Diploma I Year (Common for All Branches of Engineering)
COMBINED (Yearly & Semester) SCHEME SESSION 2006-2007 & **ONWARDS**

Code No.	Subject	Distribution of Time Hours per week				Distribution of Max. Marks/ Duration Board's Exam.				Sessionals			Total Marks
		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	--	--	100	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	--	180	75	525	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.

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 to attain proficiency in the subject.

CONTENTS

		L
1.	Narration, Voice, Basic Sentence Patterns. (Nine basic sentence patterns)	**5**
2.	Transformation of Sentences, Determiners, Preposition.	**7**
3.	Tenses, Common errors (Noun, Pronoun, Articles, Adverb, Punctuation, Preposition etc.)	**7**
4.	Modals in Conversational Usage, Prefix, Suffix, Idioms & Phrasal verbs :	**4**

Modals

Can, Could, Should ,Will, Would, May, Might, Must, Need not, Dare not, Ought to, Used to.

Phrases

At all; In stead of; In Spite of; As well as; Set up; Up set; Look up; Call off; Call out; Come across; Set right; Look other.

Idioms

Work up (excite); Break down; Stand up for; Turn down; Pass away; Pass on; Back up; Back out; Carry out; Done for (ruined); Bring about; Go through; Ran over; Look up (improve); Pick out (selected).

5.	Composition - 1. Unseen Passage, Precis Writing	**2**
6.	Letter Writing, Paragraph Writing, Report Writing	**3**
7.	Essay Writing - Essays on general and local 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 excercises 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 ——— 1 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 the given points on general/ local topic related to environmental problems.
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. Living Eng. Structure   Stannard Alien.
                                                            Pub: Longman
4. A Practical Eng. Grammar   Thomson and Martinet.
   (and its Exercise Books)   Pub : ELBS
5. High School English Grammar   Wren & Martin.
   and Composition

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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 :   **6**
   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 and Limitations

2.   Elasticity :   **4**
   2.1   Elasticity
   2.2   Stress and Strain
   2.3   Elastic Limit & Hooke's law
   2.4   Young's Modulus, Bulk Modules & Modulus of Rigidity,
             Poisson's Ratio

3.   Properties of Liquids: 7
    3.1   Surface Tension & Surface Energy
    3.2   Cohesive & Adhesive Force
    3.3   Angle of Contact
    3.4   Capillarity & Expression for Surface Tension
    3.5   Streamline & Turbulent Flow
    3.6   Reynold Number.
    3.7   Viscosity & Coefficient of Viscosity
    3.8   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
    4.6   Velocity & Time Period of an Artificial Satellite.

5.   Sound Waves: 8
    5.1   Velocity of Sound Waves
             5.1.1   Newton's Formula
             5.1.2   Laplace Correction
             5.1.3   Factors affecting Velocity of Sound Waves
    5.2   Propagation of Progressive Wave, Displacement, Velocity and
             Acceleration of a particle during propagation of wave
    5.3   Superposition of Waves
             5.3.1   Stationary Waves (without mathematical analysis)
             5.3.2   Resonance tube

6.   Transfer of Heat: 7
    6.1   Modes of Transmission of Heat - Idea of Conduction,
             Convection & Radiation
    6.2   Thermal Conductivity & Coefficient of Thermal Conductivity
    6.3   Black Body
    6.4   Kirchoff's Laws & Stefan Boltzmann Law (statement only)
    6.5   Newton's Law of Cooling & its Derivation from Stefan's Law

7.   Electrostatics: 7
    7.1   Coulomb's Law
    7.2   Intensity of Electric Field, Intensity due to a Point Charge
    7.3   Electric Lines of Forces & Electric Flux
    7.4   Electric Potential, Electric Potential due to a Point Charge

8.   D.C. Circuits :   7
    8.1   Resistivity, Effect of Temperature on Resistance
    8.2   Ohm's Law
    8.3   Resistance in Series and Parallel and their Combination

8.4   Kirchoff's Law
8.5   Wheatstone Bridge
8.6   Meter Bridge
8.7   Principle of Potentiometer

9.   A.C. Circuits: 8
9.1   Faraday's Laws of Electro Magnetic Induction, Lenz's Law
9.2   Self and Mutual Inductance
9.3   Alternating Current, Phase & Phase Difference
9.4   Instantaneous, Average and rms value of AC
9.5   Behaviour of Resistance, Capacitance and Inductance in an AC Circuit
9.6   AC Circuits Containing, R-L, R-C and LCR in Series
9.7   Power in AC Circuit and Power Factor
9.8   Choke Coil

10.   Semi Conductor Physics: 9
10.1   Energy Bands in Conductor, Semi Conductor & Insulator
10.2   Chemical Bonds in Semiconductor
10.3   Intrinsic and Extrinsic Semiconductors
10.4   PN-Junction Diode, Working, Biasing and Characteristics Curves
10.5   Zener Diode and Voltage Regulation using it
10.6   Half Wave & Full Wave Rectifiers (only working, no derivations)
10.7   Junction Transistors, Working, Biasing and Characteristic Curves
10.8   Brief Idea of Using Transistors as an Amplifier (without mathematical analysis)

