Integral University, Lucknow
Department of Polytechnic
Study and Evaluation Scheme

Program: Diploma in Electrical Engineering

Semester Ist

S. No.	Course code	Course Title	Type of Paper	Period Per hr/week/sem			Evaluation Scheme				Sub. Total	Credit	Total Credits	Attributes						
				L	T	P	CT	TA	Total	ESE				Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
THEORIES																				
1	DMA-101	Applied Mathametics-1(A)		03	01	00	40	20	60	40	100	3:1: 0	4	Y		Y				
2	DPH-101	Applied Physics (A)		03	01	00	40	20	60	40	100	3:1: 0	4	Y	Y	Y		Y		
3	DCH-101	Applied Chemistry (A)		03	01	00	40	20	60	40	100	3:1: 0	4	Y	Y	Y		Y		
4	DEC-101	Basic Electronics-I		03	01	00	40	20	60	40	100	3:1: 0	4	Y	Y	Y				
5	DEE-101	Basic Electrical Engineering-I	Core	03	01	00	40	20	60	40	100	3:1: 0	4	Y		Y				
6	DED-101	Engineering Drawing		01	03	00	40	20	60	40	100	1:3: 0	4	Y	Y	Y				Y
PRACTICAL																				
1	DCH-151	Applied Chemistry Lab		00	00	02	40	20	60	40	100	0:0: 1	1	Y	Y	Y		Y		
2	DCAD-151	Basic Computer Aided Design Lab		00	00	02	40	20	60	40	100	0 :0: 1	1	Y	Y	Y				Y
3	DWS-151	Workshop Practice		00	00	03	40	20	60	40	100	0: 0 :1.5	1.5	Y	Y	Y		Y		
4	DCS-151	Computer Application Lab		01	00	02	40	20	60	40	100	1: 0 :1	2	Y	Y	Y				
5	GP-151	General Proficiency		-	-	-	-	-	60	-	60								Y	Y
Total				17	08	09	-	-	-	-	**1060**		**29.5**							

APPLIED MATHEMATICS-I (A)
(DMA-101)

(Common to All Diploma Engineering Courses)

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UNIT-1 [9]

Series:

Arithmetical Progression**:** n^{th} term of AP, Sum of **'n'** terms, Arithmetic Mean.

Geometrical Progression**:** n^{th} term of GP, Sum of **'n'** terms& infinite terms, Geometric Mean.

Binomial theorem:

Definition of factorial notation, permutation and combination, Binomial theorem for positive index, negative and fractional index(without proof), Application of Binomial theorem.

Determinants:

Definition, expansion and elementary properties of determinant of order 2 and 3. Solution of system of linear equations, Consistency of equations, Cramer's rules.

UNIT-2 [8]

Trigonometry:

Trigonometric functions of allied, compound, multiple and submultiple angles.Trigonometric identities.Sine, Cosine, Projection and Tangent rules.

Hyperbolic and Inverse circular functions.

UNIT-3 [7]

Complex Number:

Definition of imaginary number, complex number & its conjugate.Algebra of complex number (equality, addition, subtraction, multiplication and division).Geometrical representation of a complex number, modulus and amplitude.Polar form of a complex number, Square root of a complex number.De Moivre's theorem (without proof)& its application.

UNIT-4 [8]

Coordinate Geometry:

Standard from of curves.

Parabola: $x^2 = 4ay, y^2 = 4ax$

Ellipse: $\frac{x^2}{a^2} + \frac{y^2}{b^2} - 1$, Hyperbola: $\frac{x^2}{a^2} - \frac{y^2}{b^2} - 1$

Distance between two points in space, direction cosine and direction ratio.

UNIT-5 [8]

Plane and Sphere:

Finding equation of straight line and shortest distance between two lines, Equation of a plane, Relation between lines and planes, Sphere.

References:

1. Applied Mathematics: Kailash Sinha, Meerut publication.
2. Applied Mathematics: P.K Gupta, Asian Publication.
3. Applied Mathematics: H.R Luthra, Bharat Bharti publication.
4. Applied Mathematics: H.K Das, C.B.S Publication.

