



Polytechnic First Year Syllabus

Semester I

ENGLISH & COMMUNICATION SKILLS (CODE DECS 101)

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.

Part A: English

Unit I

General: Narration, Voice, Basic Sentence Patterns. (Nine basic 5 sentence patterns), Transformation of Sentences, Determiners and Preposition, Tenses, Prefix, Suffix, Parts Of Speech-Common errors (Noun, Pronoun, Articles, Adverb, Punctuation, Preposition etc.)

Unit II

Modals: Modals in Conversational Usage, **Modals-** Can, Could, Should , Will, Would, May, Might, Must, Need not, Dare not, Ought to, Used to

Unit III

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.

Unit IV

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).

Unit V

Composition and Writing Skills: Unseen Passage, Precise Writing, Letter Writing, Paragraph Writing, Report Writing, Essay Writing - Essays on general and local topics related to environmental problems.



Part B: Communication Skills

Unit I

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

1. Listening

Listening: Listen to Prerecorded Tapes, Reproduce vocally what has been heard, Reproduce in Written form, Summarise the text heard, Suggest Substitution of Words and Sentences, Answer Questions related to the taped text, Summarise in Writing

2. Speaking

Speaking: Introducing English consonant-sounds and vowel-sounds, Remedial exercises where necessary, Knowing Word stress, Shifting word stress in poly-syllabic words [For pronunciation practice read aloud a para or page regularly while others monitor]

Unit II

Vocabulary: Synonyms. Homonyms. Antonyms and Homophones, Words often confused, as for example, [I-me; your-yours; its-it's; comprehensible-comprehensive; complement-compliment], Context-based meanings of the words, for example, man[N] man[vb]; step[[N] ,step[vb], conflict _____ Israel Palestinian conflict, Emotional conflict, Ideas conflict, learn _____ 1 learn at this school, I learnt from the morning news

Unit III

Delivering Short Discourses: About oneself, Describing a Place, Person, Object, Describing a Picture, Photo.

Unit IV

Group Discussion: Developing skill to initiate a discussion [How to open], Snatching initiative from others [Watch for weak points, etc.]

Unit V

Expand a topic-sentence into 4-5 sentence narrative.

Reference Books:

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|---|----------------------------------|
| 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 | |



APPLIED PHYSICS-I (CODE DAPY 102)

Introduction:

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.

Theory

Unit I

Units and Dimensions :Idea of various systems of units, SI units - Basic, Supplementary and Derived Units, Prefixes & Symbols, Dimensions and Dimensional Formulae, Principle of Homogeneity of Dimension,, Dimensional Analysis, Applications and Limitations.

Unit II

Elasticity: Stress and Strain, Elastic Limit & Hooke's law, Young's Modulus, Bulk Modulus & Modulus of Rigidity, Poisson's Ratio.

Unit III

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

Unit IV

Properties of Liquids: Surface Tension & Surface Energy, Cohesive & Adhesive Force, Angle of Contact, Capillarity & Expression for Surface Tension Streamline & Turbulent Flow, Reynold Number, Viscosity & Coefficient of Viscosity, Stoke's law & Terminal Velocity.

Unit V

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

Reference Books:

1. Engineering Physics
2. Applied Physics Vol.-I

Gaur & Gupta
Hari Harlal, NITTTR



3. Applied Physics Vol.-II
4. A Text Book of Applied Physics
5. Principles of Physics

Hari Harlal, NITTTR
N.S. Kumar
Brijlal, Subhramanyam

APPLIED CHEMISTRY-I (CODE DACH 103)

Introduction:

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.

Theory

Unit I

Atomic Structure and Periodic Table: Constituents of the Atom, Bohr's Model of the Atom, Quantum Number and Electronic Energy Levels, Aufbau's Principle, Pauli's Exclusion Principle, Hund's Rule, $n + l$ Rule, Electronic Configuration of Elements (s, p, d Block Elements), Development of Periodic Table- Modern Periodic Law, Long form of Periodic Table, 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.

