

GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION, RAJASTHAN, JODHPUR
 TEACHING AND EXAMINATION SCHEME FOR
Diploma I Year (Common for All Branches of Engineering)
ANNUAL SCHEME SESSION 2018-2019 & ONWARDS

Code No.	Subject	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks
		Hours per week				Board's Exam.				Sessionals			
		L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU	PR(S)	
101	English & Communication Skills	1	--	2	3	70	3	--	--	30	--	50	150
102	Applied Physics	3	--	2	5	70	3	--	--	30	--	50	150
103	Applied Chemistry	2	--	2	4	70	3	--	--	30	--	50	150
104	Applied Mathematics	3	2/2	--	4	70	3	--	--	30	50	--	150
105	Computer & Information Technology Fundamentals	2	--	2	4	70	3	--	--	30	--	50	150
106	Applied Mechanics	2	2/2	2/2	4	70	3	--	--	30	25	25	150
107	Engineering Drawing	--	--	4	4	--	--	50	3	30	--	70	150
108	Workshop Practice	--	--	3	3	--	--	50	3	--	--	100	150
109	Electrical & Electronics Workshop	--	--	3	3	--	--	50	3	--	--	100	150
	Student Centred Activities *	--	--	2	2	--	--	--	--	--	--	--	--
	Total	13	2	21	36	420	--	150	--	210	75	495	1350
Grand Total :													1350

* Student Centred Activities include expert lectures/ practice sessions on technical topics of common interest, personality development, human values, yoga, industrial visits, art of living, environmental issues, quiz programmes, interview techniques, greening and cleaning the campus etc.

Student Centred Activities will be graded on the basis of attendance, interested learning of the student.

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|--|--|
| 1. L : Lecture | 5. PR : Marks for Board's Examination for Practicals |
| 2. T : Tutorial | 6. CT : Marks for Class Tests |
| 3. P : Practical | 7. TU : Marks for Tutorials |
| 4. TH : Marks for Board Examination for Theory | 8. PR(S) : Marks for Practical and Viva |

ENGLISH & COMMUNICATION SKILLS

CODE 101

L T P
1 - 2

RATIONALE

The students seeking admission to the diploma courses do not have the required proficiency in English. It has, therefore, been decided to introduce English and Communication Techniques to help them attain proficiency in the subject.

CONTENTS

	L
1. Narration, Voice, Basic Sentence Patterns (only five- SVA,SVO,SVOO,SVC,SVOC)	5
2. Transformation of Sentences Determiners, Preposition. Interchange of degree of comparison Interchange of Affirmative and negative sentences Interchange of Interrogative and Assertive sentences Transforming Simple to Compound sentence using And,Or,But,Either...or,Neither...nor,Not only..but also,As well as.	7
3. Tenses, Rearranging the jumbled sentences into meaningful ones.	7
4. Modals: Can, Could, Should, Will, Would, May, Might, Must, Need not, Dare not, ought to, Used to.	4
Short Story "The Three Questions" by Leo Tolstoy	
5. Composition - . Unseen Passage	1
6. Job Application with CV, General Application,E-mail,Dialogue	4
7. Essay Writing - Essays on general topics and topics related to environmental problems.	2

PRACTICALS

We envisage two successive stages for attaining skill in communication ability;

1. Listening
2. Speaking

We can club them together as shown above.

	P
1. Listening:	6
1.1 For improving listening skills the following steps are recommended,	
1.1.1 Listen to Prerecorded Tapes	
1.1.2 Reproduce Vocally what has been heard	
1.1.3 Reproduce in Written form	
1.1.4 Summarise the text heard	
1.1.5 Suggest Substitution of Words and Sentences	
1.1.6 Answer Questions related to the taped text	
1.1.7 Summarise in Writing	
2. Speaking:	6
2.1 Introducing English consonant-sounds and vowel-sounds.	
2.1.1 Remedial exercises where necessary	

- 2.2 Knowing Word stress
Shifting word stress in poly-syllabic words
[For pronunciation practice read aloud a para or page regularly while others monitor]
- 3. Vocabulary: 10**
- 3.1 Synonyms. Homonyms. Antonyms and Homophones
- 3.2 Words often confused, as for example,
[I-me; your-yours; its-it's; comprehensible-comprehensive; complement-compliment]
- 3.3 Context-based meanings of the words, for example,
- 3.3.1 man[N] man[vb]; step[[N] ,step[vb]
- 3.3.2 conflict _____ Israel Palestinian conflict
Emotional conflict,
Ideas conflict
- 3.3.3 learn _____ I learn at this school
I learnt from the morning news
- 4. Delivering Short Discourses: 15**
- 4.1. About oneself
- 4.2 Describing a Place, Person, Object
- 4.3 Describing a Picture, Photo.
- 5. Group Discussion : 15**
- 5.1 Developing skill to initiate a discussion [How to open]
- 5.2 Snatching initiative from others [Watch for weak points, etc.]
- 6. Expand a topic-sentence into 4-5 sentence narrative. 8**

Note:

1. The Medium of teaching and examination will be English.
2. The Question on Essay Writing (Unit-7) will be compulsory.
The student will have to attempt one essay out of two, touching upon given points .
3. At least on question will be set from each unit.
4. No theory question will be set from syllabus of practicals.

REFERENCE BOOKS:

- | | |
|---|--|
| 1. Intermediate English Grammar | Raymond Murphy,
Pub: Foundation Books,
New Delhi |
| 2. Eng. Grammar, usage & Composition | Tickoo & Subramanian
Pub: S.Chand and Co. |
| 3. A Practical Eng. Grammar
(and its Exercise Books) | Thomson and Martinet.
Pub : ELBS |
| 4. High School English Grammar
and Composition | Wren & Martin. |
| 5. Selected Stories by Leo Tolstoy | Rupa Publications |

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APPLIED PHYSICS

CODE 102

L T P
3 -- 2

RATIONALE

Physics is an applied science from which all engineering technologies have evolved, therefore, a thorough knowledge of the basic principles & applied aspects will help students understand, apply & evolve technologies more effectively and there by improve the life of the society.