11.   Modern Physics: 8
11.1   Photo Electric Effect
11.2   Einstein's Equation
11.3   Photo Cells
11.4   Lasers
     11.4.1   Stimulated Emission and Population Inversion
     11.4.2   Types of Laser - Helium Neon and Ruby Laser
     11.4.3   Application of Lasers (brief idea only)
         11.4.3.1 Material Processing
         11.4.3.2 Lasers in Communication
         11.4.3.3 Medical Applications

12.   Nuclear Physics: 8
12.1   Idea of Nuclear Force
12.2   Mass - Defect and Binding Energy
12.3   Nuclear Reactions,
12.4   Natural and Artificial Radioactivity
12.5   Law of Radioactive Disintegration
12.6   Half Life & Mean Life
12.7   Idea of Nuclear Fission and Fusion

12.8   Chain Reaction
12.9   Nuclear Reactor

13.   Pollution and its control: 5
13.1   Introduction to Pollution – Water, Air, Soil , Noise, Nuclear and
        mental pollution
13.2   Types of Pollution
13.3   Brief idea about Noise Pollution and its Control
13.4   Nuclear Hazards
13.5   Nuclear Waste Management

PRACTICALS

At least 15 experiments to be performed from the following list :-

1. To Measure Internal Dia, External Dia and Depth of a Calorimeter using
    Vernier Callipers.
2. To Measure Density of a Wire using Screwgauge
3. To Measure Radius of Curvature of a Lens, 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 Determine the Velocity of Sound at O^0c using Resonance Tube.
8. To Determine Young's Modulus of Elasticity using Searle's Apparatus.
9. To Determine Acceleration due to Gravity using Simple Pendulum.
10. To Verify Newton's Law of Cooling.
11. To Verify Law of Resistances.
12. To Determine Specific Resistance of Material using Meter Bridge.
13. To Determine Internal Resistance of a Primary Cell using Potentiometer.
14. To Compare emf of two Primary Cells using a Potentiometer.
15. To Draw Characteristic Curves of PN Diode and Determine its Static and
    Dynamic Resistance.
16. To Draw Characteristic Curves of a PNP/NPN Transistor in CB/CE
    Configuration.
17. To Measure Resistance of a Galvanometer by Half-Deflection Method.

REFERENCE BOOKS :

1. Engineering Physics   Gaur & Gupta
2. Applied Physics Vol.-I   Hari Harlal, NITTTR
3. Applied Physics Vol.-II   Hari Harlal, NITTTR
4. A Text Book of Applied Physics   N.S. Kumar
5.   Principles of Physics   Brijlal, Subhramanyam

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APPLIED CHEMISTRY

CODE 103
<div align="right">

L   T   P
2   --   2
</div>

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

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1.   **Atomic Structure**:   **4**
    1.1   Constituents of the Atom
    1.2   Bohr's Model of the Atom
    1.3   Quantum Number and Electronic Energy Levels
    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)

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. Electron Affinity. Electronegativity. Variation of Effective Nuclear Charge in a Period. Metallic Character.

3.   **Electro Chemistry:**   **4**
    3.1   Ionisation, Degree of Ionisation, Factors which Influence Degree of Ionisation .
    3.2   Hydrolysis – Degree of Hydrolysis, Hydrolysis Constant.
    3.3   pH Value
    3.4   Buffer Solution
    3.5   Electrolysis, Faraday's Laws of Electrolysis

4.   **Kinetic Theory of Gases:**   **3**
    4.1   Postulates of kinetic Theory
    4.2   Ideal Gas Equation, Pressure and Volume Corrections, Vender Walls Equations
    4.3   Liquefaction of Gases, Critical Pressure and Critical Temperature for Liquefaction.
    4.4   Liquefaction 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. (upto 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
   6.5   Effect of Alloying Elements in 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
           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,
           Problems on Calculation of Hardness
   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   Problems on Softening of Water
   8.7   Drinking Water, its Requisites, Purification and Sterilization of
           Water.

9.   Fuels: 6
   9.1   Definition, Classification
   9.2   Calorific Value (HCV and LCV) and Numerical Problems on
           Calorific Value
   9.3   Combustion of Fuels, Numerical Problems on Combustion
   9.4   Solid Fuels
           9.4.1   Coal and Coke
   9.5   Liquid Fuels
           9.5.1   Petroleum and its Distillation
           9.5.2   Cracking, Octane and Cetane Values of Liquid Fuels
           9.5.3   Synthetic Petrol, Power Alcohol

9.6   Bio-Gas

9.7   Nuclear Fuels – Introduction to Fission and Fusion Reactions.

10.   Corrosion: 3

10.1   Definition

10.2   Theories ff 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   Various Methods for Protection from Corrosion

11.   Polymers: 5

11.1   Definition

11.2   Plastics

    11.2.1   Classification, Constituents

    11.2.2   Preparation, Properties and Uses of Polythene, Bakelite Terylene and Nylon.

11.3   Rubber

    11.3.1   Natural Rubber, Vulcanisalion

    11.3.2   Synthetic Rubbers - Buna - N, Buna-S, Butyl and Neoprene

12   Cement and Glass: 3

12.1   Manufacturing of Portland Cement

12.2   Chemistry of Setting and Hardening of Cement

12.3   Glass : Preparation, Varieties and Uses.

13.   Lubricants: 3

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: 4

14.1   Refractories : Definition, Classification and Properties

14.2   Abrasives : Natural and Synthetic Abrasives

14.3   Paint and Varnish : Definition and Function of Constituents

14.4   Soap and Detergents : Definition, Properties and Uses

15.   New Engineering Materials: (Brief Idea of Following)   4

15.1   Superconductors

15.2   Organic Electronic Materials

15.3   Fullerences

15.4   Optical Fibres

PRACTICALS

1. Identification of Acid and Basic Radicals in a Salt (Total Numbers = 5)
2. Analysis of a Mixture Containing Two Salts (Not Containing Interfacing Radicals). (Total Numbers = 5)
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 the Strength of Farrous Sulfate Solution using Standard Solution of Thiosulphate.
7. Determination of the Strength of Copper Sulphate Solution using a Standard Solution of thio Sulphate.
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 an Oil.
12. Preparation of Soap.

