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)

L T P

3 1 0

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]

L T P

3 1 0

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)

L T P

3 1 0

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)

L T P
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	**Co-Requisite**	**L**	**T**	**P**	**C**
None	**None**	**00**	**00**	**02**	**----**
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

STUDY & EVALUATION SCHEME

Diploma in Engineering – First Year

Branch – Electrical Engineering

Year-1, Semester -2

S. No.	Subject Code	Subject	Periods			Evaluation Scheme				Sub. Total
						Sessional			Exam	
			L	T	P	CT	TA	Total	SES	
Theory Subjects										
1	DMA-201	Applied Mathametics-1(B)	03	01	00	30	20	50	100	150
2	DPH-201	Applied Physics (B)	03	01	00	30	20	50	100	150
3	DCH-201	Applied Chemistry (B)	03	01	00	30	20	50	100	150
4	DEE-201	Basic Electrical Engg. –II	03	01	00	30	20	50	100	150
5	DEM-201	Electrical & Electronics Engineering Materials	03	01	00	30	20	50	100	150
6	DPC-201	Professional Communication	03	01	00	30	20	50	100	150
Practical Subjects										
1	DPH-251	Applied Physics Lab	00	00	02	10	10	20	30	50
2	DEC-251	Basic Electronics – I Lab	00	00	02	10	10	20	30	50
3	DEE-251	Basic Electrical Engg. Lab	00	00	02	10	10	20	30	50
4	DPC-251	Professional Communication Lab	00	00	02	10	10	20	30	50
5	GP-251	General Proficiency	_	_	_	_	50	_	_	50
Total			18	06	08	_	_	_	_	1150

APPLIED MATHEMATICS-I (B)
(DMA-201)

(Common to All Diploma Engineering Courses)

L T P

3 1 0

UNIT-1 [9]

Differential Calculus-I

Function, Limit, Continuity:

Definitions of variable, constant, intervals (open, closed, semi-open). Definition of function, graph of function, range and domain, value of a function and type of functions. Elementary method for finding limits, continuity& differentiability.

Derivatives:

Definition of derivative and notation,derivativeof standard function, derivative of trigonometric function. Fundamental rules for derivative (without proof), derivatives of sum or difference, scaler multiplication, product of function, quotient of function and function of function.

UNIT-2 [9]

Differential Calculus-II

Differentiation:

Logarithmic differentiation, differentiation of implicit function, differentiation of parametric equation, differentiation of a function with respect to another function.differentiation of special functions (Hyperbolic and Inverse circular functions), higher order differentiation, Leibniz's theorem.

Application: Tangents and Normals, Maxima and Minima, Rate, Velocity and Acceleration.

UNIT-3 [9]

Integral Calculus:

Definition of Integration(anti-derivative), Integration of standard functions. Rule of integration (Integration of sum, difference and scaler multiplication).

Indefinite Integral:

Integration by substitution, Integration by parts, Integration by partial fraction, Integration of special functions(Hyperbolic and Inverse circular functions).

Definite Integral:

Definition of definite integral, properties and evaluation of definite integral.

UNIT-4 [7]

Application of Integral Calculus:

Finding areas bounded by sample curves, length of simple curves, Volume of solids of revolution, mean value, mean square value, root mean square value of function.

UNIT-5 [6]

Numerical Integration & Error:

Introduction, Newton-Cote's Quadrature formula,Trapezoidal rule, Simpson's $1/3^{rd}$ rule and $3/8^{th}$ rule.Concept of error for simple function.

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.
5. Mathematics for Polytechnic: S.P Deshpande, Pune Vidyarthi Griha.

APPLIED PHYSICS(B)
(DPH-201)
[Common to All Engineering Courses]

L T P
3 1 0

UNIT-I **[6]**

Application of Sound Waves :

Acoustics :

Standing waves, Closed and Open organ pipes, Resonance, End correction.Definition of pitch, loudness, quality and intensity of sound waves. Echo and reverberation and reverberation time. Sabine's formula, Control of reverberation time (problems on reverberation time).Accoustics of buildings, defects and remedy.

Ultrasonics,

Generation, Magnetostriction, Piezoelectric effect, Application in new technology

UNIT-II **[8]**

Quantum nature of light, Coherence (Spatial and temporal), Duality of wave and particle, Concept of Interference, Biprism, Fraunhoffer single slit diffraction,grating, Resolving and dispersive power, Elementary concept of polarization.

Fibre Optics :

Critical angle, Total internal reflection, Principle of fiber optics, Optical fiber, Pulse dispersion in step-index fibers, Graded index fiber, Single mode fiber, Optical sensor

UNIT-III **[8]**

D.C. Circuits :

Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); potentiometer, Kirchhoff's Law and their simple application. Principle of Carey-Foster's bridge.

Electric potential, potential energy, Energy of a charged capacitor. Charging and Discharging of capacitors,

Dielectrics :

Electric dipole; effect of electric field on dielectrics, polarization.Magnetic Fields & Materials :

Dia, Para and Ferro-magnetism, Ferrites, Hysteresis, Hysteresis curve of a ferro magnetic materials and their uses, Basic idea of super conductivity.

UNIT-IV[**[10]**

Semiconductor Physics :

classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semi conductors, Electrons and holes as charge carriers in semiconductors, Effect of temperature in conduction in semiconductors, P-type and N-type semiconductors, P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode.

Production of X-rays types of X-rays spectra :

Continuous and characteristics of X-rays,Properties & applications of X-rays.

