dimensional analysis.	
01.02	Scales & Mesurements	**[02]**
01.02.01	Vernier Scale & least count.	
01.02.02	Vernier (Slide) Callipers.	
01.02.03	Screw - Pitch & Least Count.	
01.02.04	Screw Gauge (Micrometer Gauge) & Spherometer - their construction and operation.	
01.02.05	Spherometer - Measurement of thickness of a sheet or plate.	
01.03	Scalars & Vectors	**[02]**
01.03.01	Scalar & Vector quantities, Representation of a Vector.	
01.03.02	Addition & Subtraction of two vectors - triangle method.	
01.03.03	Resolution of vector into two mutually perpendicular components.	
01.04	Linear Motion	**[01]**
01.04.01	Speed & velocity - Definition, Difference (Distinction), their Units & Dimensions.	
01.04.02	Uniform Velocity, Uniformly accelerated Velocity (Uniform acceleration) & Retardation.	
01.04.03	Derivation of formulas: (i) $v = u + at$ (ii) $s = ut + \frac{1}{2} at^2$ using differentiation & integration method.	
01.05	Motion Under Gravity	**[01]**
01.05.01	Acceleration due to gravity - Unit & Dimension. Weight and mass.	
01.05.02	Co-ordinate Convention of displacement, Velocity and acceleration.	
01.05.03	Equations of motion of body moving freely under gravity: (i) Downwards (ii) Upwards	

01.06 Projectile **[02]**

01.06.01 Projectile - Definition & examples.
01.06.02 Oblique projection - Derivation of equation for trajectory, Range, Maximum height, Time of flight & time for attaining maximum height.
01.06.03 Angle of projection for maximum range for fixed speed of projection.
01.06.04 Horizontal & vertical projectiles and their path.
01.06.05 Simple numericals based on formulas.

01.07 Friction **[02]**

01.07.01 Friction - Definition, Types of friction - Sliding & Rolling, Static & Dynamic (Kinetic).
01.07.02 Limiting frictional force. Laws of Static & Kinetic friction.
Experimental Verification not required.
01.07.03 Co-efficient of friction - a unitless quantity.
01.07.04 Equilibrium of a body on rough inclined plane under the effect of its weight & frictional force.
01.07.05 Angle of Repose & its uses.
01.07.06 Friction - necessary evil.
01.07.07 Use of lubricants to reduce friction - solid, liquid & gas.
01.07.08 Simple numericals based on formulas.

01.08 Circular Motion **[02]**

01.08.01 Circular Motion - Definition.
01.08.02 Angular Displacement, Velocity and acceleration & their units.
01.08.03 Relation between linear and angular velocity and acceleration - Differential Calculus method.
01.08.04 Centripetal Force and its derivation by Vector method.
01.08.05 Centrifugal force, its presence felt only in rotational systems - Pseudo force.
01.08.06 Applications of Circular motion:
- motion of cyclist on curved path
- banking of tracks
- principle of working of cream separator, cloth drier, centrifuge machine

01.08.07 Simple numericals based on formulas.

01.09 Simple Harmonic Motion **[02]**

01.09.01 Periodic motion & S.H.M. - Definitions.
01.09.02 Expressions for displacement, velocity, acceleration and time period of S.H.M.
Derivation not required.
01.09.03 Phase & Epoch - Definition.
01.09.04 Equation of S.H.M. starting from equilibrium position and another point.
$y = a \sin wt$ & $y = a \sin (wt+\phi)$.
01.09.05 Elastic spring & spring constant.
01.09.06 Motion of a block tied to a massless spring moving on a horizontal frictionless table.
01.09.07 Time period of a Simple pendulum - derivation.
01.09.08 Simple numericals based on formulas.

01.10 Gravitation **[02]**

01.10.01 Newton's law & formula for force between two bodies.
01.10.02 Units & Dimensions of 'G' and 'g'.
01.10.03 Relation between 'G' and 'g' and their values.
01.10.04 Value of 'g' at earth's surface, above and below earth's surface - maximum value.
No Derivation required.
01.10.05 Satellite - Orbital Velocity and time period.
01.10.06 Parking Orbit - Definition
01.10.07 Escape Velocity - Definition & expression in terms of 'g'.
Derivation not required.
01.10.08 Simple numericals based on formulas.

01.11 Rotational Motion and Moment of Inertia **[03]**

01.11.01 Moment of Inertia & Radius of Gyration - Definition, units and dimension.
01.11.02 M.I. of Uniform ring & Uniform Disc about their natural axes.
01.11.03 M.I. of Solid Sphere about its diameter - derivation of expression.
01.11.04 Rolling on inclined smooth plane without slipping - Expression for acceleration along the plane to be derived.
01.11.05 Sliding motion of a body down a rough inclined plane under its own weight only - No external force - derivation of expression.
01.11.06 Torque and angular momentum - definition & expression.
01.11.07 Principle of Conservation of angular momentum and its examples.
No derivation required.
01.11.08 Simple numericals based on formula.

01.12 Fluids **[01]**

01.12.01 Surface Tension & Surface Energy - Introduction, Unit & Dimension.
01.12.02 Capillary rise - expression and its applications.
No Derivation required.
01.12.03 Laminar Flow & Co-efficient of Viscosity - Unit & Dimension.
01.12.04 Streamline & Turbulent flow - Definition.
01.12.05 Motion of Spinning ball in air (a viscous medium) and free fall of rain drops - Qualitative Discussion.