CONTENTS

		L
1.	Units and Dimensions :	5
1.1	Idea of various systems of units SI units - Basic, Supplementary and Derived Units, Prefixes & Symbols	
1.2	Dimensions and Dimensional Formulae	
1.3	Principle of Homogeneity of Dimensions	
1.4	Dimensional Analysis	
1.5	Applications	
2.	Elasticity :	4
2.1	Elasticity	
2.2	Stress and Strain	
2.3	Elastic Limit & Hooke's law	
2.4	Young's Modulus, Bulk Modulus & Modulus of Rigidity, Poisson's Ratio	
3.	Properties of Liquids:	7
3.1	Surface Tension & Surface Energy	
3.2	Cohesive & Adhesive Forces	
3.3	Angle of Contact	
3.4	Capillarity & Surface Tension using capillary rise method (without derivation)	
3.5	Streamline & Turbulent Flow. Reynold Number.	
3.6	Viscosity & Coefficient of Viscosity	
3.7	Stoke's law & Terminal Velocity	
4.	Gravitation & Satellites:	6
4.1	Newton's law of Gravitation	
4.2	Acceleration due to Gravity	
4.3	Kepler's laws of Planetary Motion (statement only)	
4.4	Artificial Satellite (simple idea), Geo-Stationary Satellites	
4.5	Escape Velocity	
5.	Simple Harmonic Motion and Sound Waves:	10
5.1	Periodic motion, Simple Harmonic motion	
5.2	Displacement, Velocity, K.E., P.E. & Total Energy of a particle executing SHM.	
5.3	Velocity of Sound Waves - Newton's Formula and Laplace Correction	
5.4	Basic idea of progressive wave	
5.5	Superposition of Waves	
5.6	Stationary Waves (without mathematical analysis) & Resonance tube	
6.	Transfer of Heat:	6
6.1	Modes of Transmission of Heat - Idea of Conduction, Convection & Radiation	
6.2	Black Body	
6.3	Kirchoff's Law & Stefan Boltzmann Law (statement only)	
6.4	Newton's Law of Cooling & its Derivation from Stefan's Law	
6.5	Laws of thermodynamics (Statement only)	
7.	Electrostatics:	10
7.1	Coulomb's Law	
7.2	Intensity of Electric Field, Intensity due to a Point Charge	
7.3	Electric Lines of Forces & its properties	

	7.4	Electric Potential, Electric Potential due to a Point Charge	
	7.5	Capacitance, Idea of parallel plate capacitor and its combination	
8.	D.C. Circuits:		7
	8.1	Ohm's Law , Resistance and Resistivity,	
	8.2	Resistance in Series and Parallel and their Combination	
	8.3	Kirchoff's Laws	
	8.4	Wheatstone Bridge and its application – Meter bridge	
	8.5	Principle of Potentiometer and its applications	
9.	A.C.Circuits		7
	9.1	Faraday's Laws of Electro Magnetic Induction, Lenz's Law	
	9.2	Self and Mutual Inductance (without derivation)	
	9.3	Instantaneous, Average and rms value of AC	
	9.4	Behaviour of Resistance, Capacitance and Inductance in an AC Circuit	
10.	Basic Electronics : An Introduction		8
	10.1	Energy Bands in Conductor, Semi Conductor & Insulator	
	10.2	Intrinsic and Extrinsic Semiconductors	
	10.3	PN-Junction Diode, Working, Biasing and Characteristics Curves	
	10.4	Half Wave & Full Wave Rectifiers (only working, no derivations)	
	10.5	Introduction of Transistors	
11.	Modern Physics:		14
	11.1	Photo Electric Effect	
	11.2	Einstein's Photoelectric Equation	
	11.3	Lasers - Stimulated Emission and Population Inversion	
	11.4	He - Ne gas Laser and Ruby Laser	
	11.5	Brief Introduction to Nano materials	
	11.6	Idea of Nuclear Force, Fission and Fusion	
	11.7	Principle and working of Nuclear Reactor	
12.	Pollution and its control:		6
	12.1	Pollution – An Introduction	
	12.2	Types of Pollution – Noise and Nuclear Pollution	
	12.3	Noise Pollution and its Control	
	12.4	Nuclear Pollution and its Control	

PRACTICALS

1. To measure internal dia, external dia and depth of a calorimeter using vernier callipers.
2. To measure density of a wire using screw gauge.
3. To measure radius of curvature of a lens or mirror using spherometer.
4. To determine refractive index of glass using prism.
5. To determine the refractive index of glass using travelling microscope
6. To determine focal length of a convex lens by displacement method.
7. To measure surface tension of water by capillary rise method.
8. To determine the velocity of sound at 0^oc using resonance tube.
9. To determine Young's modulus of elasticity using Searle's apparatus.
10. To determine acceleration due to gravity using simple pendulum.
11. To verify Newton's law of cooling.
12. To establish relation between resistance of a wire and its length using Ohm's law.
13. To verify series or parallel law of resistances.
14. To determine specific resistance of material using meter bridge.
15. To determine internal resistance of a primary cell using potentiometer.
16. To compare emf of two primary cells using a potentiometer.
17. To draw characteristic curves of PN Diode and determine its static and dynamic resistance.
18. To draw characteristic curves of a PNP/NPN transistor in CB/CE configuration.

REFERENCE BOOKS

- | | |
|-----------------------------------|-------------------------|
| 1. Engineering Physics | Gaur & Gupta |
| 2. Engineering Physics | S.L. Kakani & S. Kakani |
| 3. Applied Physics Vol.-I | Hari Harlal, NITTTR |
| 4. Applied Physics Vol.-II | Hari Harlal, NITTTR |
| 5. A Text Book of Applied Physics | N.S. Kumar |
| 6. Principles of Physics | Brijlal, Subhramanyam |
| 7. Fundamental of Nano science | S.L. Kakani & S. Kakani |

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2018-19

APPLIED CHEMISTRY

CODE 103

L	T	P
2	--	2

RATIONALE

It is essential that one has to understand the fundamentals of basic sciences before trying to learn their application in various branches. In framing the curriculum of chemistry, emphasis has been laid on the teaching of such topics, which have a bearing on the topics of various branches of engineering. With this object in view, some important fundamental topics of chemistry have been included in this syllabus.