REFERENCE BOOKS :

1. Engineering Chemistry II (Hindi)   Mathur and Agarwal
2. Chemistry of Engineering Materials   C.V. Agarwal
3. Engineering Chemistry   P.C. Jain and Monika
4. Engineering Chemistry   M.M. Uppal
5. Engineering Chemistry   V.P.Mehta Jain Bros. Jodhpur
6. Practical Chemistry for Engineers   Virendra Singh
7. Hand book of Technical Analysis   Bannerji Jain Bros.Jodhpur
8. पर्यावरण अवबोध   ओझा
9. Engineering Chemistry-I(Hindi)   Mathur & Agrawal.
10. Inorganic Chemistry   Shivhare & Lavania.
11. Organic Chemistry   Kumar & Mehnot
12. Practical Engineering Chemistry   Dr Renu Gupta & Dr Sapana Dubey
13 प्रायोगिक रसायन विज्ञान   Dr R. S. Sindhu &
                                             Dr. Roshan lal pitalia
14. A Text book of Engineering Chemistry   S. K. Jain & K. D. Gupta
15. Engineering Chemistry   Dr. K.L. Menaria & Dr Praveen Goyal

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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:**	**6**	**2**

1.1.1   Factorial Notation
1.1.2   Meaning of C(n, r), P(n, r)
1.1.3   Binomial Theorem for Positive Index, any Index
1.1.4   Exponential Theorem
1.1.5   Logarithm Theorem

1.2   **Complex Number:**
1.2.1   Definition of Complex Number
1.2.2   Operations on Complex Number (Add., Sub., Multiplication, Division)
1.2.3   Conjugate Complex Number
1.2.4   Modulus and Amplitude of a Complex Number
1.2.5   Polar form of a Complex Number

2.   Trigonometry: 6   2
2.1   Allied Angle(sin (180±A), sin (90±A) etc.,
2.2   Sum and Difference Formula (without proof) and their Application
2.3   Product Formula and C-D Formula
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, sin X=A, cos X =A & tan x = A

3.   Matrices and Determinants: 7   2
3.1   Definition and Properties of Determinants
3.2   Definition and Types of Matrix
3.3   Transpose of a Matrix, Symmetric, Skew Symmetric Matrices, Orthogonal matrices, Hermitian and Skew Hermitian
3.4   Minors and Cofactors
3.5   Adjoint and Inverse of a Matrix
3.6   Cramer's Rule
3.7   Solution of Simultaneous Linear Equations by Inverse Matrix Method.
3.8   Characteristic Matrix, Characteristic Equation, Eigen Values & Vectors, Cayley Hamilton Theorem (verification only)

4.   **Numerical Integration :**   **6**   **2**
     4.1   Trapezoidal Rule
     4.2   Simpson's 1/3 Rule
     4.3   Simpson's 3/8 Rule
     4.4   Newton - Raphson Rule

5.   **Two Dimensional Coordinate Geometry:**   **10**   **3**
     5.1   General Introduction
     5.2   Distance Formula and Ratio Formula
     5.3   Co-ordinate of Centroid, In-Centre, Ortho-Centre and Ex-Centre of a Triangle
     5.4   Area of Triangle
     5.5   Straight Line, Slope form, Intercept form, Perpendicular form, One Point Slope form, Two Point form & General form
     5.6   Angle between Two Lines
     5.7   Perpendicular Distance of a Line from a Point

6.   **Conic:**   **8**   **3**
     6.1   **Circle :**
         6.1.1   Definition and Standard Equations
         6.1.2   Equations of Tangent and Normal at a Point (simple problems)
     6.2   **Parabola :**
         6.2.1   Definition and Standard Equations
         6.2.2   Equations of Tangent and Normal at a Point (Simple problems)
     6.3   **Ellipse and Hyperbola :**
         6.3.1   Definition and Standard Equations
         6.3.2   Equations of Tangent and Normal at a Point (simple problems)