TOPIC: 02 - HEAT: [01]

02.01 Heat **[01]**

02.01.01 Heat form of energy. Unit of heat - Joule & Calorie.
02.01.02 Modes of heat transfer and their examples.

TOPIC: 03 - ELECTROSTATICS: [03]

03.01 Field & Potential **[01]**

03.01.01 Electric Field, Intensity and Potential due to a point charge.
03.01.02 Units & Dimensions of electric intensity & potential.
03.01.03 Derivation of potential at a point due to point charge.

03.02 Capacity & Condenser **[02]**

03.02.01 Capacity of a Single Conductor and Condenser (Capacitor).
03.02.02 Capacity of a Parallel Plate Condenser - Expression only.
No derivation required.
03.02.03 Series & Parallel grouping of Condensers and expressions for equivalent capacities.
No derivation required.

TOPIC: 04 - CURRENT ELECTRICITY AND MAGNETISM: [12]

04.01 E.M.F. & P.D. **[01]**
04.01.01 Definition - Units
04.01.02 Internal resistance of cell.
Expression for current $I = E/(R+r)$.

04.02 Kirchoff's Laws **[02]**

04.02.01 Kirchoff's Laws and Wheatstone bridge - Condition for balance.
No derivation required.

04.03 Magnetic Effect **[02]**

04.03.01 Biot-Savart's Law, Expression for magnetic induction & direction of magnetic induction.
04.03.02 Expression for magnetic induction due to an infinitely long conductor carrying electric current.
No derivation required.
04.03.03 Expression for magnetic induction due to Circular Coil carrying electric current,
- at centre of the coil &
- at a point on the axis of the coil.

No derivation required.

04.04 Heating Effect **[02]**

04.04.01 Heat developed in a current carrying conductor - expression.
04.04.02 Electrical Power & energy and their units.
04.04.03 Specifications marked on electrical appliances - Wattage & Voltage.
04.04.04 Resultant power (Total power) consumed in parallel combination of electrical appliances.
Kilo watt hour (Kwh) and electrical unit.
Expressions only.
No derivation required.
04.04.05 Simple numericals based on formulas.

04.05 Electromagnetic Induction **[02]**

04.05.01 Magnetic Flux - Definition & Unit.
04.05.02 Electromagnetic Induction - definition.
04.05.03 Faraday's Law & Lenz's Law of Electromagnetic Induction.
04.05.04 Eddy (Focault's) Current & its used in induction furnace and braking (stopping) of rotating wheels.

04.06 Alternating Current **[03]**

04.06.01 Uniform rotation of a coil in uniform magnetic field - Derivation of expression for e.m.f. induced.
04.06.02 Peak Value & R.M.S. Value of A.C.
Rated Value - R.M.S. Value.
04.06.03 Expressions for e.m.f. and curent in A.C. Circuit containing:
- resistance only
- Inductance only
- capacitance only

Expressions only. No Derivation required.
04.06.04 Choke Coil - Simple introduction.
04.06.05 Transformer & losses in it - Simple ideas.

TOPIC: 05 - MODERN PHYSICS: [10]

05.01 Atomic Structure **[01]**

05.01.01 Bohr's atomic model.
05.01.02 Stationary orbits & energy levels.
05.01.03 Transition of electron between two orbits - emission of electromagnetic radiation, Expression for wavelength of emitted radiation.
No derivation required.
05.01.04 Simple numericals based on formulas.

05.02 Thermionic Emission **[01]**

05.02.01 Thermionic emmission and Diode Valve.
05.02.02 Half Wave rectifier.

05.03 X-Rays **[01]**

05.03.01 Simple ideas of production of X-ray (No Diagram needed), Soft & hard X-rays.
05.03.02 Expression of minimum wavelength.
05.03.03 Use of X-ray in medicine & industry.
05.03.04 Simple numericals based on formulas.

05.04 Photoelectric Effect **[02]**

05.04.01 Definition, Photon and its energy.
05.04.02 Threshold frequency

05.04.03 Effect of Intensity & Energy of incident light on Photoelectric effect.
05.04.04 Use of Photoelectric effect:
- medical use in Glucometer (Blood Sugar Measurement)
- Exposure meter
- Density measurement of exposed X-ray & photo films
- Television telecasting

05.04.05 Simple numericals based on formulas.

05.05 Radioactivity **[01]**

05.05.01 Definition, Radioactive Decay and its formula - Half life time.
05.05.02 Types of radiations emitted from radioactive materials
05.05.03 Fission and Fusion - Simple ideas.
05.05.04 Principle of nuclear reactor and Stellar energy (energy from star)
05.05.05 Simple numericals based on formulas.

05.06 Ultrasonics **[01]**

05.06.01 Definition
05.06.02 Piezo electric effect - Simple ideas (No diagram).
05.06.03 Uses in medicine and industry - simple ideas.

05.07 Laser & Optical Fibre **[01]**

05.07.01 Introduction & Working principle - simple ideas.
05.07.02 Uses in medicine & industry - simple ideas.

05.08 Semiconductor **[02]**

05.08.01 Intrinsic & Extrinsic Semiconductor - simple ideas.
05.08.02 Tetravalent Structure of intrinsic semiconductor.
Doping material (Impurity) trivalent & pentavalent.
05.08.03 PN junction & simple introduction of forward and reverse bias.

TOPIC: 06 - ENVIRONMENT & SAFETY: [02]

06.01 Environment & Safety

06.01.01 Noise pollution and its effect on human health.
06.01.02 Radiation Hazards and Safety thereof.
06.01.03 Non conventional Energy- Solar Energy, Solar battery Cell, Wind Energy, Geothermal Energy.