CONTENTS

	L
1. Atomic Structure:	4
1.1 Constituents of the Atom	
1.2 Bohr's Model of the Atom	
1.3 Quantum Number	
1.4 Aufbau's Principle, Pauli's Exclusion Principle, Hund's Rule, $n + l$ Rule	
1.5 Electronic Configuration of Elements (s,p,d Block Elements)	
1.6 Introduction of Atomic, Molecular and Equivalent weight.	
2. Development of Periodic Table:	3
2.1 Modern Periodic Law, Long form of Periodic Table.	
2.2 Study of Periodicity in Physical and Chemical Properties with special reference to : - Atomic and Ionic Radii, Ionisation Potential, Electronegativity, Metallic Character.	
3. Electro Chemistry:	4
3.1 Ionisation, Degree of Ionisation, Factors which Influence Degree of Ionisation .	
3.2 Unit of concentration (Normality, Molarity, Molality and Formality)	
3.3 Basic principles of Acid & Base	
3.4 pH Value	
3.5 Buffer Solution	
4. Kinetic Theory of Gases:	3
4.1 Postulates of kinetic Theory	
4.2 Ideal Gas Equation, Vender Walls Equation	
4.3 Liquification of Gases, Critical Pressure and Critical Temperature for Liquification.	
4.4 Liquification of Gases by Joule – Thomson Effect, Claude's Method and Linde's Method	
5. Carbon Chemistry:	3
5.1 Definition of Organic Chemistry. Difference between Organic and Inorganic Compounds.	
5.2 Classification and Nomenclature - Open Chain and Closed Chain Compounds, IUPAC System of Nomenclature. (up to C5).	
6. Metals and Alloys:	3
6.1 General Principles and Terms listed in Metallurgy	
6.2 Metallurgy of Iron and Steel	
6.3 Different forms of Iron	
6.4 Effect of Impurities on Iron and Steel	
7. Pollution:	6
7.1 Water Pollution	
7.1.1 Causes and Effects	
7.1.2 Treatment of Industrial Water Discharges - Screening, Skimming and Sedimentation Tanks, Coagulation, Reductions, Chlorination, Biological Methods.	
7.2 Air Pollution	
7.2.1 Causes and Effects (BHOPAL GAS TRAGEDY)	
7.2.2 Control Methods – Electrostatic Precipitator, Scrubbers, Gravitational Setting Methods, by Plants.	

	7.3	Awareness on Green House Effect, Depletion of Ozone Layer and Acid rain.	
8.	Water:		6
	8.1	Sources of Water	
	8.2	Hardness of Water.	
	8.3	Degree of Hardness, Estimation of Hardness by EDTA method (only theory)	
	8.4	Disadvantages of Hardness	
	8.5	Softening Methods	
	8.5.1	Lime-Soda Method	
	8.5.2	Permutite Method	
	8.5.3	Ion -Exchange Method	
	8.6	Drinking Water, its Requisites, Purification and Sterilization of Water.	
9.	Fuels:		6
	9.1	Definition, Classification	
	9.2	Calorific Value (HCV and LCV)	
	9.3	Solid Fuels	
	9.4.1	Coal and Coke	
	9.4	Liquid Fuels	
	9.4.1	Petroleum and its Distillation	
	9.4.2	Cracking, Octane and Cetane Values of Liquid Fuels	
	9.4.3	Synthetic Petrol, Power Alcohol	
	9.5	Bio-Gas	
	9.6	Nuclear Fuels – Introduction to Fission and Fusion Reactions.	
10.	Corrosion:		3
	10.1	Definition	
	10.2	Theories of Corrosion	
	10.2.1	Acid Theory (Rusting)	
	10.2.2	Direct Chemical Corrosion or Dry Corrosion	
	10.2.3	Wet Corrosion or Electro-Chemical Corrosion (Galvanic and Concentration Cell Corrosion)	
	10.3	Protection from Corrosion by following methods-	
	10.3.1	Galvanisation	
	10.3.2	Tinning	
11.	Polymers:		6
	11.1	Definition	
	11.2	Plastics	
	11.2.1	Classification, Constituents	
	11.2.2	Preparation, Properties and Uses of Polythene, Bakelite Terylene, Nylon, Teflon and PVC (Polyvinyl Chloride).	
	11.3	Rubber	
	11.3.1	Natural Rubber, Vulcanisation	
	11.3.2	Synthetic Rubbers - Buna - N, Buna-S, Butyl and Neoprene	
	11.4	Biodegradable polymers	
12	Cement and Glass:		3
	12.1	Manufacturing of Portland cement	
	12.2	Chemistry of Setting and Hardening of Cement	
	12.3	Glass: raw materials, Varieties and Uses.	
13.	Lubricants:		5
	13.1	Definition, Classification	
	13.2	Properties of Lubricants: Viscosity, Oiliness, Flash Point, Fire Point, Acid Value, Saponificatin, Emulsification, Cloud and Pour Point.	
	13.3	Artificial Lubricants	

14 Miscellaneous Materials:

5

- 14.1 Refractories: Definition, Classification and Properties
- 14.2 Soap and Detergents: Definition, Properties and Uses
- 14.3 Superconductors
- 14.4 Optical Fibres

PRACTICALS

1. Identification of Acid and Basic Radicals in a Salt (Total Numbers = 05).
2. Characteristic tests of carbohydrates, fats and proteins in pure sample and their detection in given food stuffs.
3. Determination of Percentage Purity of an Acid by Titration With Standard Acid.
4. Determination of Percentage Purity of a Base by Titration with Standard Alkali Solution.
5. Determination of the Strength of Ferrous Sulphate using Standard Ferrous Ammonium Sulphate and Potassium Dichromate as Intermediate Solution .
6. Determination of melting point and boiling point of Compounds.
7. Determination of Heat of neutralisation between Acid and Base.
8. Determination of pH Values of Given Samples.
9. Determination of Hardness of Water by EDTA Method.
10. Estimation of Free Chlorine in Water.
11. Determination of Acid Value of Oil.
12. Preparation of Soap.