Mathematics for Polytechnic: S.P Deshpande, Pune Vidyarthi Grih

APPLIED PHYSICS-(A)

(DPH-101)

[COMMON TO ALL DIPLOMA ENGINEERING COURSES]

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UNIT-1

Measurement:
Units and Dimensions [6]
Fundamental and derived units:
S.I. Units and Dimensions of physical quantities, Dimensional formula and dimensional equation, Principal of homogeneity and application of homogeneity principle to:
(i) Checking the correctness of physical equations
(ii) Deriving relations among various physical quantitions,
(iii) Conversion of numerical values of physical quantities form one system of units into another, Limitations of dimensional analysis, Errors in measurement, accuracy and precision, random and systematic errors, estimation of probable errors in the result of measurement (combination of errors in addition, subtraction, multiplication and power). Significant figures and order of accuracy in respect to instruments.

Vector:
Scaler and vector quantities; Addition, Subtraction, Resolution of vector; Cartesian components of vector, Scaler and vector product of vectors.

UNIT-II [10]

Force and Motions:
Newton's Law of Motion, Circular motion, angular velocity, angular acceleration and centripetal acceleration. Relationship between linear velocity and angular velocity, Relationship between linear acceleration and angular acceleration.

Fluid mechanics and fiction:
Surface tension, capillaries, equation of continuity, Bernoulli's theorem, stream line and turbulent flow, Reynold's number. Physical significance of friction, Advantage and disadvantage of friction and its role in every day life, Static and dynamic frictional forces, Coefficients of static and dynamic frictions and their measurement, Viscosity, Coefficients of viscosity and its determination by Stoke's method.

Work, Power and Energy:
Work done by force on bodies moving on horizontal and inclined planes in presence of frictional forces, Concept of power and its units, Calculation of power(simple cases). Concept of kinetic

and potential energy, various forms of energy, conservation of energy, Force constant of spring, Potential energy of stretched spring.

Unit-III **[8]**

Elasticity:
Elasticity, Stress and Strain, Hooke's law, Elastic limit, Yielding point and breaking point, Modulus of elasticity, Young's modulus, Bulk modulus and modulus of rigidity, Poisson ratio, Resilience.
Simple Harmonic Motion, Peridic Motion,Characteristics of Simple Harmonic Motion,Equation of Simple Harmonic Motion and determination of Velocity and acceleration, Graphical representation, Spring Mass system, Simple pendulum, Derivation of their periodic time, Energy conservation in Simple Harmonic Motion, Definition of free, Forced, undamped and damped vibrations, Resonance and its sharpness, Q-factor.

Unit-IV **[8]**

Gas laws and specific heats of gases:
Boyle's law, Charle's law, Gay Lussac's law, Absolute temperature, Kelvin scale of temperature, General gas equation(without derivation), Molar or universal gas constant, Universal gas equation, Standard or normal temperature and pressure (N.T.P), Specific heat of gases, Relation between two specific heat, Thermodynamics variables, first law of thermodynamics(statement and equation only), Isothermal, Isobaric, Isochoric and adiabatic processes (Difference among these processes and equation of state).

Unit-V **[8]**

Heat transfer and radiation:
Modes of heat transfer, Coefficient of thermal conductivity and its determination by
(i) Searle's Method for good conductors.
(ii) Lee's Method for poor conductors.
Conduction of heat through compound media, Conduction and convection, Radial flow of heat, Blackbody radiation, Stefan's law, Wein's displacement and Rayleigh- Jeans laws, Planck's law.

References:

1. Nootan Physics: Kumar & Mittal
2. Applied Physics: P.K. Gupta.
3. Pradeep Fundamental: Gogia & Gomber.
4. Applied Physics: P.S. Kushwaha.

DCH-101	Applied Chemistry (A)				
Pre-requisite	**Co-Requisite**	**L**	**T**	**P**	**C**
None	**None**	**03**	**01**	**00**	**--**
Objective	To know the basic concept of Chemistry and their Applications in Engineering				
UNIT I	**Atomic Structure and Classification of Elements:**				08
Basic concept of atomic structure, Matter wave concept, Quantum number, Heisenberg's uncertainty principle, Shapes of orbitals. Modern classification of elements (s, p, d, and f block elements), periodic properties: ionization potential, electro negativity, electron affinity.					
UNIT II	**Chemical Bonding:**				07
Overview of basic concept of Ionic, Covalent & Co-ordinate bonds, Hydrogen bonding, Valence bond theory, Hybridization, VSEPR theory, Molecular orbital theory.					
UNIT III	**Electrochemistry-I and Electrochemistry-II:**				08
Arrhenius theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of acid and bases: Arrhenius, Bronsted and Lewis theory. Concept of pH and numericals. Buffer solutions, Indicators, Solubility product, Common ion effect with their application. Redox reactions, electrode potential (Nernst equation), Electro-chemical cell (Galvanic and Electrolytic). EMF of a cell and free energy change. Standard electrode potential, Electrochemical series and its application. Chemical and electrochemical theory of corrosion, Galvenic Series. Prevention of corrosion by various methods.					
UNIT IV	**Chemical Kinetics, Catalysis and Solid State:**				09
Introduction, Law of mass action, order and molecularity of reaction. Activation energy, rate constants, 1st order reactions and 2nd order reactions. Definition, Characteristics of catalytic reactions, Catalytic promoters and poison, autocatalysis and negative catalysis. Theory of catalysis and applications. Types of solids (Amorphous and Crystalline), classification (Molecular, Ionic, Covalent and Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of crystals, FCC, BCC, Crystal imperfection.					