Books Recommended for Engineering Physics:

Text Books:

1	Introductory Physics (Vol. I & II)	- By N.N. Ghosh
2	Intermediate Physics (Vol. I & II)	- By Durga Pd. Singh
3	Physics for Class XI & XII Part I	- By N.K. Bajaj (Tata McGraw Hill)

Reference Books:

1	University Physics	- By Sears & Zeemansky
2	Physics Part I & Part II	- By Halliday & Resnik
3	Applied Physics Vol. I & II	- By TTTI Chandigarh, (Tata McGraw Hill)
4	Concepts of Physics Vol. I & II	- By H.C. Verma
5	Intermediate Physics	- By S.C. Roy Chowdhary & Dr. D.B. Singh
6	Intermediate Physics	- By Lakhmer Singh & Subramaniam
7	I.Sc. Physics Vol. I & II	- By V.P. Bhatnagar (Pitambar Publishing Co., New Delhi)

ENGINEERING CHEMISTRY

Subject Code	Theory			No of Period in one session : 50		
01103/ 02203	No. of Periods Per Week			Full Marks	:	100
	L	T	P/S	Annual Exam.	:	80
	04	—	—	Internal Exam.	:	20

Rationale & Objective:

Keeping in view the recent developments in Science and the present needs in Industries, the curriculum of Engineering Chemistry has been revised so that the Engineers or Technicians may have a better knowledge of Chemistry, especially regarding the application of the subject in various fields of Industries. An emphasis, in this direction, has been made in the curriculum.

A new chapter on Environmental Chemistry has been introduced to make the students aquainted with the various pollution hazards which is becoming more critical everyday.

The following topics are so chosen that through their contents the students are able to develop knowledge, skill and scientific attitude. It will enable them to distinguish, differentiate, analyse and solve engineering problems.

S.No.	Topics	Periods
GROUP - A		
1.	Importance of Chemistry for Engineers and its applications in industries	(02)
2.	General Chemistry	(05)
3.	Atomic Structure	(03)
4.	Chemical Bonding	(03)
5.	Chemical Equilibrium	(03)
6.	Metallurgical Operations	(08)
7.	Water Treatment	(08)
8.	Fuel & Combustion	(08)
9.	Lubricants	(02)
10.	Paints and Varnishes	(02)
11.	Environmental Chemistry	(06)

CONTENTS:

GROUP - A

Topic: 01 - Introduction **[02]**

01.01 Importance of Chemistry for Engineers and its application in industries.

Topic: 02 - General Chemistry **[05]**

02.01 Atomic Wt. Equivalent Wt., Molecular Wt. and their determination, Numerical Problems.

02.02 Mole Concept, Avogadro's number, Numerical Problems.

Topic: 03 - Atomic Structure **[03]**

03.01 Basic idea of fundamental particles, Atomic Number, Mass Number, Rutherford model & Bohr's model.

03.02 Electronic congiguration in s, p, d, f notation.

Topic: 04 - Chemical Bonding **[03]**

04.01 Ionization Potential, Electron affinity, electronegativity.

04.02 Types of Chemical Bonds - Electrovalent, Covalent (Polar and non-polar) and Co-ordinate bonds.

Topic: 05 - Chemical Equilibrium **[03]**

05.01 Reversible and Irreversible reaction, Chemical Equilibrium.

05.02 Law of mass action.

05.03 Ionic product of water, PH-scale, Common Ion Effect and Numerical problems.

Topic: 06 - Metallurgical Operations **[08]**

06.01 General metallurgical operations, Concentration of metal ore, Roasting, Calcination, Smelting, refining of metals.

06.02 Extraction of Iron, Aluminium and Copper.

06.03 Manufacture of steel - (a) Bessemer process, (b) Open Hearth process, effect of impurities such as Mn, P, S and Si. Heat treatment of steel, Anealing, Hardening, Tempering, Normalising, Case hardening, Nitriding and Cyaniding

06.04 Introduction, Importance, Classification and uses of alloys with examples.

GROUP - B

Topic: 07 - Water Treatment **[08]**

07.01 Introduction - Use of water for Industrial and domestic purposes, sources of water supply.

07.02 Hardness of water, degree of hardness and its estimation (Hehner and EDTA methods). Numerical problems on degree of hardness. PH-value of water, disinfection of water and Municipal Supply.

07.03 Softening of hard water (Lime-Soda method, Permutit, Ion Exchange and calgon methods).

Topic: 08 - Fuel and Combustion **[08]**

08.01 Introduction - Importance of fuels in Industries, classification of fuels, calorific values, Determination of calorific value and Numerical problems. Characteristics of an ideal fuel.

08.02 Refining and cracking of petroleum, knocking. Octane Number and Cetane Number. Merits and demerits of fuels, L.P.G., Coal gas, Oil gas and Producer gas.

Topic: 09 - Lubricants **[02]**

10.01 Introduction & Classification of lubricants.

10.02 Properties of lubricants, Lubricants Oil, grease, emulsions.

Topic: 10 - Paints and Varnishes **[02]**

11.01 Characteristics of a good paint, brief study of various constituents of a paint.

Topic: 11 - Environmental Chemistry **[06]**

13.01 Introduction:

13.01.01 Effect of pollution on human health (Name of diseases) and plant.

13.02 Air Pollution:

13.02.01 Causes of air pollution like factory Smoke discharge, Automobile exhaust gas, Deforestation etc.

13.02.02 Brief idea of pollution effects like Acid rain, Green house effect, Action of Ozone layer which causes green house effect on earth, effect of chloroflurocarbon on depletion of ozone layer.

