Integral University, Lucknow
Department of Polytechnic
Study and Evaluation Scheme

Program: Diploma in Electronics 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)	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y		Y				
2	DPH-101	Applied Physics (A)	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y		Y		
3	DCH-101	Applied Chemistry (A)	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y		Y		
4	DECE-101	Electrical Engineering-I	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y		Y				
5	DECE-102	Electronic Components & Devices-I	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y				
6	DED-101	Engineering Drawing	Core	01	03	00	40	20	60	40	100	1:3:0	4							
PRACTICAL																				
1	DPH-151	Applied Physics Lab	Core	00	00	02	40	20	60	40	100	0:0:1	1	Y	Y	Y		Y		
2	DECE-151	Electrical Engineering Lab	Core	00	00	02	40	20	60	40	100	0:0:1	1	Y		Y				
3	DCAD-151	Basic Computer Aided Design Lab	Core	00	00	02	40	20	60	40	100	0:0:1	1	Y	Y	Y				Y
4	DWS-151	Workshop Practice	Core	00	00	03	40	20	60	40	100	0:0:1.5	1.5	Y	Y	Y				
5	GP-151	General Proficiency		-	-	-	-	-	60	-	60									
Total				16	08	09	400	200	660	**400**	**1060**		**28.5**							

ELECTRONICS ENGINEERING

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

Ellipse: $\frac{x^2}{b^2} + \frac{y^2}{b^2} = 1$, 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	

ELECTRICAL ENGINEERING-1

(DECE-101)

UNIT-1 **L T P**

3 1 0

CLASSIFICATION:

Classification of materials into conducting materials, Insulating materials, Semi conducting materials with reference to their atomic structure.

Conducting Materials:

A. Resistivity and factors affecting resistivity such as temperature, alloying and mechanical stressing.

B. Classification of conducting materials into low resistivity and high resistivity materials. Some examples of each and their typical applications. 8

UNIT-II

INSULATING MATERIALS:

A. Electrical Properties: Volume resistivity, Sarface resistance, Dielectric loss, Dielectric strength (Break down voltage) and Dielectric constant.

B. Chemical properties: Solubility, Chemical resistance, Weather ability.

C. Physical properties: Hydroscopicity, tensile and compressive strength, Abrassive resistance, Brittleness.

D. Thermal properties: Heat resistance, classification according to permissible temperature rise, effect of electrical over loading on the life of an electrical appliance.

E. Plastic insulating materials: Classification into thermoplastic and thermo stating categories, examples of each their typical applications.

UNIT-III

BATTERIES:

i) Construction of lead acid and nickel cadmium batteries.

ii) Charging and maintenance of batteries.

iii) Rating of batteries.

iv) Back up batteries (Lithium & Silver Oxide batteries)

v) Shelf life of batteries. 7

UNIT-IV

D.C. CIRCUITS:

i) Ohm's Law, resistivity, effect of temperature on resistance, heating effect of electric current, conversion of mechanical units into electrical units.

ii) Kirchoff's laws, application of Kirchoff's laws to solve, simple d.c. Circuits.

iii) Thevenins theorem, maximum power transfer theorem, Norton's theorem and super position therorem, simple numerical problems. 6

UNIT-V

ELECTROSTATICS:

i) Capacitance and capacitor, definition, various types.

ii) Charging and discharging of a capacitor, growth and decay of current in a capacitive circuit.

iii) Energy stored in a capacitor.

iv) Capacitance in terms of dimensions of parallel plate capacitor.

v) Dielectric constant of material, Break down voltage of a capacitor.

vi) Series and parallel connection of capacitors. 8

REFERENCES:

1. Fundamentals of Electrical Engg. - Ashfaq Husain
2. Electrical Technology Volume -1 B.L. Theraja
3. K.B. Raina and S.K. Bhattacharya – Pubs: S.K. Dataria & Son

ELECTRONICS COMPONENTS & DEVICES-I
(DECE-102)

LT P
3 1 0

UNIT-I

INTRODUCTION TO ELECTRONICS:

Application of Electronics in different fields.

Brief introduction to active components and devices.

VOLTAGE AND CURRENT SOURCES:

Concept of constant voltage sources, symbol and graphical representation, characteristics of ideal and practical voltage sources.

Concept of constant current source, symbol and graphical representation, characteristics of ideal and practical current sources.

Conversation of voltage source into a current source and vice-versa

Concept of floating and grounded D.C. supplies. 9

UNIT-II

PASSIVE COMPONENTS:

Resister- Working characteristics/properties, Resistors-Carbon film, metal-film, carbon composition, wire wound and variable type (presets and potentiometers) constructional details, characteristics (size, voltage, tolerance, temperature and frequency dependence and noise consideration, specification Testing, mutual comparison and typical applications, Voltage Dependent Resistor (VDR).

Capacitors- Working characteristics/properties, Capacitors polyester, Metallized polyester, ceramic paper mica and electrolytic tantalum and solid aluminum types; construction details and testing, specifications, mutual comparison & typical applications.

Inductors, Transformers and RF coils- Working characteristics/properties Methods of manufacture of inductors, RF coils and small power and AF transformer and their testing. Properties of cores. Needs and types of shielding. 9

UNIT-III

SEMICONDUCTOR DIODE:

P-N junction diode, Mechanism of current flow in P-N junction drift and diffusion currents, depletion layer, potential barrier, P-N junction diode characteristics, zener & avalanche breakdown, concept of junction capacitance in forward & reverse bias conditions.