Nuclear Physics :

Radioactivity, Nuclear stability, Radioactive emission, radiation hazards, Nuclear fission and fusion, Nuclear reactors and their application, Mass-energy relation, Atomic mass unit, Mass defect and binding energy.

UNIT-V **[8]**

Lasers and its Applications :

Absorption and Emission of energy by atom, Spontaneous and Stimulated Emission, Population inversion. Main components of laser and types of laser,Ruby Laser, He-Ne laser and their applications.

Non-conventional energy resources.

Wind energy : Introduction, scope and significance,measurement of wind velocity by anemometer, general principle of wind mill, Indian wind energy programme.

Solar energy: Solar radiation and potentiality of solar radiation in India, unit of solar radiation.

Bio fuel and Gobar gas plants

Uses of solar energy: Solar Cooker, solar water heater, solar photo-voltaic cells, solar energy collector, Modern applications in technology.

References :

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

DCH-201	Applied Chemistry (B)				
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	**Fuels:**				07
Definition, its classification, high and low calorific value. Determination of calorific value of solid and liquid fuels by Bomb calorimeter. Liquid fuel- Petroleum and its refining, distillates of petroleum (Kerosene oil, Diesel and Petrol), Benzol and power alcohol. Knocking, Anti-knocking agents, Octane number and Cetane number. Cracking and its type, Gasoline from hydrogenation of coal (Bergius process and Fischer Tropsch's process) Gaseous Fuel- Coal gas, Oil gas, Water gas, Producer gas, Biogas, LPG and CNG. Numerical problems based on topics.					
UNIT II	**Colloidal State of Matter and Lubricants:**				08
Concept of colloidal and its types, different system of colloids, dispersed phase and dispersion medium. Methods of preparation of colloidal solutions, Dialysis and electrodialysis. Properties of colloidal solution with special reference to absorption, Brownian movement, Tyndal effect, Electrophoresis and Coagulation. Relative stability of hydrophilic and hydrophobic colloids. Protection and protective colloids. Emulsion, types, preparation, properties and uses. Application of colloids chemistry in different industries. Definition, classification, necessity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, importance of additive compounds in lubricants, Synthetic lubricants and cutting fluids. Industrial application, its function in bearing.					
UNIT III	**Hydrocarbons:**				08

A. Classification and IUPAC nomenclature of organic compounds homologous series (Functional Groups). B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.		
UNIT IV	**Organic Reactions and Mechanism:**	08
Fundamental aspects- A. Electrophiles and nucleophiles, Reaction intermediates, Free radicals, Carbocation, Carbanion. B. Inductive effect, Mesomeric effect, Electromeric effect. Mechanism- A. Mechanism of addition reaction (Markonicove's Rule, Cyanohydrin and Peroxide effect). B. Mechanism of substitution reactions; (Nucleophillic) hydrolysis of alkyl halide, electrophillic substitution halogenations, Sulphonation, Nitration and Friedel- Craft reaction. C. Mechanism of Elimination reaction- Dehydration of primary alcohol, Dehydrohalogenation of primary alkyl halide.		
UNIT V	**Polymers and Synthetic Materials:**	09
Polymers- Polymers and their classification. Average degree of polymerization, Average molecular weight, Free radical polymerisation (Mechanism). Thermosetting and thermoplastic A. Addition polymers and their industrial applications- Polythene, Polystyrene, PVA, PVC, PAN, PMMA, Buna-S, Buna-N, Teflon. B. Condensation polymers and their industrial applications- Nylon 6, Nylon 6,6, Bakelite, Melamine formaldehyde, Urea formaldehyde, Terylene or Dacron, Polyurethanes. General concept of Bio polymers, Biodegradable polymers and Inorganic polymers (Silicon). Synthetic Materials- A. Introduction- Fats and Oils		

	B. Saponification of fats and oils, Manufacturing of soap C. Synthetic detergents, types of detergents and its manufacturing. Explosives: TNT, RDX and Dynamite Paint and Varnish.	
Reference books:	6. Applied Chemistry: R. S. Katiyar and J. P. Chaudhary 7. Applied Chemistry: Rakesh Kapoor 8. Principles of general and inorganic chemistry: O. P. Tandon 9. Engineering Chemistry: S. Chandra 10. Applied Chemistry: M. Gupta	

BASIC ELECTRICAL ENGINEERING-II
(DEE-201)

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UNIT-I

Electromagnetism

Concept of magnetic flux, flux density, magnetic field intensity, permeability and their units. Magnetic circuits, concept of reluctance and mmf and simple problems. Analogy between electric and magnetic circuits.B-H curve and magnetic hysteresis (No mathematical derivation).Elementry ideas about hysteresis loss. Lifting powers of a magnet. 8

UNIT-II

Electromagnetic Induction

Faraday's laws of electromagnetic induction. Lenz's law, simple problem. Dynamically induced emf. Self induced emf, inductance, its role in electrical circuits. Simple problems. Mutually induced emf, mutual inductance,its role in electrical circuits. Simple problems. Energy stored in magnetic circuit. Rise and decay of current in inductors. Force on a current carrying conductor placed in a magnetic field and its applications.

Elementry idea about eddy current loss. 10

UNIT-III

A.C.Circuits

Recapitulation of terminology, instantaneous value, maximum (peak) value, cyle, frequency, Alternating current and voltage. Difference between AC and DC. Equation of an alternating voltage and current and wave shape varying sinusoidally. Average and RMS value of alternating voltage and current. Importance of RMS value. Simple problems. Concept of phase, phase difference and phasor representation of alternating voltage and current.