13.03 Water Pollution:

13.03.01 Standard prescribed by WHO, IMC and Bureau of Indian Standard for pure drinking water.

Books Recommended:

1		Text Book of Engineering Chemistry	- M.M. Uppal
2		Text Book of Engineering Chemistry	- C.V. Agrawal
3		Text Book of Engineering Chemistry	- P.C. Jain
4		Pradyogiki Rasayan (Hindi)	- S.Z. Aahmad & Prof. Subuktgin
5		Takniki Rasayan Bhag 1 evam 2 (Hindi)	- Roop Prakashan
6	a.	Inorganic Chemistry	- P.L. Soni
	b.	Physical Chemistry	- P.L. Soni
7	a.	Inorganic Chemistry	- Biltu Singh
	b.	Physical Chemistry	- Biltu Singh
8	a.	Inorganic Chemistry	- Ram Ratan Pd.
9		Environmental Chemistry	-

ELEMENTARY MECHANICAL ENGINEERING AND ENGINEERING MATERIAL

Subject Code	Theory			No of Period in one session : 60		
	No. of Periods Per Week			Full Marks	:	100
01104/ 02204	L	T	P/S	Annual Exam.	:	80
	06	-	-	Internal Exam.	:	20

Rationale & Objective:

The technicians have to handle and deal with so many materials to be used in construction of Engineering product and making machine tools and structures etc. They have to face many problems involving general mechanical, electrical, electronics and civil Engg. As such the knowledge of general Engg. principles of different branches is essential for a Diploma holder.

The course has been designed with a view to include various materials commonly used in Engineering Constructions and general principles of working of different machine tools.

S.No.	Topics	Periods
GROUP - A (Mechanical Engineering)		
1.	Simple machines	(06)
2.	Introduction of ferrous & Non ferrous metals	(05)
3.	General Process	(03)
4.	Heat Engines & fluid machines	(06)
5.	Power Transmission	(07)
6.	Boilers	(03)
	Seperate answer books for group A & group B should be given in examination & answer books should be examination by Mechanical & Civil Engg. Teachers separately.	**[30]**
GROUP - B (Engineering Material)		
7	Stones	(03)
8.	Clay Products	(03)
9.	Cement & their products	(05)
10.	Timber	(03)
11.	Miscellaneous Material	(16)
		[30]

CONTENTS:

GROUP - A (MECHANICAL ENGINEERING)

TOPIC: 01 – SIMPLE MACHINES **[06]**

Introduction to simple machines, M.A, U.R, & ŋ of simple wheel & Axle, Compound wheel & Axle, Screw jack, worm & worm wheel, Rack & pinion (simple numericals only)

TOPIC: 02 -: Introduction to ferrous & non ferrous metals Physical & mechanical properties & uses of ferrous metals &Alloys & non ferrous metals like,Al, Cu, Zn, & their alloys Properties & uses. **[05]**

TOPIC: 03 -: GENERAL PROCESS

03.01 Introduction to Soldering, brazing & welding. **[03]**
03.02 Application of soldering, brazing & welding.
03.03 Flame Cutting and Welding.
03.04 Different types of flames used
03.05 Safety precautions in Welding.

TOPIC: 04 - HEAT ENGINES & FLUID MACHINES **[06]**

04.01 Introduction to External & Internal Combustion engines.
04.02 Difference between External & Internal Combustion engines.
04.03 Concept of Heat work and Energy. Thermodynamic system and their properties. (Introduction only)
04.04 Introduction of Two-stroke and four-stroke I.C. engine, their working principles. water wheel, Introduction to Inpulse & reaction turbine ,(Pelton, francis & Kaplan Turbine, working Principle only.)

TOPIC: 05 - POWER TRANSMISSION **[07]**

05.01 Power transmission by belt
05.02 Rope chain & geardrive
05.03 Open & cross belt drive
05.04 Relation between tight side & slack side tension
05.05 Centrifugal tension, simple & compound
05.06 Gear drive, gear train.

TOPIC: 06 – BOILERS(Steam Generatars) **[03]**

06.01 Classification of boilers - Fire tube & water tube boiler. Working principle of classification boilers,working principle of cochran boiler.

06.02 Boiler accessories & Mounting, their functions.

GROUP - B (ENGINEERING MATERIAL)

TOPIC: 07 - STONES: **[03]**

07.01 Introduction of stones as engineering materials

07.02 Classification of Rocks, qualities, selection and uses of different types of stones in various engineering construction works.

07.03 List of tests on stones,
- Dressing of stones & quarrying of stones.

TOPIC: 08 - CLAY PRODUCTS: **[03]**

08.01 Common Clay products, (Vitrified, Porcelain) their manufacture and application.

08.02 Uses of brick and characteristics of good bricks.

TOPIC: 09 - CEMENT & THEIR PRODUCTS **[05]**

09.01 Lime:
- Introduction , Manufacturing Process
- Different types of limes & its applications,

09.02 Cement:
- Introduction, Manufacturing process
- Different types of cements, their ingredients and applications, grade of cements, storage of cement.