7.   **Function:**   **10**   **3**
     7.1   Definition of Function
     7.2   Range and Domain of Function
     7.3   Types of Function
         7.3.1   Absolute Value Function
         7.3.2   Exponential value Function
         7.3.3   Identity Function
         7.3.4   Reciprocal Function
         7.3.5   Rational and Irrational Function
         7.3.6   Increasing and decreasing Function
     7.4   Limits
         7.4.1   Concept of Limit
         7.4.2   L.H.L., R.H.L.
         7.4.3   Limit of Standard Functions

$$\lim_{x \to 0} \frac{\sin x}{x}, \quad \lim_{x \to 0} \frac{\cos x}{x}, \quad \lim_{x \to 0} \frac{\tan x}{x}$$

$$\lim_{x \to a} \frac{x^n - a^n}{x - a}, \quad \lim_{x \to 0} \frac{e^x - 1}{x}, \quad \lim_{x \to 0} \frac{a^x - 1}{x}$$

$$\lim_{x \to 0} \frac{\log(1 + x)}{x} \quad (\text{ simple problems })$$

    7.5   Concept of Continuity and Differentiability at a Point (simple Problems)

8. **Differential Calculus :**   7   3
    8.1   Standard Formulae (Except Hyperbolic Function)
        8.1.1   Derivative of Sum, difference, Multiplication and Division of two Functions
        8.1.2   Differentiation of Function of a Function
        8.1.3   Logarithmic Differentiation
        8.1.4   Differentiation of Implicit Functions
        8.1.5   Differentiation of Parametric Functions
        8.1.6   Differentiation by Trigonometric Transformations
        8.1.7   Differentiation of a Function w.r.t. Another Function
    8.2   Second Order Derivative

9. **Applications of Differential Calculus:**   7   3
    9.1   Geometrical meaning of dy / dx . Tangents and Normals
    9.2   Angle of Intersection between two Curves
    9.3   Derivative as a Rate Measurer
    9.4   Errors and Approximations
    9.5   Maxima and Minima of Function with one Variable

10. **Integral Calculus:**   8   2
    10.1   General Introduction of Integral Calculus
    10.2   Integration of Sum and difference of Functions.
    10.3   Integration by Simplification
    10.4   Integration by Substitution
    10.5   Integration by Parts
    10.6   Integration of Rational and Irrational Functions

$$\int \frac{dx}{x^2 \pm a^2}, \int \frac{dx}{a^2 - x^2}, \int \frac{dx}{x\sqrt{x^2 - a^2}}, \int \frac{dx}{x\sqrt{x^2 \pm a^2}}, \int \frac{dx}{x\sqrt{a^2 - x^2}},$$

$$\int \frac{dx}{ax^2 + bx + c}, \int \frac{dx}{\sqrt{ax^2 + bx + c}}, \int \sqrt{a^2 - x^2} \, . dx, \int \sqrt{x^2 - a^2} \, . dx$$

Additional standard formulae

$$\int e^{ax} \sin bx dx, \int e^{ax} \cos bx . dx$$

10.7   Integration of Trigonometric Functions

$$\int \sin^m x \cos^n x\, dx, \int \frac{dx}{a+b\sin x}, \int \frac{dx}{a+b\cos x}, \int \frac{dx}{a+b\sin^2 x},$$

$$\int \frac{dx}{a+b\cos^2 x}, \int \frac{dx}{a\cos^2 x + b\sin^2 x}$$

10.8   Definite Integral and its Properties

11.   Differential Equations: **10**   **3**

11.1   Definition of differential Equation. Order, Degree and Solution of a differential Equation.

11.2   Solution of a differential Equation of First Order and First Degree using:

    11.2.1   Variable Separable Method

    11.2.2   Homogenous Form

    11.2.3   Reducible to Homogenous Form

    11.2.4   Linear differential Equation

    11.2.5   Bernoulli's Equation

    11.2.6   Exact differential Equation

    11.2.7   Substitution Method

11.3   Solution of Linear Differential Equation of Higher order with Constant Coefficients

11.4   Applications of Differential Equations to L-R, L-C, L-C-R Circuits of Standard Forms

12.   Vector Algebra: **5**   **2**

12.1   Definition, Addition and Subtraction of Vectors

12.2   Scalar and Vector Product of two Vectors

12.3   Scalar Triple Product and Vector Triple Product

12.4   Applications of Vectors in Engineering Problems

REFERENCE BOOKS :

1.   Mathematics XI & XII   NCERT, New Delhi

2.   Mathematics XI & XII   Rajasthan Board, Ajmer

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

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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: **12**

    1.1   Computer: An Introduction

    1.2   Generation of Computers & Types : PC, PC/XT, PC/AT, Main Frame, Super, Lap Top, Pam Top

    1.3   Data Representation

        1.3.1   Bit, Nibble, Byte, Word

        1.3.2   Number System : Decimal, Binary, Hexadecimal & their Conversions

        1.3.3   Arithmetic Operations (Addition, Subtraction using Binary Number System

        1.3.4   1s , 2s Compliment

        1.3.5   Coding Technique : BCD, EBCDIC, ASCII

    1.4.   Idea of:

        1.4.1   Hardware

        1.4.2   Software

        1.4.3   Firmware

        1.4.4   Free ware

        1.4.5   Human ware

    1.5   Computer Languages and Translators:

        1.5.1   Machine

        1.5.2   Assembly

        1.5.3   High Level Language

        1.5.4   Scripting Language

        1.5.5   Object Oriented Language

        1.5.6   Platform Independent Language

        1.5.7   Translators: Assembler, Interpreter, Compiler

2.   Introduction to Computer: 8

2.1   Central Processing Unit (CPU)
2.2   Memory Unit
2.3   Input/ Out Devices : Keyboard, Mouse (Optical), Digitizer, Scanner, Web Camera, Monitor (CRT, TFT) , Printers, Plotters, Bar Code Reader
2.4   Secondary Storage Devices : Floppy, Hard Disk, CD, DVD, Flash Drive
2.5   Block Diagram Showing Interconnection of Computer Parts