A.C. through pure resistance, inductance,capacitance, phasor diagram and power absorbed. 8

UNIT-IV

R-L series circuit, idea of impedance and calculations. Apparent power, reactive power and active power,power factor, its importance and simple problems. R-C series circuit , simple problems.

R-L-C series circuit , simple problems. Solution of simple parallel A-C circuits' by

(a) Phasor diagram method,

(b) Admittance method.

Solution of AC circuits series/ parallel by j method. (simple problems).Resonance (Series and parallel) and practical application, simple problems. 7

UNIT-V

Polyphase System

Introduction to polyphase system. Advantage of three phase system over single phase system. Star and Delta connections. Relationship between

phase and line value of currents and voltage.Power in polyphase circuits. Simple problems of balanced circuits only. 7

References :

1. Fundamentals of Electrical Engineering – Ashfaq Husain
2. Electrical Technology Volume-I – B.L Thereja

ELECTRICAL AND ELECTRONICS ENGG. MATERIALS
(DEM-201)

L T P
3 1 0

UNIT-I 2

Classification :

Classification of materials into conducting,semiconducting and insulating materials with reference to their atomic structure.

UNIT-II 8

Conducting Materials :

Resistivity and factors affecting resistivity, such as temperature, alloying and mechanical stressing. Super conductivity and super conducting material. Low resistivity materials e.g. copper, aluminium and steel, their general properties as conductor e.g. resistivity, temperature co-efficient, mechanical properties, corrosion, solor ability, contact resistance and practical application. Uses of mercury as conducting material.

UNIT-III 8

Comparison of copper, aluminium and steel for various applications as electrical conductor. Low resistivity copper alloys: brass, bronze (cadmium
and beryllium), their practical application.

High resistivity materials : Manganin, constantan nichrome, carbon, tungsten, their practical applications. Electric lamp materials. Brush contact materials. Soldering materials. Thermocouple materials, Fuse materials.

UNIT-IV 12

Insulating Materials

(i) Introduction.

(ii) Properties of insulating material.

- Electrical properties: Volume resistivity, Surface resistivity, Dielectric Loss, Dielectric Contant, Dielectric strength.

- Mechnical properties:- Mechanical strength

- Physical properties :- Hygroscopicity tensile and compressive strength, Abrasive resistance brittleness.

- Thermal properties - Heat resistance, Classification according to high permissible temperature rise, Effect of over loading on the life of an electrical appliances, Increase in rating with the use of insulating materials having higher thermal stability, Thermal conductivity.

- Chemical properties - Solubility, Chemical resistance, Weather ability.

UNIT-V 10

Magnetic Materials :

(i) Classification of magnetic materials into soft and hard magnetic materials.

(ii) Soft magnetic materials - high silicon alloy steel for transformers and low silicon alloy steel, for electric rotating machine cold rolled grain oreinted and non-oriented steel, Nickel iron alloy, soft ferrites, their properties and uses.

(iii) Hard magnetic materials - tungsten steel,chrome steel, cobalt steel, alnico, hard ferrites, their properties and applications.

Semiconductor Materials :

Introduction, semiconductor and their applications, Different semiconductor materials used in manufacturing various semiconductor (Si & Ge), Material used for electronic components like resister, capactor, diode, transistors and inductors.

Special Purpose Materials :

Materials used in transistor and IC manufacturing, PC BS, computer memory devices (name of such materials to be added) Ferrous and non ferrous materials. Thermistor, Sensistor, Varistor and their practical applications.

References :

1. K.B. Raina & S.K. Bhattacharya Publication – S.K. Kataria & Sons

PROFESSIONAL COMMUNICATION
(DPC-201)
[Common to All Engineering Courses]

L T P
3 1 0

UNIT-I

Communication in English :

Concept of communication, importance of effective communication, types of communication, formal and informal, verbal and nonverbal, spoken and written, Techniques of communication, Listening and reading, writting and speaking, Barriers to communication- Modern tools of communication-

Fax, e-mail, Telephone, telegram, etc., Techniques for clear , concise , correct and coherent writing, Difference between technical writing and general writing. 5

UNIT-II

Letters :

Kinds of letters: Official, demi-offical, unofficial , enquiry letter, quotation, tender and order giving letters. Application for a job, Resume, complaint letter and adjustment letter. 5

Report writing, Note making and minutes writing.

UNIT-III

Grammar :

Transformation of sentences, synthesis, Preposition, Articles, Idioms and Phrases, One word substitution, Abbreviations. Tenses, Active and Passive voice. 15

Composition on narrative, descriptive, imaginative, argumentative, discussion and factual topics.

UNIT-IV

Spoken English:

Phonemes(Speech sound),Consonant sounds, vowels sounds and dipthongs, Phonetic transcription, IPA,word stress and Intonation. 10

Development of comprehension and knowledge of English through the study of text material and language exercises based on the prescribed text book of English.

UNIT-V.

Letter writing in Hindi:

Kinds of letters: Official, demi-offical, unofficial, enquiry letter, quotation, tender and order giving letters, Application for a job. 5

References :

1. Dr. R.P. Chauhan, : Asian Publishers, Muzaffarnagar.
2. S.V. Singh & M. S. Verma : Bharat Bharat Prakashan, Meerut.
3. R. Thakur & M . Singh, Meerut Publication.

APPLIED PHYSICS LAB
(DPH-151/DPH-251)

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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.