TOPIC: 10- TIMBER **[03]**

10.01 Classification of Timber

10.02 Characteristics of good timber

10.03 Introduction of seasoning of timber

10.04 Preservation of timber and its uses

TOPIC: 11 - MISCELLANEOUS MATERIALS **[16]**

11.01 Plastics:
- Introduction, important commercial products of plastics used in engineering works
- Types of plastics - Themoplastic & Thermosetting, Epoxy Resins

11.02 Glass:
- Types of glass
- Composition of glass
- Uses of glass as industrial material

11.03 Adhesive:
- Types of Adhesive
- Its ingredients and uses sealant & joints fillers

11.04 Rubber:
- Characteristics of Rubber
- Types and uses of Rubber

11.05 Available forms of Aluminum as structural cladding & partition
Different type of bar section & their uses.

Books Recommended:

1.	Workshop Technology	- By Hazare and Choudhary
2.	Heat Engine	- By Pandey & Saha
3.	Engineering Material	- By Banga & Sharma
4.	Engineering Material	- By Narang
5.	इंजीनियरिंग पदार्थ	- जनार्दन झा
6.	Electrical Engineering	- By Uppal
7.	वैद्युत अभियांत्रिकी	- डी॰आर॰ नारायण

LANGUAGE & COMMUNICATION SKILL (ENGLISH & HINDI)

Subject Code	Theory			No of Period in one session : 60		
	No. of Periods Per Week			Full Marks	:	100
01105/ 02205	L	T	P/S	Annual Exam.	:	80
	04	-	-	Internal Exam.	:	20

Rationale & Objective:

The primary aim of this course is to help technical students studying in Polytechnics and Engineering Institutes acquire the skills of language and communication in order to be successful in their studies and subsequent professional life. It has been found that in the world of work of diploma holder they have to perform various job functions like Letter Writing, maintaining office records, drawing up tender notices, writing technical reports, communicating with sub-ordinate staff and/or labourer and with superiors.

The curriculum has been designed to improve the knowledge of the Language, comprehension and its application to develop communication skill.

The curriculum also seeks to develop the student's power of oral communication through effective use of body language and necessarily puts knowledge to practice through exposure in varied form.

The curriculum has been designed both in English & Hindi languages.

S.No.	Group	Topic	Periods	Marks
1	A	ENGLISH	30	50
2	B	HINDI	30	50
		Total:	**60**	**100**

GROUP - A [ENGLISH]

S.No.		Topic	Periods
01	A.	Language Practice	**[08]**
	B.	Oral Communication	**[05]**
02		Comprehension	**[03]**
03		Paragraph Writing	**[02]**
04		Letter Writing	**[04]**
05		Tender Notice & Advertisement	**[04]**
06		Report Writing	**[04]**
		Total:	**30**

CONTENTS:

<u>TOPIC 01(A)</u> - Language Practice: **[08]**

01.01 Tenses of verbs

01.01.01 Writing about the Present

- Subject verb agreement
- Negative statements
- Is/ Are VERB - ed (is needed, are powered etc.)

01.01.02 Writing about the Past

- VERB - ed (Past Simple)
- Was/ Were VERB - ed (Past simple passive)
- Has/ Have VERB - ed
- Has/ Have been VERB - ed
- Has VERB - ed + VERB - ed (Past perfect + Past simple)
  (The demonstration has already started before the office broke for lunch)
- Was/ Were VERB - ed + VERB - ed
  (Past continuous + past simple)

01.01.03 Writing about the Future

- Shall/ Will VERB (Future simple)
- Shall/ Will be VERB - ed (Future simple passive)

01.02 Auxiliaries

- Use of can could, will would, shall should, may might etc.
  (Drilling exercise with suitable examples to be done)

01.03 Word Formation

- Common roots in Technical English
- Noun endings, -tion, -ment, -ance, -ity, -logy, -meter, -metry, -or, -er etc.
- Prefixes that mean NOT: in, on, non, il, im, de, dis, mis, mal
- Words that end with: -ize, -ate, -ify
- Adjectives that end with: -al, -ic, -ical, -ar, -ary, -ory, -ing

01.04 Single Word Substitution

- Drilling of exercise
  (Page No. 147 to 151 of Text Book)

01.05 Sentence Structure

- Completing, joining, reframing (for emphasis) and transformation of sentences

01.06 Punctuation

- Correct use of comma, semi-colon, colon, full stop, apostrophe, inverted commas, note of exclamation, note of interruption, dash, brackets, hyphen, capital letters and italics.

TOPIC 01(B) - Oral Communication: **[05]**

- Manners & basic etiquettes
- Body Language - the role of body postures, movements, gestures, facial expressions, dress & make up in effective communication
- Information/ Desk/ Front Office/ Telephone conversation
  (Practice with audio/ video cassettes
- Conduct while facing interviews (Mock Interview)
- Group discussions, debates, elocution

TOPIC 02 - Comprehension: **[03]**

02.01 Prescribed unit from communication in English for Technical Students (Orient Longman):

i. Uses of Mango Wastes
ii. Making Money in India
iii. Radar: its operation and benefits
iv. Technology for Mankind

TOPIC 03 - Paragraph Writing: **[02]**

03.01 General – Specific
03.02 Process – Description
03.03 Problem – Solution
03.04 Data – Comment

TOPIC 04 – Letter/ Application Writing: **[04]**

04.01 Official letters to an from higher authorities/ departments regarding administrative/ establishment/ financial matters.
04.02 Commercial letters regarding enquiries/ proposals for purchase/ service.
04.03 Drafting application for jobs - format, style & contents

TOPIC 05 - Tender Notice & Advertisement: **[04]**

05.01 Inviting Tenders/ Quotations - format & contents, formalities involved, placing orders.
05.02 Drafting advertisements for 'situation vacant'/ 'situation wanted' columns, for sale/ purchase of items etc.