REFERENCE BOOKS :

- | | |
|---------------------------------------|--|
| 1. अनुप्रयुक्त रसायन | संगीता गोयल, कविता स्वामी एवं प्रभात कुमार |
| 2. Engineering Chemistry II (Hindi) | Mathur and Agarwal |
| 3. Chemistry of Engineering Materials | C.V. Agarwal |
| 4. Engineering Chemistry | P.C. Jain and Monika |
| 5. Engineering Chemistry | M.M. Uppal |
| 6. Engineering Chemistry | V.P.Mehta Jain Bros. Jodhpur |
| 7. Practical Chemistry for Engineers | Virendra Singh |
| 8. Hand book of Technical Analysis | Bannerji Jain Bros.Jodhpur |

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APPLIED MATHEMATICS

CODE 104

L T P
3 2/2 --

RATIONALE

Mathematics is the root of engineering. To understand the engineering subjects the knowledge of mathematics is required. This proposed syllabus of mathematics is essential for diploma students of every engineering branch. The maximum number of problems related to engineering should be given to the students in their home assignment. More and more practice of numerical problems is needed for the better understanding of the subject.

CONTENTS

		L	T
1.	1.1 Introduction to Different Types of Expansion:	3	1
	1.1.1 Factorial Notation, Meaning of $C(n, r)$, $P(n, r)$ (Only formula based problems) Binomial Expansion (Problems based on General term & Middle term)		
	1.2 Complex Number:	3	1
	1.2.1 Definition, algebraic Operations, Conjugate, Modulus, Amplitude and representation in Polar form		
2.	Trigonometry:	9	3
	2.1 Allied Angle ($\sin(180 \pm A)$, $\sin(90 \pm A)$ etc.,		
	2.2 Sum and Difference Formula (without proof) and their Application		
	2.3 Product Formula and C-D Formula (Simple problems)		
	2.4 T-Ratios of Multiple and Sub-Multiple Angles ($2A$, $3A$, $A/2$)		
	2.5 Solution of Trigonometric Equations : $\sin X = 0$, $\tan X = 0$, $\cos X = 0$		
3.	Matrices and Determinants:	9	3
	3.1 Definition and Study of different type of Matrices (e.g. Transpose, Symmetric, Skew Symmetric, Orthogonal, Hermitian and Skew Hermitian matrices) Determinants, Minors, Cofactors, Ad joint and Inverse of a Matrix.		
	3.2 Cramer's Rule		
	3.3 Solution of Simultaneous Linear Equations by Inverse Matrix Method.		
4.	Two Dimensional Coordinate Geometry:	9	3
	4.1 General Introduction, Distance Formula and Ratio Formula, Area of Triangle		
	4.2 Straight Line, Slope form, Intercept form, Perpendicular form, One Point Slope form, Two Point form & General form		
	4.3 Angle between Two Lines, Perpendicular Distance of a Line from a Point		
5.	Conic:	6	2
	5.1 Definition, Standard Equations, Problems on Equation of Tangent and Normal at a Point of Circle.		
	5.2 Definition & Standard equations of conics (Definitions of Axis, Vertex, Focus, Eccentricity, Directrix; Length of latus rectum)		
6.	Function:	9	3
	6.1 Definition, Range and Domain, Standard Function (e.g. Absolute, Exponential, Identity, Reciprocal, Rational, Irrational, Increasing and decreasing)		
	6.2 Limits of all Standard Functions		
	6.3 Concept of Continuity (Using L.H.L. & R.H.L.) Differentiability at a Point (Using L.H.D. & R.H.D.)		
7.	Differential Calculus :	12	4
	7.1 Differentiation of Standard Function (e.g. Function of a function, Logarithmic, Implicit, Parametric)		
	7.2 Trigonometric, Transformations : Differentiation of a Function w.r.t. another function		
	7.3 Geometrical meaning of dy/dx . Tangents and Normals, Angle of intersection between two curves, Error & Approximation (Only formula based problems)		

- 8. Integral Calculus :** 12 4
 Definition, Methods of Integration (e.g. Simplification, Substitution and by parts);
 Integration of Rational functions (Problems based on Partial fractions, $1/x^2 - a^2$, $1/x^2 + a^2$,
 $1/a^2 - x^2$)

 Integration of trigonometric functions $\sin^n x$, $\cos^n x$, $\sin^m x \cos^n x$, $1/(a + b \sin^2 x)$,
 $1/(a + b \cos^2 x)$, $1/(a \cos^2 x + b \sin^2 x)$

 Definite Integral and its properties (Direct property based problems)
- 9. Differential Equations :** 9 3
 9.1 Definition of differential Equation. Order, Degree of a differential Equation.
 9.2 Solution of First Order and First Degree D.E. by different methods (Separation of variables, substitution, Homogenous, Reducible to Homogenous Form & Linear D.E.)
 9.3 Solution of Homogeneous Linear Differential Equation of Second & Third order with Constant Coefficients (Simple problems)
- 10. Vector Algebra:** 9 3
 10.1 Definition, Addition and Subtraction of Vectors
 10.2 Scalar and Vector Product of two Vectors, Scalar Triple Product and Vector Triple Product
 10.3 Applications of Vectors in Engineering Problems (Problems based on work & moment of a force about any point)

REFERENCE BOOKS:

- | | |
|---------------------------------------|--|
| 1. Applied Mathematics | Dr. D.K.S. Rewar , Dr. S. K. Sharma, O.P. Baheti |
| 2. Applied Mathematics | Dr. D.C. Gokhroo |
| 3. Polytechnic Mathematics | H. K. Dass |
| 4. Text Book on Differential Calculus | Chandrika Prasad |
| 5. Text Book on Integral Calculus | Chandrika Prasad |
| 6. Differential Calculus | M. Ray, S. S. Seth, & G. C. Sharma |
| 7. Integral Calculus | M. Ray, S. S. Seth, & G. C. Sharma |

COMPUTER AND INFORMATION TECHNOLOGY FUNDAMENTALS

CODE 105

L T P
2 -- 2

RATIONALE

Day by day use of computer is increasing for correct, speedy and concise work So it is very essential to educate every technocrat in computer education so that it can be used in regular work. The contents of this course have been developed with a view to give the students a computer fundamental such as components and operating system. After getting the fundamental knowledge students may go through the advanced field very smoothly. Information processing and transferring with concise and consistent was is the major goal behind Information Technology. In the present Information Technology scenario a technician should be familiar with basics of Information Computer Communication and Internet.