BASIC ELECTRONICS-I LAB
(DEC-251)

L T P
0 0 2

Perform any 10 experiments

1. Semiconductor diode : identification of types of packages,terminals and noting different ratings using data books for various types of semiconductor diodes (germaniun, point contact, silicon low power and high power and switching diode).
2. Rectifier circuits using semiconductor diode measure- ment of input and output voltage and ploting of input and output waveshapes:
   - i) Half wave rectifier
   - ii) Full wave rectifier (centre tapped and bridge rectifer circuits).
3. Plot the waveshapes of a full wave rectifier with shunt capacitor, series inductor, and filter circuit.
4. Transistor Biasing Circuits Measurment of operating point (IC and VCF) for a
   - i) Fixed bias circuit
   - ii) Potential divider biasing circuit. (Measurement can be made by changing the transistor in the circuit(s) by another of same type number.
5. Single stage common emitter amplifier circuit
   - i) Measurement of voltage gain at 1 KHZ for differnet load resistances.
   - ii) Plotting of frequency response of a single stage amplifier circuit.
   - iii) Measurement of input and output impedance of the amplifier circuit.
6. To measure the overall gain of two stage R.C coupled amplifier at 1 KHZ and note the effect of loading of second stage on the first stage.
7. (a) To plot the laod Vs output power characterstic to determine the maximum signal input for undistorted signal output.
   (b) The above experiment is to be performed with single ended power amplifier, transistorized push pull amplifier.
   Complementary symetry power amplifier.
8. To observe the effect of a bye-pass capacitor by measuring voltage gain and plotting frequency response for a single stage amplifier.
9. To measure input and output impedance of a feedback amplifier with and without by-pass capacitor.
10. Measurement of voltage gain, input and output impedance and plotting of frequency response of an emitter follower circuit.
11. Plot the FET characteristics and determination of its parameters from these characteristics.
12. To determine the range of frequency variation of a RC phase shift oscillator.
13. To test adjustable IC regulator and current regulator.
14. Identification of Some Popular IC of 74 and 40 series with Pin Number and other details.
15. Application and use of Multimeter, CRO, Audio Oscillator and Power Supply (D.C.)

BASIC ELECTRICAL ENGINEERING LAB
(DEE-251)

L T P
0 0 2

Perform any 10 experiments

1. Ohm's law verification
2. To verify the laws of series connections of resisstance i.e. to verify:
   The total resistance in series connection.
   $R_T = R_1 + R_2 + R_3 + \text{- - - - - - -}$
   Where R_T is the total resistance and R_1, R_2, R_3 etc. are the resistance connected in series.
3. To verify the laws of parallel connections of resistance i.e. to verify:
   The total resistance in parallel connections
   $$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \ldots\ldots..$$
   Where RT is the total resistance and R1, R2, R3, etc. are the resistance Connected in parallel. Also to conclude that the total resistance value of a parallel circuit is less than the any individual resistance.
4. To verify Kirchoff's first laws: The algebraic sum of the currents at a Junction is zero.
5. To verify Kirchoff's second laws: The algebraic sum of e.m.f. in any closed circuit is equal to the algebraic sum of IR products (drops) in that circuit.
6. 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.
7. To verify Thevenin's theorems.
8. To verify maximum power transfer theorems.
9. To test a battery for charged and discharged conditions and to make connections for its charging.
10. To convert the given galvanometer into a voltmeter and an ammeter.
11. To charge and discharge a capacitor and to show the graph on CRO
12. Verification of law of capacitors in series & parallel.
13. Verification of voltage and current relations in star and delta connected system.

PROFESSIONAL COMMUNICATION LAB
(DPC-251)

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0 0 2

UNIT-I

Introduction to speech sounds through (IPA) International Phonetic Alphabet.

- Pronounciation practice emphasizing the articulation of vocal sounds & Word stress.
- Pronounciation Practice emphasizing the words with spelling pronounciation Mismatch.

UNIT-II

- Techniques of giving focused self description in formal communication Situations.
- Practice in describing objects.

UNIT-III

- The basics of group discussion.
- common pitfalls in group discussion.
- Techniques for making a claim & supporting it in group discussion.
- Techniques for offering polite but firm counter arguments.
- Participating in a Debate.

UNIT-IV

- The essentials of Seminar Presentation.
- Techniques for preparing a Seminar Presentation.
- Mock Interview: Preparation, Unfolding of personality and expressing Ideas effectively.
- Role Play/General Conversation, Making polite enquiries at Railway station, Post Office and other Public Places.

UNIT-V

Project :

At the beginning of the Semester each student in the class will be given topics for one informative & one persuasive speech to be delivered by him/her towards the end of the semester. The students will research for, organize and finalize the speeches under the guidance of the subject teacher. For each speech, the student will submit a one page written outline.

Software:

- Learn to Speak English (BPB MultiMedia)
- A talking Dictionary.
- CD's of Professional Communication.