<u>TOPIC 06</u> - Report Writing: **[04]**

06.01 Types, structure and utility of reports

06.02 Technical reports

06.02.01 Project reports

06.02.02 Enquiry reports

06.02.03 Stock verification reports etc.

(The teacher should help the students in the preparation of their project report)

Books Recommended:

Text Book:

1. Communication in English for Technical Students - prepared by C.D.C., T.T.T.I. Calcutta (Orient Longman)

Reference Books:

1. An Intermediate English Practice Book - by S. Pit Corder (Orient Longman)
2. Living English Structure - by W.S. Allen (Orient Longman)
3. Advance Learner's Dictionary - by A.S. Hornby (O.U.P.)

GROUP - B [HINDI]

क्रम सं॰	पाठ्य	व्याख्यान
01	भाषा अभ्यास	**[08]**
02	मौखिक सम्प्रेषण	**[05]**
03	अपठित गद्यांश और प्रश्नोत्तर	**[03]**
04	अनुच्छेद लेखन	**[02]**
05	पत्र / आवेदन लेखन	**[04]**
06	निविदा सूचना एवं विज्ञापन	**[04]**
07	प्रतिवेदन लेखन	**[04]**
	कुलः	**[30]**

CONTENTS:

<u>पाठ्य 01</u> – भाषा अभ्यासः **[08]**

01.01 शब्द रचना

01.01.01 विशेषण

विशेष्य और विशेषण की रचनाए विशेषण बनाने के कुछ नियम, पद वाचक विशेषण

01.01.02 मूल शब्द, उपसर्ग, प्रत्यय

01.01.03 विदेशी शब्दों का हिन्दी प्रयोग

01.02 वाक्य रचना

01.02.01 वाक्य का रूपान्तर, सामान्य वाक्य, वाक्य उपवाक्य, वाक्य की अशुद्धियाँ, वाक्य में कर्त्ता और क्रिया का मेल, संज्ञा और सर्वनाम का मेल, वाक्यज्ञत प्रयोग।

01.03 विराम चिन्ह

01.04 . विपरीतार्थक शब्द

. युग्म शब्द

. अनेक शब्दों के लिए एक शब्द

. एक शब्द और विभिन्न प्रयोग

. एक शब्द का विभिन्न शब्द भेदों में प्रयोग

. संक्षेपण

<u>पाठ्य 02</u> – मौखिक संप्रेषणः **[05]**

02.01 तौर तरीके एवं आधारभूत शिष्टाचार

02.02 शारीरिक भाषा – शारीरिक भावभंगिमा द्वारा सम्प्रेषण, अतिविहित, संकित मुखाकृति द्वारा सम्प्रेषण, पोशाक तथा प्रसाधन द्वारा प्रभावकारी सम्प्रेषण

02.03 जानकारी/ डेस्क/ कार्यालय का अग्रभाग/ टेलीफोन वार्त्तालाप
(श्रष्टा/ दृश्य कैसेटों द्वारा अभ्यास)

02.04 अन्तर्वीक्षा के समय आचरण

02.05 सामूहिक परिचर्चा, वाद–विवाद, वक्तृता

<u>पाठ्य 03</u> – अपठित गद्यांश और प्रश्नोत्तरः **[03]**

सम्बद्ध पाठ्यक्रम समसामयिक पत्रिका, अखवार एवं पुस्तक में सम्पादकीय तथा लेख पर आधारित होगें। परीक्षा अपठित अवतरणों पर आधारित होगी, शब्दार्थ, तर्क, विचार, वाक्य संरचना, वाक्य संरचना एवं प्रयोग के सम्बन्ध में विशेषकर वस्तुनिष्ठ प्रश्न पूछे जायेगें।

<u>पाठ्य 04</u> – अनुच्छेद लेखनः **[05]**

04.01 सामान्य – विशेष

04.02 प्रक्रिया – वर्णन

04.03 समस्या – समाधान

04.04 अकिंछा – समीक्षा

पाठ्य 05 – पत्र/ आवेदन लेखनः **[04]**

05.01 उच्चाधिकारियों/ विभागों के साथ प्रशासनिक/ स्थापना/ वित्तीय मामलों से सम्बन्धित पत्राचार।

05.02 पूछताछ/ क्रय/ सेवा से सम्बन्धित पत्राचार।

05.03 नियोजन हेतु आवेदन

पाठ्य 06 – निविदा सूचना एवं विज्ञापनः **[04]**

06.01 निविदा/ कोटेशन आमंत्रित करना – रूपरेखा एवं संदर्भ सम्बद्ध औपचारिकता, आदेश।

06.02 रिक्तियाँ/ आवश्यकता/ क्रय/ विक्रय आदि के लिये विज्ञापन का प्रारूप।

पाठ्य 07 – प्रतिवेदन लेखनः **[04]**

07.01 प्रतिवदेन के प्रकार, संरचना एवं उपयोगिता।

07.02 तकनीकी प्रतिवेदन – परियोजना प्रतिवेदन, जाँच प्रतिवेदन आदि (परियोजना प्रतिवेदन तैयार करने में शिक्षक को विद्यार्थियों की मदद करनी चाहिए)