UNIT V	**Water Treatment:**	08
Hardness of water, its limits and determination of hardness of water by EDTA method. Softening methods (Only Soda lime, Zeolite and Ion exchange resin process). Disadvantages of hard water in different industries, scale and sludge formation, corrosion, caustic embrittlement, priming and foaming in boilers. Disinfection of Water by chloramine-T, Ozone and chlorine. Advantages and disadvantages of chlorination. Industrial waste and sewage, Municipality waste water treatment, Definition of BOD and COD. Numerical problems based on topics.		
Reference books:	1. Applied Chemistry: R. S. Katiyar and J. P. Chaudhary 2. Applied Chemistry: Rakesh Kapoor 3. Principles of general and inorganic chemistry: O. P. Tandon 4. Engineering Chemistry: S. Chandra 5. Applied Chemistry: M. Gupta	

BASIC ELECTRONICS-1

(DEC-101)

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UNIT-I

Semiconductor diode:

Semiconductor materials N type and P type, P-N junction, its forward and reversed biasing, V-1 characteristic of diode. Different types of diode (symbol, construction and characteristic): Zener diode, varactor diode, point contact diode, tunnel diode, LEDs and photo diodes. Avalanche & zener breakdown.

Important specifications.

Rectifiers & filters:

Need of rectifier, definition. Types of rectifier: Half wave and full wave rectifier (Bridge & centre tapped), relationship between D.C. output voltage and A.C. input voltage. Rectification efficiencyand ripple factor for rectifier circuits.

Need of filters, types of filters: shunt capacitor, series inductor, LC filter and π filter.
10

UNIT-II

Transisters

1) Bipolar Junction Transistor (BJt):

Introductions, basic concepts, PNP and NPN transistors their symbols and mechanism of current flow, relationship between different currents in transistor.Transistor configuration: CB, CE &CCcircuit diagram & charactristics.

Transistor parameters: input resistance, output resistance, α ß & relation between them.

2)Field Effect Transistor(TEE): Construction, operation and charactristics of JEFT, MOSFET & CMOS, comparison between JEFT, MOSFET & BJT 8

UNIT-III

Biasing of BJT:

Introduction, need of biasing, concept of dc load line, selection of operating point (Q-point), Types of biasing circuits: fixed bias, potential divider bias, circuit operation of each circuit.

6

UNIT-IV

Single Stage Transistor Amplifier:

Single Stage CE amplifier with proper biasing circuit and its working as voltage amplifier. AC load line and its use in:

(a) Calculation of current and voltage gain of a single stage amplifier circuit.

(b) Explanation of phase reversal of the output voltage with respect to input voltage. Introduction to tuned voltage amplifier.

8

UNIT-V

Multistage & Power Amplifiers:

Need of multistage amplifier, role of capacitor amplifier, simple numerical problems on gain, frequency response and bandwidth, working of R-C coupled amplifier, transformer coupled amplifier and direct coupled amplifier, advantages, disadvantages and applications of different types of amplifiers, working of push-pull amplifier. 8

References:

1. Principles of Electronics-V.K.Mehta & Rohit Mehta
2. Principles of Electronics-Shahdev
3. Fundamentals of Electronics-Malvino
4. Principles of Electronics-M.S.Katre Vol.1

BASIC ELECTRICAL ENGINEERING-I
(DEE-101)

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3 1 0

UNIT-I

Basic Terminology and their concepts of Current, EMF, potential difference (Voltage), resistance, resistivity, their units, conductors & insulators, Insulation resistance of a cable. Effect of temperature on the resistance of conductors, semiconductors (C, Si, Ge) and insulators physical explanation, temperature coefficient of
resistacne. Electrical power, energy and their units (SI), Heating effect of electric current and its practical examples.
Relationship between electrical, mechanical and thermal SI units of work, power and energy, Electrical Safety and precautions. 10