References :

1. Grant Taylor : English Conversation Practice (T.M.H.)
2. Grathe King :Colloqnial English Routledge London

Integral University, Lucknow
Department of Polytechnic
Study and Evaluation Scheme

Program: Diploma in Electrical Engineering

Semester III[rd]

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-301	Applied Mathematics-II (A)	Core	03	01	00	40	20	60	40	100	3: 1 :0	4	Y		Y				
2	DEE-301	Electrical Design Drawing & Estimating-I	Core	03	01	00	40	20	60	40	100	3: 1: 0	4		Y	Y				
3	DEE-302	Electrical Instrument & Measurements-I	Core	03	01	00	40	20	60	40	100	3 :1: 0	4	Y	Y	Y				
4	DEE-303	Elementary Mechanical & Civil Engineering	Core	03	01	00	40	20	60	40	100	3: 1: 0	4	Y	Y	Y				
5	DEE-306	Power System	Core	03	01	00	40	20	60	40	100	3: 1: 0	4	Y		Y				
6	DEE-307	Circuit Theory	Core	03	01	00	40	20	60	40	100	3: 1: 0	4	Y		Y				
PRACTICAL																				
1	DEE-351	Electrical Wiring & Fabrication Shop	Core	00	00	03	40	20	60	40	100	0: 0: 1.5	1.5	Y	Y	Y				
2	DEE-352	Electrical Instruments & Measurement Lab	Core	00	00	03	40	20	60	40	100	0 :0: 1.5	1.5	Y	Y	Y				
3	DEE-353	Elementary Mechanical Engineering Lab	Core	00	00	03	40	20	60	40	100	0: 0: 1.5	1.5	Y		Y				
4	GP-351	General Proficiency		-	-	-	-	-	60	-	60								Y	Y
Total				18	06	09	-	-	-	-	**960**		**28.5**							

APPLIED MATHEMATICS-II (A)

(DMA-301)

(Common to All Diploma Engineering Courses)

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UNIT-1 [10]

Matrix-I

Type of matrix: Null matrix, unit matrix, square matrix, symmetric and skew-symmetric matrix, orthogonal matrix, diagonal and triangular matrix, Hermitian and Skew-Hermitian matrix, unitary matrix.

Algebra of Matrix: Addition, subtraction and multiplication.

Determinant of matrix, cofactor of matrix, computing inverse through determinant and cofactor.

Elementary row/column transformation: meaning and use in computing inverse of matrix.

UNIT-2 [8]

Matrix-II

Linear dependence/independence of vectors. Definition and computation of rank of matrix through determinants, elementary row and column transformation (Echelon and Normal form of matrix), consistency of equations.

UNIT-3 [6]

Eigen Values and Eigen Vectors, Cayley-Hamiltom Theorem

Definition and evaluation of Eigen values and Eigen vectors of a matrix of order 2 and 3. Cayley-Hamilton theorem (without proof) and its verification, use of Cayley-Hamilton theorem in finding inverse.

UNIT-4 [8]

Ordinary Differential Equation

Introduction, formation, order, degree of ordinary differential equation. Formation of ordinary differential equations through physical, geometrical, mechanical, electrical consideration.

Solution of differential equations of first order and first degree by variable separable, reducible to variable separable forms, linear and Bernoulli form and exact differential equation.

UNIT-5 **[8]**

Second Order Differential Equation

Properties of solution, linear differential equation of second order with constant coefficients, complimentary function and particular integral, equation reducible to linear form with constant coefficients.

Simple Applications

LCR circuit, Motion under gravity, Newton's law of cooling, Radioactive decay, Population growth, Oscillations of a string, Equivalence of electrical mechanical system.

References:

1. Applied Mathematics: Kailash Sinha, Meerut publication.
2. Applied Mathematics: P.K Gupta, Asian Publication.
3. Applied Mathematics: H.R Luthra, Bharat Bharti Prakashan.
4. Applied Mathematics: H.K Das, C.B.S Publication.
5. Mathematics for Polytechnic: S.P Deshpande, Pune Vidyarthi Griha.
6. Calculus: Single Variable: Robert T. Smith, Tata McGraw Hill.
7. Mathematics I: Ane Books India. Z. Khan, Q.S Ahmad & S.A. Khan.

ELECTRICAL DESIGN, DRAWING & ESTIMATING-I
(DEE-301)

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3 1 0

UNIT-I **[8]**

Electrical Symbols and Diagrams:
Need of symbols; List of symbols for electrical equipments and accessories used in electrical light, fan and power circuits, alarm and indicating circuit , contactor control circuits as per I.S.S. Type of diagrams - Wiring diagrams (multiple and single line representation) and schematic diagrams as per I.S.S.
* One Drawing Sheet for atleast - 50 symbols.

UNIT-II **[8]**

Wiring materials and accessories :
Brief description, general specifications (as per I.S.S.) and approximate cost of different types of wires, cables, switches, distribution board, switch board, boxes, batten and its accessories, conduit and its accessories, lamp holders, socket out lets, plug ceiling roses. fuse amd energy meter used in domestic and power wiring installations. Brief description, general specifications and approximate cost of switches,push buttons, bells, indicating lights, indicating panels, relays etc.used in alarm circuits. * Study of materials and accessaries in work shop.

UNIT-III **[8]**

Light and Fan Circuits :
Schematic and wiring diagrams (multiline and single line both) using junction boxes and looping systems
for the following types of circuits:-
(i) Light and fan controlled by necessary switches and regulators.
(ii) Stair case wiring
(iii) Corridor lighting
(iv) One lamp controlled by three or more switches.
* One drawing sheet for atleast 4- problems.
* Wiring practice for atleast 3-circuits.

UNIT-IV **[8]**

Estimation of Domestic Internal Wiring Circuits :
(Small Houses)
(i) Description of various wiring systems and methods.
(ii) Need of earthing and point to be earthed in internal wiring system as per IE rules.
(iii) I.S. specifications, calculation of No. of points (light, fan, socket outlet), calculation of total load including domestic power, determination of no. of circuits, size of wires and cables, switches and
main switch, distribution board and switch board, batten conduit and other wiring accessories.