निर्धारित पुस्तकें

टेक्स्ट बुक(पाठ्य पुस्तक)/ रदिर्ग पुस्तकें

1.	आधुनिक हिन्दी व्याकरण और रचना	. डा॰ वासुदेव नन्दन प्रसाद, भारती भवन, पटना
2.	हिन्दी में उन्नत टिप्पण और सार	. राम विनायक सिंह, लोक भारती प्रकाशन, इलाहाबाद
3.	हिन्दी में प्रशासनिक पत्र लेखन	. राम विनायक सिंह, लोक भारती प्रकाशन, इलाहाबाद
4.	हिन्दी प्रारूपण और टिप्पण	. मल्होत्रा, फ्रेजर रोड, पटना
5.	शिक्षार्थी हिन्दी शब्दकोश	. डा॰ हरदेव वाहरी, रामपाल एण्ड सन्स
6.	अंग्रेजी हिन्दी शासकीय प्रयोग कोश	. गोपीनाथ श्रीवास्तव, सम पाल एण्ड सन्स

ENGINEERING PHYSICS LAB

Subject Code	Practical			No of Period in one session : 50		
01106/ 02206	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	Annual Exam.	:	40
	—	—	04	Internal Exam.	:	10

At Least ten experiments to be performed:

S.No.	Experiment
1.	Determination of diameter using Slide Callipers.
2.	Determination of depth using Slide Callipers.
3.	Measurement of diameter of wire using Screw Gauge.
4.	Measurement of thickness using Screw Gauge.
5.	Determination of thickness of a plate using Spherometer.
6.	Measurement of radius of curvature of a Convex Surface using Spherometer.
7.	Study the relation between length of a Simple pendulum and square of its time period.
8.	Measurement of resistance using Post Office Box.
9.	Verification of Laws of Series and parallel grouping of resistances using P.O. Box.
10.	Determination of resistance using meter bridge.
11.	Study relationship between current and potential difference at different lengths of meter bridge (or potentiometer) wire.
12.	Comparison of e.m.fs two cells using potentiometer.
13.	Determination of angle of repose using inclined plane friction table and to find co-efficient of friction.
14.	Study of junction diode.
15.	Comparison of illuminating power (luminous intensity) of two light sources using Photoelectric Cell.

Books Recommended for Engineering Physics (Lab.):

1	Practical Physics	-	By N.N. Ghosh
2	Practical Physics	-	Sharma Singh & Prasad Bharti Bhawan Publication
3	Practical Physics	-	By Durga Pd. Singh
4	Practical Physics	-	By C.L. Arora S. Chand & Co.
5	Practical Physics	-	By K.K. Mahindroo Pitambar Publishing Co., New Delhi

ENGINEERING CHEMISTRY LAB

Subject Code	Practical			No of Period in one session : 50		
01107 02207	No. of Periods Per Week			Full Marks	:	50
	L	T	P/S	Annual Exam.	:	40
	—	—	04	Internal Exam.	:	10

Rationale & Objective:

The Chemistry Lab. Practical has been introduced with a view to develop scientific attitude among the students. The topics (experiments) have been chosen to develop skill among the students so that they can measure, differentiate and analyse the best results. This will help them solve the engineering problems in their world of work.

S.No. Topics **Periods**

(At least ten experiments are to be performed)

1 Preparation of derivatives
2 Titration
3 Quantitative Analysis
4 Quantitative Analysis of Simple Inorganic Salts
5 Qualitative and Quantitative Analysis of drinking water

CONTENTS:

Topic: 01 - Preparation of derivatives

01.01 Preparation of Barium Sulphate from Barium Chloride.
01.02 Preparation of Copper Sulphate from Copper Carbonate.
01.03 Preparation of Copper Sulphate from Copper Nitrate.
01.04 Preparation of Copper Chloride from Copper Sulphate.
01.05 Preparation of Calcium Carbonate from Calcium Oxide.

Topic: 02 - Titration

02.01 Preparation N/10 solution of oxalic acid and Sodium Carbonate
02.02 Standarisation of the given solution of NaOH or KOH with the help of N/10 Oxalic acid solution.
02.03 Determination of the volume of a drop of water.
02.04 To determine the quantity of Na_2CO_3/litre in a mixture of Na_2CO_3 and NaOH solution.

Topic: 03 - Quantitative Analysis

03.01 Determination of percentage of calcium or calcium carbonate in a given sample of calcium carbonate.
03.02 Determination of percentage of moisture in a given sample of coal..

Topic: 04 - Qualitative Analysis

04.01 Analysis of simple inorganic salts containing not more than two radicals among the following :-

Pb^{++}, Hg^{++}, Cu^{++}, Cd^{++}, Bi^{+++}, As^{+++}, Sb^{+++}, Fe^{++} or Fe^{+++},
Al^{+++}, Cr^{+++}, Mn^{++}, Zn^{++}, Co^{++}, Ca^{++}, Sr^{++}, Ba^{++}, Mg^{++}, Na^{+},
K^{+}, NH_4^{++}, Ci^{-}, Br^{-}, I^{-}, NO_3^{-}, CO_3^{--}, SO_4^{--}, S^{--}, and
NO_2^{-}

Topic: 05 - Qualitative & quantitative Analysis of Drinking Water

Note :- Water samples from five different sources, Well, handpump, water supply etc. from neighbourhood to be collected by each group of two students and following tests to be conducted :-
Qualitative Analysis (with the help of field test kits available) or the following :-

i. Total Solid dissolved.
ii. Chlorine.
iii. Flourine.
iv. Iron.
v. Nitrite.
vi. Nitrate.
vii. Sulphide/Sulphate.

Quantitative Analysis in the laboratory

i. pH-Value-By pH meter.
ii. Chlorine- By Gravimetric method.
iii. Sulphate- By Gravimetric method.