CONTENTS

	L
1. Introduction:	10
1.1 Computer: An Introduction	
1.2 Generation of Computers & Types: Micro, Mini, Main Frame, Super, Lap Top.	
1.3 Components of Computer:	
1.3.1 Block Diagram of Computer	
1.3.2 Central Processing Unit (CPU)	
1.3.3 Input/Output Devices: Keyboard, Mouse (Optical), Scanner, Web Camera, Monitor (CRT, TFT, LED), Printers, Bar Code Reader.	
1.3.4 Memory Unit: RAM, ROM, Cache	
1.3.5 Secondary Storage Devices: Hard Disk, CD, DVD, Pen Drive	
2. Data Representation	10
2.1 Bit, Byte.	
2.2 Number System: Decimal, Binary, Octal, Hexadecimal	
2.3 Number system conversions	
2.4 Arithmetic Operations (Addition, Subtraction using Binary Number System)	
2.5 Introduction of 1s, 2s Compliment	
3. Operating System	5
3.1 Idea of: Hardware, Software	
3.2 Computer Languages and Translators:	
3.2.1 Machine	
3.2.2 Assembly	
3.2.3 High Level Language	
3.2.4 Translators: Assembler, Interpreter, Compiler	
3.3 Definition of Operating System (OS)	
3.4 Types of OS	
3.4.1 Single user	
3.4.2 Multi user	
3.4.3 Time Sharing	
3.4.4 Multi Processing	
4. Introduction to Windows OS:	15
4.1 Introduction to Windows Environment	
4.2 Parts of Windows Screen	
4.3 Icon, Menu, Start Menu	
4.4 Minimising, Maximising, Closing Windows.	
4.5 Windows Explorer, Recycle Bin, My Computer, My Network Places	
4.7 Accessories: Paint, System Information, Run, Notepad, Caculator, Calander.	
5. Information Concepts and Processing:	5
5.1 Definition of Data, Information	
5.2 Need of Information	

5.3	Quality of Information	
5.4	Concepts of Data Security, Privacy, Protection, Encryption, Decryption	
5.5	Computer Virus and their types	
5.6	Scanning & Removing Virus	
6.	Computer and Communication:	15
6.1	Need of Data Transmission	
6.2	Data Transmission Media: Twisted pair, Coaxial, Fiber Optical.	
6.3	Digital and Analog Transmission, Serial and Parallel Data Transfer, MODEM.	
6.4	Types of Networking: LAN, WAN, MAN, Bluetooth, WiFi, Hotspot	
6.5	LAN Topologies: Bus, Star, Ring, Hybrid, Mesh	
6.6	Introduction to Internet:	
6.6.1	Web Addressing: www, URL, IP address	
6.6.2	Web browsing, Web page, Search engines	
6.6.3	E-mail, E-Commerce	
7.	Introduction to M.S. Word, Excel and Power Point: Copy, Paste, Inserting, Moving, Delete, Redo, Undo, Find and Replace, Header & Footer, Sorting & Filtering, Spell Check, Create & Running, Slides, Printing & Saving	

PRACTICALS

		P
1.	Demonstration of Windows Environment	2
2.	Practice of using My Computer, Windows Explorer, My Network Places	4
3.	Practice of Paint	4
4.	Visit to Internet Site	2
5.	Creating e-mail Account, Sending and Receiving e-mails.	4
6.	Sending e-mail with Attachment & Signature	2
7.	Searching Web Page/ Site using Search Engine	4
8.	Word Processing:	15
8.1	Introduction to MS-Word	
8.2	Starting MS-Word	
8.3	Using Help	
8.4	Opening Document, Typing and Editing	
8.5	Operation Text and Object: Copying, Inserting, Moving, Deleting	
8.6	Copying from One Document to Other	
8.7	Undo, Redo, Spell Check, Find and Replace	
8.8	Formatting, Characters and Fonts, Spacing	
8.9	Page Setting: Header, Footer	
8.10	Print Preview and Printing	
8.11	Tables and Columns	
8.12	Auto Text and Auto correct	
9	Electronic Spread Sheet	15
9.1	Introduction to MS-Excel	
9.2	Starting Spread Sheet	
9.3	Editing the Worksheet	
9.4	Formula Entering	
9.5	Function Wizard	
9.6	Saving and Printing Work Book	
9.7	Charts and Graph	
9.8	Sorting and Filtering	
10	Power Point:	10
10.1	Introduction to Power Point	
10.2	Creating a Presentation/Slide	
10.3	Adding Animation in Slide	
10.4	Running a Slide Show	

REFERENCE BOOKS:

- | | | |
|----|---|---|
| 1. | Computer Fundamental | V.K. Jain, Standard Pub.& Distributors |
| 2. | PC Software for Windows made simple | R.K. Taxali, TMH |
| 3. | Mastering Windows 7/10 | TMH |
| 4. | BPB Computer Course
BPB in Hindi | BPB Editorial Board, |
| 5. | Introduction to Networking | NANCE, PHI |
| 6. | First Course in Computer Science | Sanjeev Saxena, Vikas
Publishing House |
| 7. | First Look Microsoft Office 2003 | Murray, PHI |
| 8. | Web Based Application Development
using HTML, DHTML, Javascript
Perl/ CGI | Ivan Beyross, TMH |
| 9. | Computer Networks | James Kurose |

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2018-19

APPLIED MECHANICS		L	T	P
CODE 106		2	2/2	2/2
RATIONALE				
The Subject deals with the understanding of basic concepts of statics and dynamics and its application to various disciplines of engineering. Knowledge of this subject is essential for all the disciplines of engineering for better understanding of their respective subjects.				
CONTENTS		L	T	
1.	FUNDAMENTALS OF MECHANICS	2	1	
	1.1 Definitions			
	1.2 Units			
	1.3 Different Types of Forces.			
2.	COPLANAR FORCES:	8	3	
	2.1 Resolution of Forces			
	2.2 Law of Parallelogram of Forces			
	2.3 Resultant of two or more Forces			
	2.4 Basic Conditions of Equilibrium			
	2.5 Lami's Theorem (No Proof)			
	2.6 Law of Polygon of Forces (Only Statement)			
3.	MOMENT:	6	3	
	3.1 Definitions, Units & Sign Convention			
	3.2 Principle of Moments			
	3.3 Application of Equilibrium Conditions for non-concurrent Forces			
4.	APPLICATION OF PRINCIPLES OF FORCES & MOMENTS:	5	2	
	4.1 Levers & their Types.			
	4.2 Reactions of Simply Supported Beams (Analytical Method)			
	4.3 Steel Yard.			
5.	CENTRE OF GRAVITY:	5	2	
	5.1 Concept			
	5.2 Centroid			
	5.3 Calculation of C.G. of Plain Geometrical Figures			
6.	FRICTION:	6	3	
	6.1 Types of Friction			
	6.2 Laws of Friction			
	6.3 Angle of Friction			
	6.4 Angle of Repose			
	6.5 Friction on Horizontal and Inclined Planes			
7.	SIMPLE MACHINES:	5	4	
	7.1 Basic Concepts			
	7.2 Loss in Friction			
	7.3 Screw Jack			
	7.4 Worm and Worm Wheel			
8.	RECTILINEAR MOTION:	4	2	
	8.1 Concept			
	8.2 Motion under Constant Velocity			
	8.3 Motion under Constant Acceleration			
9.	MOTION UNDER GRAVITY:	4	2	
	9.1 Concept			
	9.2 Vertical Motion			
10.	PROJECTILES:	4	2	
	10.1 Concept			
	10.2 Range, Maximum Height and Time of Flight			
	10.3 Equation of Trajectory			