UNIT-V **[8]**

Layout of installation plan, single line wiring diagram,
calculation of length of batten/conduit of differant sizes and wire length; schedule of materials. Estimating for small houses using PWD/CPWD electrical schedule rates (E.S.R.)
* The drawing sheet for atleast 4-layouts and circuits
* Estimation practice for atleast - 2 installations each for small houses.

Reference Books:

1. Electrical Engg. Drawing Design & Estimating - K.B.Raina & S.K. Bhattacharya –Willey Eastern Publication
2. Electrical Engg. Drawing Desing & Estimating – Jaggi & Pal & Lal – Nav Bharat Prakashan, Meerut

ELECTRICAL INSTRUMENTS AND MEASUREMENTS-I

(DEE-302)

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3 1 0

UNIT-I **[6]**

Introduction to electrical measuring instruments:

Concept of measurement and instruments. Electrical quantities and instruments for their measurements.

UNIT-II **[10]**

Measurement and Errors. Accuracy, precision, types of errors, probability of errors and Gaussian Errors curve, sensitivity, resolution and stability. Classification of errors. Types of electrical measuring instruments, indicating, integrating and recording instruments. Essentials of indicating instruments , deflecting, controlling and damping torques. Measurement of dielectric strength of insulating oil and dielectric loss.

UNIT-III **[8]**

Ammeters and voltmeters (moving coil and moving iron type) Concept of ammeters and voltmeters and difference between them. Construction and working principle of moving coil and moving iron instruments.

UNIT-IV **[8]**

Merits and demerits, sources of errors and application of these instruments. Extension of range, use of C.T. & P.T. simple problems theorem for d.c. circuits.

UNIT-V **[8]**

Wattmeters (Dynamometer type) and Maximum Demand Indicator: Construction, working principle, merits and demerits of dynamometer type wattmeter. Sources of errors. Power measurement in three phase circuit by Two wattmeter and three wattmeter methods, simple problems. Construction and working principle of maximum demand indicators.

Reference Book :

A course in Electrical & Electronics Measurement & Instrumentation – A.K. Shahney Dhanpat Rai & Sons Publication.

ELEMENTARY MECH. & CIVIL ENGG.
(DEE-303)

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3 1 0

UNIT-I **[8]**

Applied Mechanics
General condition of equilibrium of a rigid body under coplaner forces. Concept of tie, strut, beam and trusses. Shear force and bending moment diagram of simply supported beam and cantilever for point load. Concept of centre of gravity, moment of inertia and friction. Mechanical advantage, velocity ratio, mechanical efficiency of simple machines: Lifting machines much as pulley, differential pulley, wheel and axle, simple screw jack, worm and worm wheel.

UNIT-II **[8]**

Strength of Materials & Power Transmission:
Stress, strain, elastic constraints, stress in circular shaft subjected to pure torsion only. Rivetted and bolted joints. Power transmission by solid and hollow shaft. Gear trains - simple and compound, fly wheel. Rope and belts - velocity ratio, length, size of belt and power transmited. Hydraulics & Hydraulic
Machines:

UNIT-III **[8]**

Properties of fluids, pressure of fluid and its
measurement. Flow of fluids velocity and discharge, Bernaulli's theorem and its application in venturimeter, flow through pipe, head loss due to friction. water turbines- Pelton and Reaction, reciprocating and centrifugal pump.

UNIT-IV **[8]**
Heat Engines:
External & internal combustion engines, working of diesel and petrol engine, horse power of IC engines, steam generator, constrcution and working of Bobcock & Wilcox boiler, Cochran boiler, condenser, steam turbine classifcation and principle of operation, gas turbine.
Civil Engineering Materials:
General idea of raw materials, manufacturing process, properties and uses of Bricks, lime, cement and Timber.

UNIT-V **[8]**
Foundation
(i) Bearing capacity of soil and its importance, need of foundation for electrical machines.
(ii) Foundations for heavy, light and vibrating machines.
(iii) Concrete proportion, mixing w/c ratio, workability RCC and its use. Surveying
(i) Basics of chaining and leveling
(ii) Description of Instruments used
Reference Book
Basic Mechanical Engineering – R.S. Khurmi

POWER SYSTEM
DEE-306

L T P
3 1 0

UNIT I **8**

SUPPLY SYSTEM
Layout of electrical power system from generating station to consumer end, Component of electrical power system from generating station to consumer end. Advantages of high voltage transmission. Requirement of interconnection, Advantages of interconnection. Concept of grid interconnection

UNIT II **8**

CONDUCTORS AND POWER CABLES
Types of conductors. Comparison of conductor cost in various systems. Comparison of overhead/under ground systems. Power cable construction. Oil filled, gas filled and SF6 gas cables. Testing of cables

UNIT III **8**

MECHANICAL CHARACTERISTICS
Types of insulators. Voltage distribution and string efficiency. Improvement of voltage distribution. Line support. Parabolic method of sag calculation at level support. Ice and wind loading of conductors. Factors affecting sag
.