Unit II

Metals and Alloys: General Principles and Terms listed in Metallurgy, Metallurgy of Iron and Steel, Different forms of Iron, Effect of Impurities on Iron and Steel, Effect of Alloying Elements in Steel, **Corrosion**-Definition, Theories of Corrosion- Acid Theory (Rusting), Direct Chemical Corrosion or Dry Corrosion, Wet Corrosion or Electro-Chemical Corrosion (Galvanic and Concentration Cell Corrosion), Various Methods for Protection from Corrosion

Unit III

Electro Chemistry: Ionisation, Degree of Ionisation, Factors which Influence Degree of Ionisation, Hydrolysis – Degree of Hydrolysis, Hydrolysis Constant., pH Value, Buffer Solution, Electrolysis, Faraday's Laws of Electrolysis

Unit IV



Kinetic Theory of Gases: Postulates of kinetic Theory, Ideal Gas Equation, Pressure and Volume Corrections, Vender Walls Equations, Liquefaction of Gases, Critical Pressure and Critical Temperature for Liquefaction, Liquefaction of Gases by Joule – Thomson Effect, Claude's Method and Linde's Method

Unit V

Fuels: Definition, Classification, Calorific Value (HCV and LCV) and Numerical Problems on Calorific Value, Combustion of Fuels, Numerical Problems on Combustion, Solid Fuels - Coal and Coke, Liquid Fuels- Petroleum and its Distillation, Cracking, Octane and Cetane Values of Liquid Fuels, Synthetic Petrol, Power Alcohol, Bio-Gas, Nuclear Fuels – Introduction to Fission and Fusion Reactions.

Reference Books:

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|--|-------------------------------------|
| 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. Engineering Chemistry-I(Hindi) | Mathur & Agrawal. |
| 9. Inorganic Chemistry | Shivhare & Lavania. |
| 10. Organic Chemistry | Kumar & Mehnot |
| 11. Practical Engineering Chemistry | Dr Renu Gupta & Dr Sapana Dubey |
| 12. A Text book of Engineering Chemistry | S. K. Jain & K. D. Gupta |
| 13. Engineering Chemistry | Dr. K.L. Menaria & Dr Praveen Goyal |

APPLIED MATHEMATICS- I (CODE DAMM 104)

Introduction:

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.

Theory

Unit I



Introduction to Different Types of Expansion: Factorial Notation, Meaning of $C(n, r)$, $P(n, r)$, Binomial Theorem for Positive Index, any Index, Exponential Theorem, Logarithm Theorem, Complex number: Definition of Complex Number, Operations on Complex Number (Add., Sub., Multiplication, Division), Conjugate Complex Number, Modulus and Amplitude of a Complex Number, Polar form of a Complex Number

Unit II

Trigonometry: Allied Angle($\sin (180\pm A)$, $\sin (90\pm A)$ etc., Sum and Difference Formula (without proof) and their Application, Product Formula and C-D Formula, T-Ratios of Multiple and Sub-Multiple Angles ($2A$, $3A$, $A/2$), Solution of Trigonometric Equations : $\sin X = 0$, $\tan X = 0$, $\cos X = 0$, $\sin X=A$, $\cos X =A$ & $\tan x = A$

Unit III

Matrices and Determinants: Definition and Properties of Determinants, Definition and Types of Matrix, Transpose of a Matrix, Symmetric, Skew Symmetric Matrices, Orthogonal matrices, Hermitian and Skew Hermitian, Minors and Cofactors, Adjoint and Inverse of a Matrix, Cramer's Rule, Solution of Simultaneous Linear Equations by Inverse Matrix Method, Characteristic Matrix, Characteristic Equation, Eigen Values & Vectors, Cayley Hamilton Theorem (verification only)

Unit IV

Vector Algebra: Definition, Addition and Subtraction of Vectors, Scalar and Vector Product of two Vectors, Scalar Triple Product and Vector Triple Product, Applications of Vectors in Engineering Problems