Semiconductor diode characteristics, dynamic resistance & their calculation from diode characteristics dynamic resistance of diode in term of diode current and forward voltage with temperature (No deviation).

Diode (P-N junction) as rectifier, Half wave rectifier, full wave rectifier including bridge rectifier, relationship between D.C. output voltage and A.C. input voltage rectification efficiency and ripple factor for rectifier circuits, filter circuits shunt capacitor, series inductor, capacitor input filter, working of the filter and typical applications of each type. Different types of diodes, characteristics and typical applications of power diodes, zener diodes, varactor diodes, point contact diodes, tunnel diodes, LED's and photo diodes. 7

UNIT-IV

INTRODUCTION TO BIPOLAR TRANSISTOR:

Concept of bipolar transistor as a two junction three terminal device having two kinds of charge carriers, PNP and NPN transistors, their symbols and mechanisms of currentflow, explanation of fundamental current relations. Concept of leakage current (ICBO) effect of temperature on leakage current. Standard notation for current and voltage polarity.

CB, CE and CC configurations.

Common base configuration (CB): input and output characteristics, determination of transistor parameters (input and output) dynamic resistance, current amplification factor.

Common emitter configuration: current relations in CE configuration, collector current interms of base current and leakage current (ICEO), relationship between the leakage current in CB and CE configuration, input and output characteristics, determination of dynamic input and output resistance and current amplification factor B from the characteristics.

Common collector configuration: Expression for emitter current interms of base current in CC configuration. 7

UNIT-V

Comparison of CB and CE configuration with regards to dynamic input and output resistance, current gain and leakage current performance of CE configuration for low frequency voltage amplification. Typical application of CB configuration in amplification.

Transistors as an amplifier in CE configuration.
DC load line, its equation and drawing it on collector characteristics.
Determination of small signal voltage and current gain of a basic transistor amplifier using CE output characteristics and DC load line, Concept of power gain as a product of voltage gain and current gain.

Refference:
Principles of Electronics-V.K.Mehta
Fundamental of Electrical Engg.-Ashfaq Husain
Bhargava, Kulshershtha & Gupta-"Basic Electronics & Linear Circuits" – Tata Mcgraw-Hill

ENGINEERING DRAWING
(DED -101)

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.

APPLIED PHYSICS LAB
(DPH-151)

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0 0 2

Note: Any ten experiments are to be performed.

1. Determination of 'g' using simple pendulum.
2. To find the surface Tension of water by the method of capillary rise.
3. To determine the frequency of A.C. mains by using a sonometer and a horse shoe magnet.
4. To determine the value of modulus of rigidity of given material of a wire by statical method using Barton's apparatus.
5. Determination of coefficient of viscosity of water by capillary flow (Poiseuilles method).
6. To determine the height of a tower by Sextant.
7. To determine the moment of Inertia of a flywheel.
8. Determination of velocity of sound by resonance tube.
9. Determination of resistivity of a given wire by Post Office Box.
10. By using Potentiometer, determination of
    (i) E_1/E_2
    (ii) Internal resistance of givn cell.
11. Determination of coefficient of friction on a horizontal plane.
12. Determination of viscosity coefficient of a lubricant by Stoke's law.
13. Determination of Spring Constant.
14. Verification of Kirchoff's laws.
15. To draw the characteristics of a p-n junction diode.

ELECTRICAL ENGINEERING LAB

(DECE-151)

L T P

0 0 2

PERFORM ANY 10 EXPERIMENTS:

1. Ohm's Law Verification
2. To verify the laws of series and parallel connections of resistances i.e. to verify :-
   (i) The total resistance in series connections RT=RI +R2+R3……..
   Where RT is the total resistance and RI, R2,R3 etc. are the resistance connected in series.
   (ii) The total resistance in parallel connection .
   1/RT=1/R1+1/R2+1/R3……..
   Where RT is the Total resistance and R1, R2, R3etc. are the resistance connected in parallel. Also to conclude that the total resistance value of circuit is less than the any individual resistance .
3. To verify Kirchhoff's following laws:-
   The algebraic sum of the currents at a junctions is zero
   The algebraic sum of the e.m. f. in any closed circuit is equal to the algebraic sum of IR products (drops)in that circuit.
4. To measure the resistance of an ammeter and a voltmeter and to conclude that ammeter has very low resistance whereas voltmeter has very high resistance .
5. To verify Thevenin's and maximum power transfer theorems
6. To find the ratio of inductance values of a coil having air core and iron core respectively and thus see that by the introduction of magnetic material inside the coil , the inductance value of coil is substantially increased .
7. To verify the relation:-
   CT=(C1*C2)/(C1+C2)
   And
   CT=C1+C2
   For tow capacitors, connected is series and parallel respectively.
8. To test a battery for charged and discharged conditions and to make connections for its charging .
9. To show that the range of an ammeter (d.c.and a.c.) and a voltmeter (d.c.and a.c.) can be extended with the use of shunts and multiplier .
10. To convert the given galvanometer into a voltmeter and an ammeter.

Basic Computer Aided Design Lab

(DCAD-151)

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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 ans 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.