3.   Operating System :   2

3.1   Definition of Operating System (OS)
3.2   Types of OS
       3.2.1   Single user
       3.2.2   Multi user
       3.2.3   Multi Programming
       3.2.4   Time Sharing
       3.2.5   Multi Processing,

4.   Introduction to Windows XP: 7

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, Clipboard, My Computer, My Network Places
4.6   Control Panel : Adding New Hardware and Software, Display, Font, Multimedia, Mouse, International System
4.7   Accessories: Paint, Media Player, Scan disk, System Information

5.   Information Concepts and Processing: 3

5.1   Definition of Data, Information
5.2   Need of Information
5.3   Quality of Information
5.4   Concepts of Data Security, Privacy, Protection
5.5   Computer Virus and their types
5.6   Scanning & Removing Virus

6.   Computer and Communication: 7

6.1   Need of Data Transmission
6.2   Data Transmission Media
6.3   Baud rate and Bandwidth, Digital and Analog Transmission Serial and Parallel Data Transfer, Protocols, MODEM.
6.4   Networking of Computers : LAN, WAN, MAN, Blue tooth

6.6   LAN Topologies: Bus, Star, Ring, Hybrid
6.7   Introduction to Ports : RS232, IEEE 488, PS2, USB, UTP

7.   Internet: **6**

7.1   Introduction to Internet
7.2   Bridges, Routers, Switch, Gate way
7.3   www, Web Site, URL
7.4   e-mail, e-Commerce
7.5   Web browsing, Web page
7.6   Introduction to Hyper text & HTML
7.7   Introduction to http & ftp Protocol

8.   Information Processing: **12**
8.1.   Word processor
        8.1.1   Introduction to MS-Word
        8.1.2   Starting MS-Word
        8.1.3   Special Features of MS-Word
        8.1.4   Using Help
        8.1.5   Opening Document, Typing and Editing
        8.1.6   Copying, Inserting, Moving, Deleting
        8.1.7   Copying from One Document to Others .
        8.1.8   Undo, Redo, Spell Check, Find and Replace
        8.1.9   Formatting
                 8.1.9.1   Characters and Fonts
                 8.1.9.2   Spacing
                 8.1.9.3   Removing Characters Formatting
        8.1.10   Inserting Symbols
        8.1.11   Paragraphs.
        8.1.12   Page Setting
        8.1.13   Header and Footer
        8.1.14   Page Breaks
        8.1.15   Borders and Shading
        8.1.16   Print Preview and Printing
        8.1.17   Tables and Columns
        8.1.18   Mail Merge
        8.1.19   Auto Text and Auto correct
        8.1.20   Introduction to Macro

8.2   Electronic Spread Sheet
        8.2.1   Introduction to MS-Excel
        8.2.2   Working with Spread Sheet
        8.2.3   Editing the Worksheet
        8.2.4   Worksheet Formatting
        8.2.5   Formula Entering
        8.2.6   Function Wizard
        8.2.7   Saving and Printing Work Book
        8.2.8   Analysis Tools

8.2.9	Data Tools	
8.2.10	Charts	
8.2.11	Linking Work Sheets	
8.2.12	Report Wizard	
8.2.13	Data Base Application	

8.2.13.1 Data Base Components
8.2.13.2 Working with Database
8.2.13.3 Creating Excel Database
8.2.13.4 Adding Records using Data Form
8.2.13.5 Deleting Records using Menu Command
8.2.13.6 Deleting Records using Data Form
8.2.13.7 Editing Records
8.2.13.8 Finding Records based on Criteria

9.   Power Point: 3

9.1   Introduction to Power Point
9.2   Creating a Presentation/Slide
9.3   Adding Animation in Slide
9.4   Running a Slide Show

PRACTICALS

		P
1.	Study of Computer Components	2
2.	Practice of Computer Booting Process in XP	2
3.	Demonstration of Windows Environment	4
4.	Practice of using My Computer, Windows Explorer	2
5.	Practice of using Control Panel	2
6.	Practice of My Network Places	2
7.	Practice of CD and DVD Writing	2
8.	Practice of Paint	4
9.	Installation of Windows XP by using NTFS File System.	4
10.	Demonstration of Network	2
11.	Visit to Internet Site	2
12.	Creating e-mail Account , Sending and Receiving e-mails.	4
13.	Sending e-mail with Attachment & Signature	
14.	Searching Web Page/ Site using Search Engine :	4
	(eg. google.com, yahoo.com, altavista.com etc.)	
15.	Exercise Based on MS-Word:	8

15.1   Document Preparation
15.2   Printing Document
15.3   Mail Merge usage
15.4   Draw Table

16.	Exercise Based on Ms-Excel :	8

16.1   Work Book Preparation
16.2   Printing Workbook
16.3   Data-base usage
16.4   Draw Charts

17.	Exercise Based on Power Point :	4

17.1   Creating Slide

    17.2   Adding, Animations in Slide
    17.3   Running Slide

18.   Creating Simple Web Page using HTML.   **4**

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 XP   TMH
4. BPB Computer Course   BPB Editorial Board, BPB in Hindi
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 Pearl/ CGI   Ivan Beyross, TMH