Unit V

Conic: Circle-Definition and Standard Equations, Equations of Tangent and Normal at a Point (simple problems), Parabola-Definition and Standard Equations, Equations of Tangent and Normal at a Point (Simple problems), Ellipse and Hyperbola-Definition and Standard Equation, Equations of Tangent and Normal at a Point (simple problems)

Reference Books:

1. Mathematics XI & XII
2. Mathematics XI & XII
3. Polytechnic Mathematics

NCERT, New Delhi
Rajasthan Board, Ajmer
H. K. Dass



COMPUTER AND INFORMATION TECHNOLOGY FUNDAMENTALS (CODE DCIT 105)

Introduction:

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.

Theory

Unit I

Introduction: Computer: An Introduction, Generation of Computers & its type, Data Representation, Number System & their Conversions, Arithmetic Operations, 1s , 2s Compliment, Coding Technique, Idea of- Hardware, Software, Firmware, Free ware, Human ware, Computer Languages and Translators, Central Processing Unit (CPU), Memory Unit, Input/ Out Devices, Block Diagram Showing Interconnection of Computer Parts, Definition of Operating System (OS), Types of OS, Single user, Multi user, Multi Programming, Time Sharing, Multi Processing,

Unit II

Introduction to Windows XP: Introduction to Windows Environment, Parts of Windows Screen, Icon, Menu, Start Menu, Minimising, Maximising, Closing Windows, Windows Explorer, Recycle Bin, Clipboard, My Computer, My Network Places, Control Panel : Adding New Hardware and Software, Display, Font, Multimedia, Mouse, International System, Accessories: Paint, Media Player, Scan disk, System Information

Unit III

Information Processing Using Microsoft Office: Word processor, Introduction to MS-Word, Introduction to Macro, Electronic Spread Sheet, Introduction to MS-Excel, Working with Spread Sheet, Power Point-Introduction to Power Point, Creating a Presentation/Slide, Adding Animation in Slide, Running a Slide Show

Unit IV



Computer and Communication: Need of Data Transmission, Data Transmission Media, Baud rate and Bandwidth, Digital and Analog Transmission, Serial and Parallel Data Transfer, Protocols, MODEM, Networking of Computers, Topologies: Bus, Star, Ring, Hybrid, Introduction to Ports : RS232, IEEE 488, PS2, USB, UTP, Introduction to Internet, Bridges, Routers, Switch, Gate way, www, Web Site, URL, e-mail, e-Commerce, Web browsing, Web page, Introduction to Hyper text & HTML, Introduction to http & ftp Protocol

Unit V

Information Concepts and Processing: Definition of Data, Information, Need of Information, Quality of Information, Concepts of Data Security, Privacy, Protection, Computer Virus and their types, Scanning & Removing Virus

Reference Books:

1. Computer Fundamental & Distributors V.K. Jain, Standard Pub.
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 Ivan Beyross, TMH using HTML, DHTML, Javascript Pearl/ CGI

ENGINEERING DRAWING-I (CODE DEDW 106)

Introduction:

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.

Theory

Unit I

Introduction of Drawing Instruments: Types of Line, Lettering – Single Stroke, Italics, Various Systems of Placing the Dimensions, Type of Scales (Reducing and Enlarging), Representative Fraction, Plain and Diagonal Scales



Unit II

Geometrical Construction and Engineering Curves: Regular Polygons of Given Side, Conic sections – Construction of Ellipse, Parabola, Hyperbola, Construction of Cycloid, Epicycloid and Hypocycloid, Construction of Involute, Archimedian Spiral and Cylindrical Helix

Unit III

Section of Solids and Development of Surfaces: Introduction of Sectional Planes, Sectional Plane Perpendicular to one Reference Plane and Parallel to other, Sectional Plane Perpendicular to one and Inclined to other, Section of all types of Geometrical Solids. viz, Prism, Pyramid, Cone and Cylinder, Apparent Section and True Section, Development of Surfaces of Regular Solids viz, Prism, Pyramid, Cone and Cylinder, Sectional Plan, Sectional Elevation and Sectional Side View and Development of Surface of Solid after Section, Conventional Method of Representing Full, Half, Removed, Revolved, Partial and Offset Section, Section Lines for Different Material as per ISI Recommendations.