UNIT IV **8**

PERFORMANCES OF LINES
Line parameters. Expression for line inductances and line capacitances. Performances of short and medium lines. Normal tee and л-method of calculation of voltage regulation and efficiency. Elementary idea of long transmission line

UNIT V **8**

SUBSTATIONS
Layout of substation, substation equipment and their functions, gas insulated substation (GIS)

REACTORS
Types of reactors, current limiting reactors, uses of reactors

Reference Books:

1. Electrical power system by “Ashfaq Hussain”
2.Electrical power system by “Nagrath and Kothari”

CIRCUIT THEORY
DEE-307

L T P
3 1 0

UNIT I **8**

CIRCUIT ANALYSIS AND DC TRANSIENTS
Ideal and practical voltage and current sources. **Source transformation:** Voltage Sources to Current Source and vice versa. Mesh and nodal analysis of DC circuits with voltage sources, current sources and combination of these two. Growth of current in an inductive circuit, time constant of R-L circuit , decay of current in an inductive circuit. Charging of a capacitor, time constant of RC circuit, initial and final values. Discharge of a capacitor

UNIT II **8**

TWO PORT NETWORK
Various two port circuit parameter: their interrelationship, evaluation of Z,Y,h and transmission (ABCD) parameters, cascading of two port network

UNIT III **8**

AC CIRCUITS
Definition and explanation of alternating current, voltage and their relative terms, phasor diagrams of alternating current and voltage in series and parallel A.C. circuit containing purely resistive, capacitive, inductive elements (a combination of two elements and a combination of all three elements). Mesh analysis for A.C. circuits, nodal analysis for A.C. circuits, choice between mesh and node analysis.

UNIT IV **8**

THREE PHASE CIRCUITS
Generation of three phase voltages, phase sequence, star and delta connection, line and phase values, phasor diagrams, power in a three phase balanced and solution of three phase balanced circuits

UNIT V **8**

RESONANCE
Series resonance: definition, derivation of expression for resonant frequency, quality factor, voltage and current, resonance curve, lower and upper half power frequency, bandwidth and selectivity, dependence of band width and selectivity on quality factor (problems based on the above). **Parallel resonance circuit** (same as for series resonance)

Reference Books

1. Network and systems: Ashfaq Husain
2. Electrical technology: B.L.Theraja

ELECTRICAL WIRING & FABRICATION SHOP

(DEE-351)

L T P

0 0 3

1. To prepare a folder/display board of accessories used in domestic wiring with complete specifications.

2. To prepare a display board of tools used in wiring and fabrication shop.

3. Batten wiring containing light, ceiling fan, socket points.

4. Staircase wiring using two way switches.

5. Connection of a fluorescent tube using starter, choke and single way switch and its fault detection.

6. Practice of domestic conduit wiring.

7. Testing of wiring installation by meggar.

8. Connection of mercury lamp along with accessories.

9. Making of an extension board containing two 5 A and 15 Amp plug points controlled by individual switches using MCB/ELCB (Earth Leakage Circuit Braker).

Ref. Book :

A Course in General Electrical Design & Drawing – Surjeet Singh – Katson Publication,N.Delhi

ELECTRICAL INSTRUMENTS AND MEASUREMENT LAB

(DEE-352)

L T P

0 0 3

Perform any 10 experiments:

1. To extend the range of an ammeter

2. To extend the range of an Voltmeter

3. To convert an ammeter into voltmeter.

4. To calibrate 1-phase energy meter by direct loading method.

5. To make proper connections of indicating/integrating instruments in a circuit e.g. wattmeter, frequency meter, power factor meter, 1-phase and 3-phase energy meter (Analog type/Digital Type) etc.

6. To measure power, power factor in a l-phase circuit using wattmeter and power factor meter and verify results with calculations.

7. Measurement of power and power factor of a 3-phase balanced load by 2-wattmeter method.

8. Measurement of voltage, frequency of a sinusoidal signal with C.R.O.

9. Measurement of resistance, voltage, current with electronic multimeters (Analog & Digital) and compare the reading.

10. To measure strain by transducer.

11. To measure inductance by maxwell's bridge.

12. To measure capacitance by Wein's/Schering bridge.

13. To calibrate three phase energy meter with the help of standard 3 phase energy meter.

14. To connect a Trivector meter in a three phase circuit and make measurement of different quantities.

Ref. Books:

A Text Book of Laboratory Course in Electrical Engg. – Kharbanda – S.Chand Publication

ELEMENTRY MECH. ENGINEERING LAB

(DEE-353)

L T P

0 0 3

1. To operate a diesel engine (starting, running and shutting down) and to study lubricating and cooling system of the engine.
2. To determine BHP of diesel or petrol engine and show that BHP is directly proportional to revolution per minute of engine shaft.
3. To determine mechanical advantage, velocity ratio, efficiency and effort loss due to friction in screw jack.
4. To verify Bernoulli's theorem with the help of Bernoulli's appratus.
5. To determine head loss due to friction in GI pipes.
6. To operate the Pelton wheel and Francis Turbine and to understand its construction and working.
7. To perform tensile test on mild steel and aluminium wire specimen and compare the result.
8. To do alignement and coupling of a motor generator set.