UNIT-II

Material Classification, conducting, insulating, Semi Conducting materials with reference to their atomic Structure. Classification of magnetic materials, Ferro Magnetism, domains, permeability, hystersis loop, Coercive Force & residual magnetism & magnetic saturation, Semi-Conductor & Special purpose material, N-type & P-type Materials, application of semi conductor materials, Materials used in transistor & I.C. 8

UNIT-III

D.C. Circuits
Kirchoff's laws.
Simple numerical problems based on Kirchoff's laws.
Introduction to Thevenin and Superposition theorem, Norton's theorem
Miaximum Power Transfer Theorem. 6

UNIT-IV

Batteries
Construction, chemical changes during charging and discharging of lead acid cells. Indications of a fully charged battery. Capacity and efficiency of lead acid cell / battery. Charging of 6 V., 12 V. commercial batteries.
Grouping of cells. Care and batteries maintenance of commercial batteries.
Problems/defects in lead acid batteries. Concept of Nickel-Iron and Nickel Cadmium Batteries.
Concept of solid sealed maintenance free batteries
(SMF batteries), Oxygen recombiniation principle. 8

UNIT-V

Capacitors
Concept of capacitor, types of capacity of parallel plate capacitor, Composite capacitor and effect of physical parameters. Energy stored in a capacitor, dielectric and its influence on capacitance of a capacitor, dielectric constant dielectric breakdown and dielectric strength. Dielectric loss. Series and parallel combination of capacitors. Capacitance of multi-plate

capacitors. Variable capacitors. Charging and discharging of capacitors. Simple broblem on capacitors. 8

References:

1. Fundamental of Electrical Engg. – Ashfaq Husain
2. Electrical Technology Volume-I – B.L. Thereja

ENGINEERING DRAWING
(DED -101/201)

L T P

3 1 0

UNIT-I

Drawing, instruments and their uses :

Introduction to various drawing, instruments.Correct use and care of Instruments.Sizes of drawing sheets and their layouts.

Lettering Techniques 1 Sheet

Printing of vertical and inclined, normal single stroke capital letters. Printing of vertical and inclined normal single stroke numbers.

Stencils and their use.

Introduction to Scales : 1 Sheet

Necesssity and use, R F

Types of scales used in general engineering drawing.

Plane, diagonal and chord scales.

UNIT-II

Conventional Presentaion : 1 Sheet

Thread (Internal and External), Welded joint, Types of lines, Conventional representation of materials, Conventional representation of machine parts.

Principles of Projection :

Orthographic, Pictorial and perspective. Concept of horizontal and vertical planes. Difference between I and III angle projections.

Dimensioning Techniques:

Projections of points, lines and planes. 2 Sheet

Orthographic Projections of Simple Geometrical Solids

Edge and axis making given angles with the reference planes. Face making given angles with reference planes. Face and its edge making given angles withreferance planes. Orthographic views of simple composite solids from their isometric views.Exercises on missing surfaces and views.

UNIT-III

Section of Solids: 1 Sheet

Concept of sectioning Cases involving cutting plane parallel to one of the reference planes and prependicular to the others. Cases involving cutting plane perpendicular to one of the reference planes and inclind to the others plane,true shape of the section

Isometric Projection : 1 Sheet

Isometric scale
Isometric projection of solids.

UNIT-IV

Free hand sketching : 1 Sheet

Use of squared paper
Orthographic views of simple solids Isometric views of simple job like carpentary joints

Development of Surfaces : 1 Sheet

Parallel line and radial line methods of developments.
Development of simple and truncated surfaces (Cube, prism, cylinder, cone and pyramid).

UNIT-V

Assembly and Disassembly Drawings : 2 Sheet

Plummer block
Footstep bearings
Couplings etc.
Rivetted & Welded Joints
Screw and form of screw thread

Orthographic Projection of Machine Parts :

1 Sheet
Nut and Bolt, Locking device, Wall bracket

Practice on AUTO CAD :

To draw geometrical figures using line, circle, arc, polygon, ellipse, rectangle - erase and other editing commonds and osnap commands (two dimensional drawing only) (Printouts of figures)

References :