Unit IV

Keys and Pulleys: Drawing and uses of Various Types of Keys - Saddle Key - Hollow and Flat, Sunk - Rectangular, Square, Key with Gib Head, Woodruff Key, Pulley - Straight Arms flat Belt Pulley, V-Belt Pulley, Shaft Couplings, Muff Coupling, Protected Type Flange Coupling, Simple Bush Bearing.

Unit V

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

Reference Books:

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|---|------------------|
| 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 |



APPLIED PHYSICS PRACTICAL-I (CODE DAPY 107)

1. To Measure Internal Diameter, External Diameter 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, 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 Young's Modulus of Elasticity using Searle's Apparatus.
8. To Determine Acceleration due to Gravity using Simple Pendulum
9. To Determine the Velocity of Sound at 0°C using Resonance Tube.
10. To Verify Newton's Law of Cooling.

APPLIED CHEMISTRY PRACTICAL-I (CODE DACH 108)

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 Ferrous 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.

COMPUTER AND INFORMATION TECHNOLOGY FUNDAMENTALS PRACTICAL (CODE DCIT 109)

1. Study of Computer Components
2. Practice of Computer Booting Process in XP
3. Demonstration of Windows Environment
4. Practice of using My Computer, Windows Explorer
5. Practice of using Control Panel
6. Practice of My Network Places



7. Practice of CD and DVD Writing
8. Practice of Paint
9. Installation of Windows XP by using NTFS File System.
10. Demonstration of Network
11. Visit to Internet Site
12. Creating e-mail Account, Sending and Receiving e-mails.
13. Sending e-mail with Attachment & Signature
14. Searching Web Page/ Site using Search Engine: (eg. google.com, yahoo.com, altavista.com etc.)
15. Exercise Based on MS-Word: Document Preparation, Printing Document, Mail Merge usage, Draw Table
16. Exercise Based on Ms-Excel: Work Book Preparation, Printing Workbook, Data-base usage, Draw Charts
17. Exercise Based on Power Point: Creating Slide, Adding, Animations in Slide, Running Slide
18. Creating Simple Web Page using HTML.

ENGINEERING DRAWING PRACTICAL-I (CODE DEDW 110)

- 1. Preparation of following on Imperial Size Drawing Sheet:-** Lines, Letters and Scales, Geometrical Constructions and Engineering Curves, Section and Development of Surfaces of Solids i.e. Cone, Cylinder, Sphere etc., Section and Development of Surfaces of Prism and Pyramids, Isometric Projections, Riveted Joints, Screw Threads and Fasteners, Pulleys, Couplings, Bearing
- 2. Preparation of following Drawings in Sketch Book (Home Assignment):** Lettering (On Graph Sheet), Section and Conventions, Set Screws, Machine Screws, Foundation Bolts, Keys

ELECTRICAL WORKSHOP (CODE DETW 111)

- 1.** Study of Symbol, Specification and Approximate Cost of Common Electrical Accessories, Tools and Wires & Cables Required for Domestic Installation.
- 2.** Study of:
 - i) Basic Electricity Rules for a Domestic Consumer
 - ii) Safety Precautions & use of Fire Fighting Equipments
 - iii) Use of series of Phase Tester, Series Test Lamp, Tong Tester and Megger in Testing of Electrical Installation.
- 3.** i) Prepare a Potential Divider and Measure Resistance of a Filament Lamp Using Voltmeter and Ammeter.
ii) Measurement of Power and Energy Consumption byan Electric Heater using Watt Meter and Energy Meter.