11.	NEWTON'S LAWS OF MOTION:	3	2
	11.1 Definitions		
	11.2 Momentum and it's Unit		
	11.3 Application of Second Law of Motion		
12.	WORK, POWER AND ENERGY:	8	4
	13.1 Work Done by a Constant Force		
	13.2 Power		
	13.2.1 Indicated Power.		
	13.2.2 Brake Power.		
	13.2.3 Efficiency		
	13.3 Energy		
	13.3.1 Potential Energy		
	13.3.2 Kinetic Energy of Rectilinear Motion		

PRACTICALS

1. Use of Engineering Calculator.
2. Verification of the Law of Parallelogram and Polygon of Forces
 - 2.1 By using Force Board
 - 2.2 By using Force Table
3. Verification of the Principle of Moments in case of
 - 3.1 Compound Lever
 - 3.2 Bell crank Lever
4. Determination of Reactions in Case of Simply Supported Beams.
5. To Determine Coefficient of Friction between two Surfaces on
 - 5.1 Horizontal Plane
 - 5.2 Inclined Plane.
6. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Simple Wheel and Axle
7. Determination of Mechanical Advantage, Velocity Ratio and Efficiency Of differential Wheel and Axle
8. Determination of Mechanical Advantage, Velocity Ratio and Efficiency Of Single Purchase Crab
9. Determination of Mechanical Advantage, Velocity Ratio and Efficiency Of Double Purchase Crab
10. Determination of Mechanical Advantage, Velocity Ratio and Efficiency Of Worm and Worm Wheel
11. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Screw Jack
12. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of First System of Pulleys
13. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Second System of Pulleys
14. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Third System of Pulleys.

REFERENCE BOOKS:

- | | |
|------------------------------------|--------------------|
| 1. Engineering Statics (in Hindi) | Gokhru & Soni |
| 2. Applied Mechanics (in Hindi) | A. R. Paage |
| 3. Engineering Mechanics | D. S. Kumar |
| 4. Engineering Mechanics | R.S. Khurmi |
| 5. Engineering Mechanics | A. R. Basu |
| 6. Applied Mechanics Practical | TTC & LRDC Jodhpur |

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ENGINEERING DRAWING

CODE 107

L T P
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RATIONALE

Drawing is the language of engineers. It is the only media of expressing thoughts and imaginations for giving them the practical shape. For developing universal understanding, it is necessary to follow certain universal conventions. This subject is essential for all the discipline of engineering.

CONTENTS

Note: All drawing should be as per IS-SP: 46-2003.

- 1. Introduction of Drawing Instruments.**
- 2. Lines, Lettering and Dimensioning:**
 - 2.1 Types of Line
 - 2.2 Lettering – Single Stroke, Italics
 - 2.3 Various Systems of Placing the Dimensions
- 3. Geometrical Construction and Engineering Curves:**
 - 3.1 Regular Polygons of Given Side
 - 3.2 Conic sections – Construction of Ellipse, Parabola, Hyperbola
 - 3.3 Construction of Cycloid, Epicycloid and Hypocycloid
 - 3.4 Construction of Involute, Archimedean Spiral and Cylindrical Helix
- 4. Theory of Orthographic Projections:**
 - 4.1 Introduction of Projections, Reference Planes and Projectors
 - 4.2 Angle of Projections (First Angle and Third Angle Projections)
 - 4.3 System of Rotations
 - 4.4 Projection of Points in Different Quadrants
- 5. Projection of Lines:**
 - 5.1 Parallel to Both the Planes
 - 5.2 Parallel to One and Perpendicular to Other Planes
 - 5.3 Parallel to One and Inclined to Other Planes
 - 5.4 Inclined to Both the Planes
- 6. Projection of Planes:**
 - 6.1 Projection of Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular Planes.
 - 6.2 Plane Parallel to One & Perpendicular to Other
 - 6.3 Plane Perpendicular to Both the Planes.
 - 6.4 Plane Perpendicular to One and Inclined to Other Plane.
- 7. Projection of Solids:**
 - 7.1 Projection of Cube, Prism, Pyramid, Cylinder and Cone
 - 7.2 Projection of Solid whose Axis is Perpendicular to One and Parallel to Other plane.
 - 7.3 Projection of Solid Whose Axis is parallel to One and Inclined to Other Plane.
 - 7.4 Projection of Solid Whose Axis is Parallel to both the Planes (excluding inclined to both the planes)
- 8. Conversion of Pictorial Views into Orthographic Views:**
 - 8.1 Orthographic Projections of Simple Solid Object from Pictorial / Isometric view.
- 9. Section of Solids and Development of Surfaces:**
 - 9.1 Introduction of Sectional Planes
 - 9.2 Sectional Plane Perpendicular to one Reference Plane and Parallel to other
 - 9.3 Sectional Plane Perpendicular to one and inclined to other
 - 9.4 Section of all types of Geometrical Solids. viz, Prism, Pyramid, Cone and Cylinder.
 - 9.5 Apparent Section and True Section.
 - 9.6 Development of Surfaces of Regular Solids viz, Prism, Pyramid, Cone and Cylinder.
- 10. Sections and Conventions:**
 - 10.1 Conventional Method of Representing Full, Half, Removed, Revolved, Partial and Offset Section.