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APPLIED MECHANICS

CODE 106   **L T P**
                           2 2/2 2/2

RATIONALE

      The Subject deals with the understanding of basic concepts of statics and dynamics and it's 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.	**Force:**	**2**	**1**
	1.1 Definition		
	1.2 Units		
	1.3 Different Types of Forces.		
2.	**Coplanar Forces:**	**5**	**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 Jib Crane		
	2.7 Law of Polygon of Forces (Only Statement)		
3.	**Moment:**	**5**	**2**
	3.1 Definition, 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: **4** **2**
4.1 Levers & their Types.
4.2 Reactions of Simply Supported Beams (Graphical & Analytical Method)
4.3 Steel Yard.
4.4 Lever Safety Valve
4.5 Foundry Crane

5. Centre of Gravity: **4** **2**
5.1 Concept
5.2 Centroid
5.3 Calculation of C.G. of Regular Bodies
5.4 Calculation of C.G. of Plain Geometrical Figures

6. Friction: **5** **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 Plains
6.6 Application of Laws of Friction Related to Wedge, Ladder and Screw Jack.

7. Simple Machines: **7** **4**
7.1 Basic Concepts
7.2 Loss in Friction
7.3 Inclined Plane
7.4 Simple & Differential Wheel and Axle (Neglecting Rope thickness)
7.5 Screw Jack
7.6 Lifting Crabs
7.7 Systems of Pulleys
7.8 Worm and Worm Wheel

8. Rectilinear Motion: **3** **1**
8.1 Concept
8.2 Motion under Constant Velocity
8.3 Motion under Constant Acceleration
8.4 Velocity-time graph and its uses

9. Motion under Gravity: **3** **2**
9.1 Concept
9.2 Vertical Motion
9.3 Smooth Inclined Plane

10. Projectiles: **4** **2**
10.1 Concept

  10.2 Range, Maximum Height and Time of Flight
  10.3 Equation of Trajectory
  10.4 Calculation of Velocity of Projectile at Certain Height
      And at Certain instant

11. **Newton's Laws of Motion:**   **3** **1**
  11.1 Definitions
  11.2 Momentum and it's Unit
  11.3 Application of Second Law of Motion

12. **Impact and Collision:**   **3** **1**
  12.1 Concept
  12.2 Impulse and Impulsive Force
  12.3 Law of Conservation of Momentum
  12.4 Collision Between Two Rigid Bodies
  12.5 Newton's Experimental Law of Collision, Coefficient of Restitution

13. **Circular Motion:**   **4** **2**
  13.1 Concept
  13.2 Motion under Constant Velocity
  13.3 Motion under Constant Acceleration
  13.4 Relationship between Linear Velocity and Angular Velocity
  13.5 Centrifugal and Centripetal Forces, their Applications

14. **Work, Power and Energy:**   **8** **4**
  14.1 Work Done by a Constant Force
  14.2 Work Done by Uniform Variable Force
      14.2.1 Power
          14.2.1.1 Indicated Power.
          14.2.1.2 Brake Power.
          14.2.1.3 Efficiency
          14.2.1.4 Power required for an Engine on Horizontal and
                 Inclined (smooth and rough) Planes.
      14.2.2 Energy
          14.2.2.1 Potential Energy
          14.2.2.2 Kinetic Energy of Rectilinear Motion
          14.2.2.3 Kinetic Rnergy of Circular 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.

15. Determination of Value of "g" by Simple Pendulum.

REFERENCE BOOKS:

1. Engineering Statics (in Hindi)   Gokhru & Soni
2. Applied Mechanics (in Hindi)   A. R. Paage
3. Applied Mechanics   I. B. Prasad
4. Engineering Mechanics   R.S. Khurmi
5. Engineering Mechanics   A. R. Basu
6. Applied Mechanics Practical   Soni & Chandel

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ENGINEERING DRAWING

CODE 107   **L   T   P**
                                                              --   --   4

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: 46-1988.

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, Archimedian Spiral and Cylindrical
                Helix

4.   **Scales:**
        4.1   Type of Scales (Reducing and Enlarging)
        4.2   Representative Fraction
        4.3   Plain and Diagonal Scales

5.   **Theory of Orthographic Projections :**
        5.1   Introduction of Projections, Reference Planes and Projectors
        5.2   Angle of Projections (First Angle and Third Angle Projections)
        5.3   System of Rotations
        5.4   Projection of Points in Different Quadrants

6.   **Projection of Lines :**
        6.1   Parallel to Both the Planes
        6.2   Parallel to One and Perpendicular to Other Planes
        6.3   Parallel to One and Inclined to Other Planes
        6.4   Inclined to Both the Planes
        6.5   True Length of a Line and its Apparent and True Inclinations

7.   **Projection of Planes :**
        7.1   Projection of Triangular, Square, Rectangular, Pentagonal,
                Hexagonal and Circular Planes.
        7.2   Plane Parallel to One & Perpendicular to Other
        7.3   Plane Perpendicular to Both the Planes.
        7.4   Plane Perpendicular to One and Inclined to Other Plane.