4. Preparation of Wiring Diagram, Wiring, Testing, Fault Finding & Costing for:
 - i) Control of one Lamp by one Switch (using Batten and Tumbler Switch)
 - ii) Control of Stair Case Wiring (using Casing Capping, CFL and Flush Type Switches)
 - iii) Control of one Bell Buzzer and Indicator by one Switch (using Conduit and Flush type Switch)
 5. Prepare one Switch Board as per Institutional Requirement (using Flush type Switches, Sockets, MCB, ELCB, Etc.)
 6. Study, Connecting, Testing and Fault Finding of
 - i) Fluorescent Tube and its Accessories
 - ii) Ceiling Fan with resistance type and Electronic Regulator
 7. Study, Functioning, Fault Finding & Repairing of following Domestic Appliances -
 - i) Automatic Electric Iron
 - ii) Air Cooler
 - iii) Electric Water Pump
 8. Design, Draw and Estimate the Material required for Installation for a small Residential Building/ Office/ Hall.
- * Accessories used in all above Experiments must be According to Latest Technology.

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 | |



Polytechnic First Year Syllabus

Semester II

APPLIED MECHANICS (CODE DAMH 201)

Introduction:

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

Theory

Unit I

Force and Moment: Definition, Units, Different Types of Forces, Resolution of Forces, Law of Parallelogram of Forces, Resultant of two or more Forces, Basic Conditions of Equilibrium, Lami's Theorem (No Proof), Jib Crane, Law of Polygon of Forces (Only Statement), **Moment-** Definition, Units & Sign Convention, Principle of Moments, Application of Equilibrium Conditions for non-concurrent Forces, **Application of Principles of Forces & Moments:** Levers & their Types, Reactions of Simply Supported Beams (Graphical & Analytical Method), Steel Yard, Lever Safety Valve, Foundry Crane, **Simple Machines:** Basic Concepts, Loss in Friction, Inclined Plane, Simple & Differential Wheel and Axle (Neglecting Rope thickness), Screw Jack, Lifting Crabs, Systems of Pulleys, Worm and Worm Wheel

Unit II

Work, Power and Energy: Work Done by a Constant Force, Work Done by Uniform Variable Force, Power, Indicated Power, Brake Power, Efficiency, Power required for an Engine on Horizontal and Inclined (smooth and rough) Planes, Energy, Potential Energy, Kinetic Energy of Rectilinear Motion, Kinetic energy of Circular Motion

Unit III

Centre of Gravity: Concept, Centroid, Calculation of C.G. of Regular Bodies, Calculation of C.G. of Plain Geometrical Figures



Friction: Types of Friction, Laws of Friction, Angle of Friction, Angle of Repose, Friction on Horizontal and Inclined Plains, Application of Laws of Friction Related to Wedge, Ladder and Screw Jack.

Unit IV

Impact and Collision: Concept, Impulse and Impulsive Force, Law of Conservation of Momentum, Collision Between Two Rigid Bodies, Newton's Experimental Law of Collision, Coefficient of Restitution

Unit V

Motion: Circular Motion and Rectilinear Motion- Concept, Motion under Constant Velocity, Motion under Constant Acceleration, Relationship between Linear Velocity and Angular Velocity, Centrifugal and Centripetal Forces, their Applications, Velocity-time graph and its uses, Motion under Gravity, Newton's Laws of Motion, Projectiles

Reference Books:

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|-----------------------------------|----------------|
| 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 |

APPLIED PHYSICS-II (CODE DAPY 202)

Introduction:

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.

Theory:

Unit I

D.C. Circuits and A.C. Circuits: Resistivity, Effect of Temperature on Resistance, Ohm's Law, R8.4 Kirchoff's Law, Wheatstone Bridge, Meter Bridge, Principle of Potentiometer, Faraday's



Laws of Electro Magnetic Induction, Lenz's Law, Self and Mutual Inductance, Alternating Current, Phase & Phase Difference, Instantaneous, Average and rms value of AC, Behaviour of Resistance, Capacitance and Inductance in an AC Circuit, AC Circuits Containing, R-L, R-C and LCR in Series, Power in AC Circuit and Power Factor, Choke Coil.