- 10.2 Section Lines for Different Material as per ISI Recommendations.
- 11. Rivets and Riveted Joints:**
- 11.1 Different Types of Rivets -Snap Head, Pan Head with Tapered Neck, Rounded Counter Sunk Head, Flat Counter Sunk Head.
- 11.2 Lap Joint - Single Riveted, Double Riveted (Chain Riveting and Zigzag Riveting)
- 11.3 Butt Joint - Single Riveted, Double Riveted Chain Riveting and Zigzag Riveting (using Single and Double Cover Plates)
- 12. Screw Threads and Fasteners:**
- 12.1 Classification of Threads
- 12.2 Profiles and uses of - Metric, BSW, B.A., American National, Square, ACME, Knuckle Threads
- 12.3 Machine Screw – Fillister, Flat Counter Sunk, Rounded Counter Sunk, Cup and Socket.
- 12.4 Set Screws – Oval, Conical, Flat and Cup Pointed
- 12.5 Hexagonal Bolt and Nut, Stud and Collar Stud.
- 13. Foundation Bolt and Locking Devices:**
- 13.1 Drawing and uses of Rag, Lewis and Eye Bolt
- 13.2 Locking by Simple Lock Nut, Split Pin and Spring Washer, Castle Nut, Locking by Plate
- 14. Keys and Pulleys:**
- 14.1 Drawing and uses of Various Types of Keys - Saddle Key - Hollow and Flat, Sunk - Rectangular, Square, Key with Gib Head, Woodruff Key
- 14.2 Straight Arms flat Belt Pulley
- 15. Shaft Couplings:**
- 15.1 Protected Type Flange Coupling.
- 16. Bearings:**
- 16.1 Simple Bush Bearing.
- 17. Building Drawing:**
- 17.1 Section of a Wall Including Foundation
- 17.2 Sectional Plan of One Room and Toilet from Given Sketch

PRACTICALS

- | | |
|---|----------|
| 1. Preparation of following on Imperial Size Drawing Sheet :- | P |
| 1.1 Geometrical Constructions and Engineering Curves. | 12 |
| 1.2 Projection of Lines | 10 |
| 1.3 Projection of Planes | 8 |
| 1.4 Projection of Solids | 10 |
| 1.5 Orthographic Projections of Simple objects | 16 |
| 1.6 Section and Development of Surfaces of Solids
i.e. Cone, Cylinder, Sphere etc. | 8 |
| 1.7 Section and Development of Surfaces of Prism and
Pyramids | 8 |
| 1.8 Riveted Joints. | 8 |
| 1.9 Screw Threads and Fasteners | 12 |
| 1.10 Pulleys | 8 |
| 1.11 Couplings | 6 |
| 1.12 Bearing | 6 |
| 1.13 Building Drawing | 8 |
- 2. Preparation of following Drawings in Sketch Book (Home Assignment) :**
- 2.1 Type of lines, letters
- 2.2 Projection of Points In Different Quadrants
Various Types of Rivet Heads
Section and Conventions
Set Screws
Machine Screws
- 2.7 Foundation Bolts, Keys

REFERENCE BOOKS:

- | | | |
|----|--|------------------|
| 1. | Engineering Drawing | N D Bhatt |
| 2. | Machine Drawing | N D Bhatt |
| 3. | Engineering Graphics | V. Laxmi Narayan |
| 4. | Machine Drawing | V. Laxmi Narayan |
| 5. | Engineering Drawing | P S Gill |
| 6. | Machine Drawing | M L Mathur |
| 7. | Engineering Drawing (Hindi) | B K Goyal |
| 8. | Mechanical Engineering Drawing (Hindi) | Gupta & Kumar |
| 9. | Engineering Drawing | A C Parkinson |

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2018-19

WORKSHOP PRACTICE

CODE 108

L T P

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RATIONALE

Every student of diploma course is expected to have the knowledge in basic shops like fitting, plumbing, carpentry, welding, sheet metal. It is expected that students should be able to carry out minor installation work / repair work of domestic appliances independently. The theoretical / practical knowledge thus gained will be helpful in achieving that end. With this view this subject is to be taught in all the branches of diploma.

CONTENTS

Note : A group of student shall be required to do practicals in all the shops during the year. The practical examination will be taken in the shops covered during the year. Theory parts of syllabus should be dealt with the respective practicals in practical classes. Students have to prepare a practical notebook showing the names, specifications and uses of tools and equipment for each shop with figures. This notebook shall be submitted at the time of the Board's practical examinations (PR).

<p>1. Carpentry Shop :</p> <p>Theory :</p> <p>Knowledge of Common Indian Timbers. Name, Functions, Material and Specifications of Common Hand Tools, Holding Tools, Cutting Tools, Measuring and Marking Tools used in Carpentry, Safety Measures.</p> <p>Introduction of Carpentry Joints and their relative Advantages and uses.</p> <p>Elementary Idea about the Wooden Polishing Work.</p>	<p>Exercises :</p> <ol style="list-style-type: none"> 1. Practice of planning, marking and sawing 2. Preparation of Cross-Half Lap Joint. 3. Preparation of Dovetail Joint 4. Preparation of Bridle Joint 5. Preparation of Mortise and Tenon Joint 6. Demonstration of Job on Wooden Polishing Work. 	<p>P</p> <p>30</p>
<p>2. Welding and Sheet Metal Shop:</p> <p>2.1 Welding Shop:</p> <p>Theory :</p> <p>Introduction to Welding and its Importance in Engineering Practices.</p> <p>Gas Welding : Name, functions and specification of tools and equipment used in gas welding . Different types of flames, gas cutting.</p> <p>Electric arc Welding (AC and DC) :Name, functions</p>	<p>Exercises :</p> <ol style="list-style-type: none"> 1. Preparation of a Butt Joint by Gas Welding. 2. Preparation of Lap Joint by Electric arc Welding. 3. Preparation of T-Joint by Electric arc Welding. 4. Preparation of a Butt Joint by Electric arc Welding.. 5. Demonstration on Soldering. 	<p>30</p>

and specification of tools and equipment used in Electric arc welding .
Common Welding Defects and Inspection, various type of Joints, end Edge Preparation.