WORKSHOP PRACTICE

Subject Code	Practical			No of Period in one session : 120		
	No. of Periods Per Week			Full Marks	:	50
01108 /02208	L	T	P/S	Annual Exam.	:	40
	—	—	04	Internal Exam.	:	10

Rationale & Objective:

A Diploma holder technician must know how to work on shop floor. This helps to develop psychomotor skill and attitude. The knowledge & skill to use machines, equipment, tools and measuring instruments is required to be developed. Safe handling of machines and tools is also very important. So, it is essential for students of 1st year to undergo basic workshop practical training. The topics include practical works in carpentry, welding, fitting, smithy sheet metal shop & machine shop. It is required to inculcate safe habits and attitude so that accidents are avoided at every step. Topics have been prescribed to fulfil these objectives.

The students are supposed to come in proper workshop dress. Wearing shoes in the workshop is compulsory.

S.No.	Topic	No. of Jobs	No. of Periods
01	Safety precautions and knowledge of hand tools	--	(03)
02	Duty & Responsibility of staffs working difference section.	02	(03)
03	Wood working (carpentry section)	02	(30)
04	Fitting Section	02	(30)
05	Blacksmithy Section	02	(20)
06	Welding	02	(19)
07	Sheet metal work	02	(15)
			(120)

CONTENTS:

TOPIC: 01 - SAFETY PRECAUTIONS & KNOWLEDGE OF HAND TOOLS: [03]

01.01 Importance, general safety precautions on different shop floors.
01.02 Personal, tools and general safety.

TOPIC:02 Dution & responsibility of staff working in different sections (03)

TOPIC: 03 - WOOD WORKING (CARPENTRY SECTION): [30]

02.01 Carpentry Practice
02.01.01 Use of hand tools for holding drilling, cutting, marking & mixed tools such as vice, clamps, saw, hammers, mallet, screwdriver etc. **[03]**
02.01.02 Different carpenter joints & their application (Mortish & Tanon, Dovetail, half lap etc. **[03]**
02.02 Identification of joint in a particular job articles of furniture items. **[04]**
02.03 Jobs to be made: **[20]**
02.03.01 Wall hanger
02.03.02 Pulse mixer

TOPIC: 04 - FITTING SECTION: [30]

03.01 Importance of fitting operation such as chipping, sawing, filling, scraping, drilling, reaming etc. **[03]**
03.02 Functions, classification of tools, work holding and clamping specific tools for example File (length, type, grade of cut etc.) vices, cold chiesel, hand tools etc. **[05]**
03.03 Use of hand dies & tape for pipe work (water and sans) **[03]**

03.04 Fitting practice & jobs **[19]**
03.04.01 Male female joint - 01
03.04.02 Chipping, Filling, Scraping - 01
03.04.03 Marking, fitting

TOPIC: 05 - BLACKSMITHY SECTION: **[20]**

04.01	Introduction to smithy tools and their uses	**[03]**
04.02	Smithy Practice (forging)	**[03]**
04.02.01	Smithy operation such as offsetting, drawing, bending, welding round to square section and vice-versa.	
04.03	Jobs to be made:	**[14]**
04.03.01	Chiesel	
04.03.02	Ring	
04.03.03	Punch	
04.03.04	Screw Driver	

TOPIC: 06 - WELDING: **[19]**

Before starting welding, the Foreman/ Instructor should show to the students the methods of line testing, working of iron clad switches, knife switches. **[03]**

By observation a student is able to:

- Identify welding materials
- Understand difference between gas welding & electric welding
- Understand difference between welding & soldering
- Know the materials which can be welded and materials which can not be welded.

05.01	Introduction to gas welding.	**[05]**
05.02	Use of welding equipment and tools and accessories including Personal Protective requirement such as Boot, Gloves, safety goggles, Apron etc.	
05.03	Welding Practice	**[11]**
05.03.01	Butt joint	
05.03.02	'T' joint	
05.04	Introduction to brazing process, filler material and fluxes application of brazing.	

TOPIC: 07 - SHEET METAL WORK: **[15]**

06.01	Introduction to sheet metal, procedure and safety precautions.	**[03]**
06.02	Aquaintance with sheet metal tools and their safe use.	
06.03	Sheet metal practice.	**[03]**
06.03.01	Simple Development and cutting, bending and shearing of sheet metal	
06.03.02	Marking	**[09]**
06.03.03	Filing & Finishing	
06.03.04	Fabrication of a sheet metal:	

- Cabinet
- Conical funnel

Books Recommended for Workshop Practice (Practical):

1.	Shop Theory	- By Anderson (Tata McGraw Hill)
2.	Workshop and Tools Hand Book	- Audel Series
3.	Workshop Technology	- Hajra & Choudhary

Reference Books:

1.	Workshop Practice	- Rajeev Upadhayay,
2.	Workshop Practice	- by N.T.T.T.I. Chanandigarh

WORKSHOP PRACTICE

Subject Code	Sessional			No of Period in one session :		
	No. of Periods Per Week			Full Marks	:	100
01109 /02209	L	T	P/S	Annual Exam.	:	60
	—	—	—	Internal Exam.	:	40

S.No.	Topic	No. of Jobs
1.	Wood Work (carpentry section):	
	(a) Wall Hanger	01
	(b) Pulse Mixer	01
2.	Fitting Section:	
	(a) Male-Female joint	01
	(b) Chipping, filing and scraping	01
3.	Blacksmithy Section:	
	(a) Chiesel	01
	(b) Ring	01
4.	Welding Section:	
	(a) Butt joint	01
	(b) "T" joint	01
5.	Sheet Metal Work:	
	(a) Fabrication of a sheet metal cabinet	01
	(b) Conical Funnel	01
		(10) jobs