Unit II

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

Unit III

Sound Waves: Velocity of Sound Waves, Newton's Formula, Laplace Correction, Factors affecting Velocity of Sound Waves, Propagation of Progressive Wave, Displacement, Velocity and Acceleration of a particle during propagation of wave, Superposition of Waves, Stationary Waves (without mathematical analysis), Resonance tube.

Unit IV

Gravitation & Satellites: Newton's law of Gravitation, Acceleration due to Gravity, Kepler's laws of Planetary Motion (statement only), Artificial Satellite (simple idea), Geo-Stationary Satellites, Escape Velocity, Velocity & Time Period of an Artificial Satellite.

Unit V

Modern and Nuclear Physics: Photo Electric Effect, Einstein's Equation, Photo Cells, Lasers, Stimulated Emission and Population Inversion, Types of Laser - Helium Neon and Ruby Laser, Application of Lasers (brief idea only), Material Processing, Lasers in Communication), Medical Applications. **Nuclear Physics-** Idea of Nuclear Force, Mass - Defect and Binding Energy, Nuclear Reactions, Natural and Artificial Radioactivity, Law of Radioactive Disintegration, Half Life & Mean Life.

Reference Books:

1. Engineering Physics
2. Applied Physics Vol.-I
3. Applied Physics Vol.-II
4. A Text Book of Applied Physics
5. Principles of Physics

Gaur & Gupta
Hari Harlal, NITTTR
Hari Harlal, NITTTR
N.S. Kumar
Brijlal, Subhramanyam



APPLIED CHEMISTRY-II (CODE DACH 203)

Introduction:

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.

Theory

Unit I

Carbon Chemistry: Definition of Organic Chemistry, Difference between Organic and Inorganic Compounds, Classification and Nomenclature - Open Chain and Closed Chain Compounds, IUPAC System of Nomenclature. (upto C5).

Unit II

Polymers: Definition, Plastics- Classification, Constituents, Preparation, Properties and Uses of Polythene, Bakelite Terylene and Nylon, Rubber- Natural Rubber, Vulcanisation, Synthetic Rubbers - Buna - N, Buna-S, Butyl and Neoprene

Unit III

Lubricants: Definition, Classification, Properties of Lubricants- Viscosity, Oiliness, Flash Point, Fire Point, Acid Value, Saponificatin, Emulsification, Cloud and Pour Point, Artificial Lubricants

Unit IV

Water: Sources of Water, Hardness of Water., Degree of Hardness, Estimation of Hardness by EDTA method, Problems on Calculation of Hardness, Disadvantages of Hardness, Softening Methods- Lime-Soda Method, Permutite Method, Ion -Exchange Method, Problems on Softening of Water, Drinking Water, its Requisites, Purification and Sterilization of Water, Water Pollution- Causes and Effects, Treatment of Industrial Water Discharges

Unit V

Miscellaneous Materials: Refractories -Definition, Classification and Properties, Abrasives : Natural and Synthetic Abrasives, Paint and Varnish- Definition and Function of Constituents, Soap and Detergents- Definition, Properties and Uses, **New Engineering Materials: (Brief Idea of Following):** Superconductors, Organic Electronic Materials, Fullerenes, Optical Fibres,



Manufacturing of Portland Cement, Chemistry of Setting and Hardening of Cement, Glass Preparation, its varieties and uses.