8.   **Projection of Solids :**
        8.1   Projection of Cube, Prism, Pyramid, Cylinder and Cone
        8.2   Projection of Solid whose Axis is Perpendicular to One and
                Parallel to Other plane.
        8.3   Projection of Solid Whose Axis is Parallel to One and Inclined to
                Other Plane.
        8.4   Projection of Solid Whose Axis is Parallel to both the Planes
                (excluding inclined to both the planes)

9. **Conversion of Pictorial Views into Orthographic Views :**
  9.1 Orthographic Projections of Simple Solid Object from Pictorial / Isometric view.

10. **Section of Solids and Development of Surfaces :**
  10.1 Introduction of Sectional Planes
  10.2 Sectional Plane Perpendicular to one Reference Plane and Parallel to other
  10.3 Sectional Plane Perpendicular to one and Inclined to other
  10.4 Section of all types of Geometrical Solids. viz, Prism, Pyramid, Cone and Cylinder.
  10.5 Apparent Section and True Section.
  10.6 Development of Surfaces of Regular Solids viz, Prism, Pyramid, Cone and Cylinder.
  10.7 Sectional Plan, Sectional Elevation and Sectional Side View and Development of Surface of Solid after Section.

11. **Isometric Projection :**
  11.1 Isometric Axes, Isometric Scale, Isometric Lines and Isometric Planes
  11.2 Isometric View and Isometric Projection of Plane (Square, Rectangular, Pentagonal Hexagonal, Circular)
  11.3 Isometric View and Isometric Projection of Prism, Pyramid, Cone, Cylinder, Sphere, their Frustum and Combination of these Solids.

12. **Sections and Conventions :**
  12.1 Conventional Method of Representing Full, Half, Removed, Revolved, Partial and Offset Section.
  12.2 Section Lines for Different Material as per ISI Recommendations.

13. **Rivets and Riveted Joints:**
  13.1 Different Types of Rivets -Snap Head, Pan Head with Tapered Neck, Rounded Counter Sunk Head, Flat Counter Sunk Head.
  13.2 Lap Joint - Single Riveted, Double Riveted (Chain Riveting and Zigzag Riveting)
  13.3 Butt Joint - Single Riveted, Double Riveted Chain Riveting and Zigzag Riveting (using Single and Double Cover Plates)

14. **Screw Threads and Fasteners:**
  14.1 Classification of Threads
  14.2 Profiles and uses of - Metric, BSW, Square, ACME, Knuckle, Sellers Threads
  14.3 Machine Screw – Fillister, Flat Counter Sunk, Rounded Counter Sunk, Cup and Socket.
  14.4 Set Screws – Oval, Conical, Flat and Cup Pointed
  14.5 Hexagonal Bolt and Nut, Stud and Collar Stud.

15. **Foundation Bolt and Locking Devices:**
     15.1   Drawing and uses of Rag, Lewis and Eye Bolt
     15.2   Locking by Simple Lock Nut, Split Pin and Spring Washer, Castle Nut, Locking by Plate

16. **Keys and Pulleys:**
     16.1   Drawing and uses of Various Types of Keys - Saddle Key - Hollow and Flat, Sunk - Rectangular, Square, Key with Gib Head, Woodruff Key
     16.2   Pulley - Straight Arms flat Belt Pulley, V-Belt Pulley

17. **Shaft Couplings:**
     17.1   Muff Coupling
     17.2   Protected Type Flange Coupling.

18. **Bearings:**
     18.1   Simple Bush Bearing.

19. **Building Drawing:**
     19.1   Introduction of Orientation and Sun Chart Diagram of Residential Building.
     19.2   Section of a Wall Including Foundation
     19.3   Sectional Plan of One Room and Toilet from Given Sketch

PRACTICALS

			P
1.		**Preparation of following on Imperial Size Drawing Sheet :-**	
	1.1	Lines, Letters and Scales	8
	1.2	Geometrical Constructions and Engineering Curves.	8
	1.3	Projection of Lines	10
	1.4	Projection of Planes	6
	1.5	Projection of Solids	10
	1.6	Orthographic Projections of Simple objects	12
	1.7	Section and Development of Surfaces of Solids i.e. Cone, Cylinder, Sphere etc.	8
	1.8	Section and Development of Surfaces of Prism and Pyramids	8
	1.9	Isometric Projections	10
	1.10	Riveted Joints.	6
	1.11	Screw Threads and Fasteners	8
	1.12	Pulleys	6
	1.13	Couplings	6
	1.14	Bearing	6
	1.15	Building Drawing	8

2.   **Preparation of following Drawings in Sketch Book (Home Assignment) :**

2.1 Lettering (On Graph Sheet)
2.2 Projection of Points In Different Quadrants
2.3 Isometric Projection of Various Planes
2.4 Various Types of Rivet Heads
2.5 Section and Conventions
2.6 Set Screws
2.7 Machine Screws
2.8 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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WORKSHOP PRACTICE

CODE 108   **L   T   P**
                                      --   --   3

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 :

1. 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 year.

2. Theory parts of syllabus should be dealt with the respective practicals in practicals classes.

3. 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 : 30

Theory :

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.

Introduction of Carpentry Joints and their relative Advantages and uses.

Elementary Idea about the Wooden Polishing Work.

Introduction to Various Carpentry Machine (Band Saw, Circular Saw, Wood Turning Lathe, Wood Planner)

Exercises :

1. Preparation of Cross-Half Lap Joint.
2. Preparation of Dovetail Joint
3. Preparation of Bridle Joint
4. Preparation of Mortise and Tenon Joint
5. Preparation of Mitre Joint
6. Demonstration of Job on Wooden Polishing Work.