1. Engineering Drawing : ND Bhatt
2. Engineering Drawing : R.K. Dhawan
3. Engineering Drawing : B.K.Goel.

DCH-151/251	Applied Chemistry Lab				
Pre-requisite None	**Co-Requisite** None	**L** 00	**T** 00	**P** 02	**C** ----
Objective	**To develop the practical knowledge for qualitative analysis of salts and determination of hardness, chloride contents, dissolved oxygen in water**				
	ANY TEN EXPERIMENTS				
Experiment 1-5	To analyze inorganic mixture for two acid and basic radicals from following radicals A. Basic Radicals : NH_4^+, Pb^{++}, Cu^{++}, Bi^{+++}, Cd^{++}, As^{+++}, Sb^{+++}, Sn^{++}, Al^{+++}, Fe^{+++}, Cr^{+++}, Mn^{++}, Zn^{++}, Co^{++} Ni^{++}, Ba^{++}, Sr^{++}, Ca^{++}, Mg^{++} B. Acid Radicals : CO_3^{--}, S^{--}, SO_3^{--}, CH_3COO^-, NO_2^-, NO_3^-, Cl^-, Br^-, I^-, SO_4^{--}				10
Experiment 6	To determine the total hardness of water sample in terms of $CaCO_3$ by EDTA titration method using E Br indicator.				02
Experiment 7	Determination of temporary hardness of water sample by O-hener's method.				02
Experiment 8	To determine the Chloride content in supplied water sample by using Mohr's methods.				02
Experiment 9	Determination of Dissolved oxygen (DO) in given water sample.				02
Experiment 10	To determine the strength of given HCl solution by NaOH solution using pH meter				02
Experiment 11	To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.				02

Basic Computer Aided Design Lab

(DCAD-151)

L T P
0 0 2

List of Experiments:-

1. To study of Auto CAD software.
2. Study And Sketch of drafting setting.
3. Study and sketch of Dimensional setting.
4. To draw geometrical figure using drawing commands.
5. To modify a geometrical figure using editing comment.
6. To draw orthographic view of a geometrical figure.
7. To Draw isometric view of a geometrical figure.
8. To Draw top front and side view of an isometric figure.
9. To draw sectional view of a soild object.
10. To do practical on page set up & scaling of drawing.

WORKSHOP PRACTICE
(DWS-151)

L T P
0 0 3

1. **Machine Shop**
    a. Study of tools and operations
    b. Plane turning
    c. Step turning
    d. Taper turning
    e. Threading
    f. Single point cutting tool grinding
2. **Fitting Bench Working Shop**
    a. Study of tools and operations
    b. Simple exercises involding filing work
    c. Making perfect male-female joint
    d. Simple exercises involving drilling/tapping/dieing
3. **Black Smithy Shop**
    a. Study of tools and operations
    b. Simple exercises based on black smithy operations such as Upsetting/drawingdown, punching, bending, fullering and swaging
4. **Welding Shop**
    a. Study of tools and operations
    b. Simple butt Joint
    c. Lap Joint
    d. Oxy acetylence welding
5. **Sheet Metal Shop**
    a. Study of tools and operations
    b. Making funnel complete with soldering
    c. Fabrication of tool box, tray, electrical panel box etc.
6. **Carpentry Shop**
    a. Study of tools and operation and carpentry Joints.
    b. Simple exercise using jack plain
    c. To prepare half lap corner, joint, mortise and tennon joints.
    d. Simple exercise on woodworking lathe.
7. **Foundry**
    a. Making a mould using single piece pattern
    b. Making a mould using two piece pattern
    c. Making a mould using a pattern with core print
    d. Making Pouring and Making an Aluminium Casting

Computer Application Lab

(DCS-151/251)

L T P
1 0 2

1. Introduction of computer types, generation, Application, characteristic & Memory.
2. Introduction and practice of Ms-Office package (Ms-Word, Ms- Excel, Ms- Power point & Ms-Access).
3. Introduction & Practice of Internet and e-mail.
4. Programming of 'C' history of character set, variables, and keywords, token data types input and output function.
5. Introduction of Decision control statement- if, if- else, nester if statement and switch case.
6. Programming practice of if, if – else, nested if statement and switch case.
7. Loops- while loop, do- while loop, for loop, break and continuous statements.
8. Programming practice of while loop do- while loop, for loop, break and continuous statements.
9. Array Declaration, initialization of one and two dimensional array.
10. Programming practice on array.

Reference:

1. Computer fundamental- Sinha & Sinha
2. Computer Basics & 'C'- V. Rajaraman
3. Office 2007 - Ruthosky, Seguim, Ruthosky
4. Programming in ANSI- E Balagurusamy