Reference Books:

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|--|-------------------------------------|
| 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. Engineering Chemistry-I(Hindi) | Mathur & Agrawal. |
| 9. Inorganic Chemistry | Shivhare & Lavania. |
| 10. Organic Chemistry | Kumar & Mehnot |
| 11. Practical Engineering Chemistry | Dr Renu Gupta & Dr Sapana Dubey |
| 12. A Text book of Engineering Chemistry | S. K. Jain & K. D. Gupta |
| 13. Engineering Chemistry | Dr. K.L. Menaria & Dr Praveen Goyal |

APPLIED MATHEMATICS- II (CODE DAMM 204)

Introduction:

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.

Theory

Unit I

Function: Definition of Function, Range and Domain of Function, Types of Function, Absolute Value Function, Exponential value Function, Identity Function, Reciprocal Function, Rational and Irrational Function, Increasing and decreasing Function, Limits, Concept of Limit, L.H.L., R.H.L., Limit of Standard Functions, Concept of Continuity and Differentiability at a Point (simple Problems)

Unit II

Differential Equations: Definition of differential Equation. Order, Degree and Solution of a differential Equation, Solution of a differential Equation of First Order and First Degree using-



Variable Separable Method Homogenous Form, Reducible to Homogenous Form, Linear differential Equation, Bernoulli's Equation, Exact differential Equation, Substitution Method, Solution of Linear Differential Equation of Higher order with Constant Coefficients, Applications of Differential Equations to L-R, L-C, L-C-R, Circuits of Standard Forms

Unit III

Numerical Integration: Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Newton - Raphson Rule

Unit IV

Two Dimensional Coordinate Geometry: General Introduction, Distance Formula and Ratio Formula, Co-ordinate of Centroid, In-Centre, Ortho-Centre and Ex-Centre of a Triangle, Area of Triangle, Straight Line, Slope form, Intercept form, Perpendicular form, One Point Slope form, Two Point form & General form, Angle between Two Lines, Perpendicular Distance of a Line from a Point

Unit V

Differential Calculus: Standard Formulae (Except Hyperbolic Function), Derivative of Sum, difference, Multiplication and Division of two Functions, Differentiation of Function of a Function, Logarithmic Differentiation, Differentiation of Implicit Functions, Differentiation of Parametric Functions, Differentiation by Trigonometric Transformations, Differentiation of a Function w.r.t. Another Function, Second Order Derivative, **Applications of Differential Calculus**-Geometrical meaning of dy / dx . Tangents and Normals, Angle of Intersection between two Curves, Derivative as a Rate Measurer, Errors and Approximations, Maxima and Minima of Function with one Variable, **Integral Calculus**- General Introduction of Integral Calculus, Integration of Sum and difference of Functions, Integration by Simplification, Integration by Substitution, Integration by Parts, Integration of Rational and Irrational Functions, Integration of Trigonometric Functions, Definite Integral and its Properties

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 |



ENGINEERING DRAWING-II (CODE DEDW 205)

Introduction:

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.

Theory

Unit I

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

Unit II

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

Unit III

Projections: Introduction of Projections, Reference Planes and Projectors, Angle of Projections (First Angle and Third Angle Projections), System of Rotations, Projection of Points in Different Quadrants, Projection of Lines Parallel to Both the Planes, Parallel to One and Perpendicular to Other Planes, Parallel to One and Inclined to Other Planes, Inclined to Both the Planes, True Length of a Line and its Apparent and True Inclinations, Projection of Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular Planes, Plane Parallel to One & Perpendicular to Other, Plane Perpendicular to Both the Planes, Plane Perpendicular to One and Inclined to Other Plane, Projection of Cube, Prism, Pyramid, Cylinder and Cone, Projection of Solid whose Axis is Perpendicular to One and Parallel to Other plane, Projection of Solid Whose Axis is Parallel to One and Inclined to Other Plane, Projection of Solid Whose Axis is Parallel to both the Planes (excluding inclined to both the planes), Conversion of Pictorial Views into Orthographic Views, Orthographic Projections of Simple Solid Object from Pictorial/Isometric view.