2. Welding and Sheet Metal Shop: 30
2.1 Welding Shop:

Theory :

Introduction to Welding and its Importance in Engineering Practices, Common Materials that can be Welded.

Gas Welding Theory : Gas Welding Equipment Adjustment of different types of Flames, Practice in Handling Gas Welding Equipment .

Electric arc Welding Theory (AC and DC), Safety Precautions while using Electric arc Welding. Practice in Setting Current and Voltage for Striking Proper arc.

Common Welding Defects and Inspection, various type of Joints, end Edge Preparation.

Explain Soldering, Brazing and Tipping of Tools, Gas Cutting Theory

Exercises :

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. Demonstration on Brazing by the Instructor.
5. Demonstration on Soldering.
6. Demonstration on Gas Cutting.

2.2 Sheet Metal Shop:

Theory :

Name, Functions and Specification of Common Sheet Metal Tools Like Slakes, Hammers, Hand Snips, Hand Punches, Groovers, Rivet Sets,

Exercises :

Preparation of following utility Jobs Involving Various Sheet Metal Joints (Single and Double Hem Joints, Wired Edge, Lap Joint,

Chisels

Name and Function of Marking and Measuring Tools - Scale, Circumference Rule, Straight Edge, Scriber, Semi Circular Protector, Trammel.

Preliminary Idea of Simple Sheet Metal Operations, Different Types of Sheet Metal Edges and Joints, Riveting Methods. Development of Surface in Sheet Metal Work

Grooved Seam Joint, Single and Double Seam Joint) and Exercises (Soldering and Riveting Joints)
1. Preparation of a Soap Tray & Mug
2. Preparation of Funnel.

3. Fitting and Plumbing Shop: 30
3.1   Fitting shop:

Theory :
Introduction to different materials used in Fitting Shop. Description of Work Bench, Names, Functions and Specification of Holding Devices.

Specification of Files, Precautions While Filing.
Marking of Jobs, use of Marking and Measuring Tools.

What is Chipping, Where Chipping is done. Names Functions and Specifications of Chisels, Hammers etc.
Simple Operation of Hacksawing, different types of Blades, and their uses, Fitting of Blade in Hacksaw Frame.

Name, Functions and Specifications of Drills, Selection of Drills for Tapping, Types of Tapes, Tapping and Dieing Operations.
Precaution While Drilling Soft Metals, Specially Lead.

Exercises :
1. Marking Filing & Hack Sawing Practice.
2. Production of Utility Job involving Marking, Filling and Hack Sawing.
3. Production of Utility Job involving Marking, Filling and Hack Sawing Drilling and Tapping.

3.2   Plumbing shop:

Theory :
Classification of Pipes According to Materials and use I.S.I. Specification for Pipes. Introductions to Cement and PVC Pipes and their uses.

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

Names Functions and Specifications
of Plumbing Tools and Accessories-
such as Pipe Dies, Wrenches, and
Pipe Vices. Different Pipe Fittings.

REFERENCE BOOKS:

1.   Workshop Technology   Gupta & Malani
2.   Workshop Technology   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

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ELECTRICAL & ELECTRONICS WORKSHOP
CODE 109   **L   T   P**
                                                                          --   --   3

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.	4.1	Prepare a Potential Divider and Measure Resistance of a Filament Lamp Using Voltmeter and Ammeter.	**3**
	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 Lamp by one Switch (using Batten and Tumbler 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, ELCB, 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, Fault Finding & Repairing of following **6**
Domestic Appliances -

8.1   Automatic Electric Iron

8.2   Air Cooler

8.3   Electric Water Pump

9.   Design, Draw and Estimate the Material required for Installation **6**
For a small Residential Building/ Office/ Hall.

*   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   Carbon and Metal Film

1.2   Variable Resistance Log and Linear

1.3   Semi Variable Preset of One Turn & Multiturn

2.   **Identification of following Capacitor and finding their Values:**   **3**

2.1   Mica

2.2   Ceramic

2.3   Polysterene

2.4   Electrolytic

2.5   Tantalum

3.   **Identification of following Switches and Study of their Working Mechanism:**   **3**

3.1   Toggel

3.2   Bandswiteh

3.3   Rotary

3.4   Push to on and off

3.5   Press to on and off

4.   **Identification and Testing of following type of Connectors: 3**

4.1   Rack and Panel

4.2   Printed Circuit Edge

4.3   Coaxial

4.4   Tape & Ribbon

4.5   Plate

5.   **Study of Different Relays and their Contacts.**   **3**

6.   **Study of following Tools used in Electronic Workshop:**   **3**

6.1   Component Lead Cutter

6.2   Wire Strippers

6.3   Soldering Iron & Soldering Station

6.4   De-Solder Pump

7.	**Measurement of Voltage, Current and Resistance using Analog & Digital Multimeter.**	**3**
8.	**Testing of Electronic, Component such as Capacitor, Inductor, Diode and Transistor.**	**3**
9.	**Measurement of Amplitude & Frequency of a Signal using CRO.**	**6**
10.	**Verification of Ohm's law using Resistive Circuit and Analog Meters.**	**6**
11.	**Soldering of different passive component combination on general purpose PCB.**	**6**
12.	**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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