Introduction to Soldering and Brazing.
Safety Precautions in Welding shop.

6. Demonstration on Gas Cutting.

2.2 Sheet Metal Shop:

Theory :

Introduction to sheet metal shop
Preliminary Idea of Simple Sheet Metal Operations, Different Types of Sheet Metal Edges and Joints. Development of Surface in Sheet Metal Work.
Name, Functions and Specification of Common Sheet Metal Tools and equipments.

Exercises :

Preparation of following utility Jobs involving various Sheet Metal Joints (Single and Double Hem Joints, Lap Joint, Grooved Seam Joint, Single and Double Seam Joint)
1. Preparation of a Soap Tray
2. Preparation of Funnel.

3. Fitting and Plumbing Shop:

30

3.1 Fitting shop:

Theory :

Introduction to fitting shop :
Name, Functions and Specification of various tools and equipments used in Fitting Shop.
Simple Operations in Fitting shop(Marking, Filing, Hack Sawing, Drilling and Tapping).

Safety Precautions in fitting shop.

Exercises :

1. Marking Filing & Hack Sawing Practice.
2. Production of Utility Job involving Marking, Filing and Hack Sawing.
3. Drilling and Tapping exercise on the above job.

3.2 Plumbing shop:

Theory :

Introductions to G.I. and PVC Pipes and their uses.

Names Functions and Specifications of Plumbing Tools and Accessories.
Different Pipe Fittings.

Exercises :

Cutting and Threading on G.I. Pipe
2. Exercise on PVC Pipe Fitting.
3. Repair of Taps and Cocks.

1. Workshop Technology
2. Workshop Technology

REFERENCE BOOKS:

- Gupta & Malani
Kumar & Mittal

- | | | |
|----|---------------------------------|-------------------|
| 3. | Workshop Technology | Hajra, Chaudhary |
| 4. | Workshop Technology | B.S. Raghhuwanshi |
| 5. | Workshop Technology (Hindi) | Tahil Maghnani |
| 6. | Workshop Technology (Hindi) | Vinay Kumar |
| 7. | Domestic Devices and Appliances | K.B. Bhatia |

2018-19

ELECTRICAL & ELECTRONICS WORKSHOP

CODE 109

L T P
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A - ELECTRICAL WORKSHOP

		P
1.	Study of Symbol, Specification and Approximate Cost of Common Electrical Accessories, Tools and Wires & Cables Required for Domestic Installation.	6
2.	Study of :	3
	2.1 Basic Electricity Rules for a Domestic Consumer	
	2.2 Safety Precautions & use of Fire Fighting Equipments	
3.	Use of series of Phase Tester, Series Test Lamp, Tong Tester and Megger in Testing of Electrical Installation.	3
4.	Measurement	3
	4.1 Prepare a Potential Divider and Measure Resistance of a Filament Lamp Using Voltmeter and Ammeter.	
	4.2 Measurement of Power and Energy Consumption by an Electric Heater using Watt Meter and Energy Meter.	
5.	Preparation of Wiring Diagram, Wiring, Testing, Fault Finding & Costing for :	9
	5.1 Control of one LED Lamp by one Switch (using casing capping & Flush type switch)	
	5.2 Control of Stair Case Wiring (using Casing Capping, CFL and Flush Type Switches)	
	5.3 Control of one Bell Buzzer and Indicator by one Switch (using Conduit and Flush type Switch)	
6.	Prepare one Switch Board as per Institutional Requirement (using Flush type Switches, Sockets, MCB, Etc.)	3
7.	Study, Connecting, Testing and Fault Finding of	6
	7.1 Fluorescent Tube and its Accessories	
	7.2 Ceiling Fan with resistance type and Electronic Regulator	
8.	Study & Functioning, of following Domestic Appliances -	6
	8.1 Automatic Electric Iron	
	8.2 Air Cooler	
	8.3 Electric Water Pump	
9.	Design, Draw and Estimate the Material required for Installation For a small Residential Building / Office / Hall.	6
*	Accessories used in all above Experiments must be According to Latest Technology.	

B - ELECTRONICS WORKSHOP

		P
1.	Identification of following Resistors and finding their Values:	3
	1.1 Fixed Resistor	
	1.2 Variable Resistance .	
	1.3 Semi Variable Preset .	
2.	Identification of following Capacitor and finding their Values:	3
	2.1 Ceramic	
	2.2 Polystyrene	
	2.3 Electrolytic	
	2.4 Tantalum	
3.	Identification of following Switches and Study of their Working Mechanism:	3
	3.1 Toggle switch	
	3.2 Slide switch	
	3.3 Rotary switch	
	3.4 Push to on Push to off	

3.5	Momentary Switch	
3.6	Electromagnetic Switch	
3.7	SPST, SPDT, DPST, DPDT	
4.	Identification and Testing of following type of Connectors:	3
4.1	Printed Circuit Edge	
4.2	Coaxial	
4.3	Tape & Ribbon	
4.4	Plug and Socket connector	
4.5	USB connector	
4.6	Power connector	
4.7	Radio Frequency connector	
5	Study of following Tools used in Electronic Workshop:	3
5.1	Component Lead Cutter	
5.2	Wire Strippers	
5.3	Soldering Iron & Soldering Station	
5.4	De-Solder Pump	
5.5	Tweezers, Noise Pliers, Screw Driver	
5.6	LCR meter	
5.7	Power Supply	
5.8	Signal Generator	
6.	Measurement of Voltage, Current and Resistance using Analog & Digital Multimeter.	3
7.	Testing of Electronic, Component such as Capacitor, Inductor, Diode and Transistor.	3
8.	Measurement of Amplitude & Frequency of a Signal using CRO.	6
9.	Verification of Ohm's law using Resistive Circuit and Analog/ Digital Meters.	6
10.	Soldering of different passive component combination on general purpose PCB.	6
11.	Sketching of different Electronic Components Symbol on Drawing Sheet.	3

REFERENCE BOOKS:

1.	Electrical Workshop	M.L. Gupta
2.	Domestic Devices & Appliances	K.B. Bhatia
3.	Electrical Workshop	S.L. Uppal
4.	Electrical Component & Shop Practice	K.R. Nahar
5.	Maintenance of Electrical Equipments	K. S. Janwal
6.	Hand Book of Philips Component	

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