Unit IV

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



Unit V

Building Drawing: Introduction of Orientation and Sun Chart Diagram of Residential Building, Section of a Wall Including Foundation, Sectional Plan of One Room and Toilet from Given Sketch

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 |

APPLIED MECHANICS PRACTICAL (CODE DAMH 206)

1. Use of Engineering Calculator.
2. Verification of the Law of Parallelogram and Polygon of Forces-By using Force Board, By using Force Table
3. Verification of the Principle of Moments in case of-Compound Lever, Bell crank Lever
4. Determination of Reactions in Case of Simply Supported Beams.
5. To Determine Coefficient of Friction between two Surfaces on- Horizontal Plane, 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.

APPLIED PHYSICS PRACTICAL-II (CODE DAPY 207)

1. To Verify Law of Resistances.
2. To Determine Specific Resistance of Material using Meter Bridge.
3. To Determine Internal Resistance of a Primary Cell using Potentiometer.
4. To Compare emf of two Primary Cells using a Potentiometer.
5. To Draw Characteristic Curves of PN Diode and Determine its Static and Dynamic Resistance.
6. To Draw Characteristic Curves of a PNP/NPN Transistor in CB/CE Configuration.
7. To Measure Resistance of a Galvanometer by Half-Deflection Method.

APPLIED CHEMISTRY PRACTICAL-II (CODE DACH 208)

1. Determination of Hardness of Water by EDTA Method.
2. Estimation of Free Chlorine in Water.
3. Determination of Acid Value of oil.
4. Preparation of Soap.

WORKSHOP PRACTICE (CODE DWSP 209)

Introduction:

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.

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).

Theory:

Unit I

Carpentry Shop 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

Unit II

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

Unit III



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

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

Unit IV

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, Filing and Hack Sawing.
3. Production of Utility Job involving Marking, Filing and Hack Sawing Drilling and Tapping.

Unit V

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

Exercises:

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



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 |

ENGINEERING DRAWING PRACTICAL-II (CODE DEDW 210)

- 1. Preparation of following on Imperial Size Drawing Sheet:-** Projection of Lines, Projection of Planes, Projection of Solids, Orthographic Projections of Simple objects, Isometric Projections, Building Drawing
- 2. Preparation of following Drawings in Sketch Book (Home Assignment):** Projection of Points In Different Quadrants, Isometric Projection of Various Planes, Various Types of Rivet Heads, Section and Conventions,

ELECTRONICS WORKSHOP (CODE DECW 211)

1. Identification of following Resistors and finding their Values-Carbon and Metal Film, Variable Resistance Log and Linear, Semi Variable Preset of One Turn & Multiturn
2. Identification of following Capacitor and finding their Values-Mica, Ceramic, Polyesterene, Electrolytic, Tantalum
3. Identification of following Switches and Study of their Working Mechanism-Toggel, Band switch, Rotary, Push to on and off, Press to on and off
4. Identification and Testing of following type of Connectors-Rack and Panel, Printed Circuit Edge, Coaxial, Tape & Ribbon, Plate
5. Study of Different Relays and their Contacts.
6. Study of following Tools used in Electronic Workshop-Component Lead Cutter, Wire Strippers, Soldering Iron & Soldering Station, De-Solder Pump
7. Measurement of Voltage, Current and Resistance using Analog & Digital Multimeter.
8. Testing of Electronic, Component such as Capacitor, Inductor, Diode and Transistor.
9. Measurement of Amplitude & Frequency of a Signal using CRO.
10. Verification of Ohm's law using Resistive Circuit and Analog Meters.
11. Soldering of different passive component combination on general purpose PCB.
12. Sketching of different Electronic Components Symbol on Drawing Sheet.



Reference Books:

1. Electrical Workshop
2. Domestic Devices & Appliances
3. Electrical Workshop
4. Electrical Component & Shop Practice
5. Maintenance of Electrical Equipments
6. Hand Book of Philips Component

M.L. Gupta
K.B. Bhatia
S.L. Uppal
K.R. Nahar
K. S. Janwal