STUDY & EVALUATION SCHEME

Diploma in Engineering

Branch- Electrical Engineering

Year-III, Semester-VI

S.No	Subject	Subject Code	Periods			Evaluation Scheme				Subject Total
						Sessional			Exam	
			L	T	P	CT	TA	TOTAL	ESE	
Theory Subjects										
1.	Power Electronics-II	DEE-605	3	1	0	30	20	50	100	150
2.	Control System	DEE-606	3	1	0	30	20	50	100	150
3.	Electrical Design Drawing and Estimating-II	DEE-603	3	1	0	30	20	50	100	150
4.	Microprocessor Development System	DEE-604	3	1	0	30	20	50	100	150
5.	Industrial Management and Entrepreneurship Development	DIM-601	3	1	0	30	20	50	100	150
Practical Subjects										
1.	Power Electronics-II Lab	DEE-652	0	0	3	10	10	20	30	50
2.	Electrical Drawing Lab	DEE-653	0	0	3	10	10	20	30	50
3.	Microprocessor Development Lab	DEE-654	0	0	3	10	10	20	30	50
4.	Project	DEE-656	-	-	-	-	--	70	100	170
5.	General Proficiency		-	-	-	--	--	--	50	50
	Total									1120

POWER ELECTRONICS-II
(DEE-605)

L T P
3 1 0

UNIT 1 **8**

CHOPPERS
Introduction: DC-to-DC Converter. **Principle of chopper operation:** constant frequency system, variable frequency system. **Types of chopper circuit:** first quadrant or type A, second quadrant or type B, two quadrant or type C Chopper, two quadrant or type D chopper, voltage commutated thyristor chopper circuits

UNIT 2 **8**

INVERTERS
Introduction: **Single phase voltage source inverter:** single phase half bridge inverter, single phase full bridge inverter
Force commutation thyristor inverter: modified Mc Murray half bridge inverter, modified Mc Murray full bridge inverter
Three phase inverter: 180,120 degree mode, introduction to current source inverter, series inverter, parallel inverter

UNIT 3 **8**

CYCLOCONVERTERS
Introduction, **Single phase to single phase circuit step up cycloconverter:** mid point cycloconverters, bridge type cycloconverters
Single phase to single phase circuit step down cycloconverters: mid point cycloconverters, bridge type cycloconverters

UNIT 4 **8**

ELECTRICAL DRIVE-I
DC drives, introduction, basic performance equation of DC motors: separately excited DC motor., DC series Motor, DC shunt motor
Single phase DC drives: single phase half wave converter drives, single phase semi converter drives, single phase full wave converter drives, single phase dual converter drives
Chopper drives: motoring control, regenerative braking control

UNIT 5 **8**

ELECTRICAL DRIVES-II
AC drives: Introduction
Induction motor drives: Analysis and performance, **Speed control of Three Phase Induction Motor:** Stator Voltage control, Stator Frequency control, Stator Frequency and voltage control, Static Rotor resistance control, Slip energy recovery control

Reference books:
1 Industrial Electronics: D.C. Gupta
2 Indutrial Electronics and Control: Bhattacharya
3 Power Electronics: P.S.Bhimbra

CONTROL SYSTEM
DEE-606

L T P
3 1 0

UNIT I **8**

CONTROL SYSTEM: FUNCTIONAL ELEMENTS AND COMPONENTS
Terminology , functional block diagram of open loop and closed loop control system (with examples), effect of feedback on system performance, servomechanism, modeling of a control system components- dc and ac tachometers, ac and dc servomotor

UNIT II **8**

BLOCK DIAGRAM AND TRANSFER FUNCTION
Transfer function of physical system, block diagram algebra, block diagram reduction technique, signal flow graphs, rules for drawing signal graphs, mason gain formula, drawing signal flow graph from given block diagram. Order and type of control systems

UNIT III **8**

STABILITY ANALYSIS OF CONTROL SYSTEM
Basic concept and definition of stability, location of root of characteristic equation, Routh–Hurwitz stability criterion, application of Routh- Hurwitz criterion

UNIT IV **8**

TIME RESPONSE ANALYSIS
Transient and steady-state response, standard test signal, time response specifications of second order system, root locus technique, procedure for drawing root locus diagram

UNIT V **8**

FREQUENCY RESPONSE ANALYSIS
Frequency response specification, Polar plot, Bode plot, procedure for drawing Bode plot and determination of gain margin, phase margin and stability

Reference Books:

1. B.S.Manke “linear control systems” khanna publishers, Delhi, Eight Edition: 2005
2. S Hasan Saeed “Automatic Control System”

ELECTRICAL DESIGN DRAWING AND ESTIMATING -II

(DEE-603)

L T P

3 1 0

Unit 1

Principles of estimating and costing:
Purpose of estimating and costing, essential of estimating and costing-market survey, price list and net prices, preparation of lists of materials, calculation of material and labour cost, contingencies, overhead charges , profit and total cost 8

Unit 2

Earthing:
Need of earthing of electrical installation, advantages and disadvantages, effect of improper earthing, points to be earthed as per I.E. rules. Methods of earthing –plate and pipe earthing, determination of size of earth wire and earth plates for different capacities of electrical installations 8

Unit 3

Estimation of internal wiring installation:
Estimation of wiring installation for commercial and industrial building such as multistoried, hotels, hospitals, school, colleges, public library, etc. Power distribution scheme, lists of material with specification , estimation of costs. Estimation of power wiring; I.S. specification and I.E. rules determination of size of cables, conductors, distribution board, main switch and starters for power circuit, estimation and cost of material 8

Unit 4

Estimation o overhead and underground distribution lines:

Main components of overhead lines, specification of material for O.H. lines, cost of material and work for overhead and underground lines upto 11 KV only. Estimation of service connection ; service connection , their types and their estimation 8

Unit 5

Estimation of small substation:

Main equipment and auxiliaries installed on the substation . estimation of material required for the small distribution substation. Costing of material and work of above substations 6

Ref Books:

1. Electrical Engineering Drawing and Estimation: K.B. Raina & S.K. Bhattacharharya

Microprocessor Development System

(DEE-604)

L T P

3 1 0

UNIT-I

Introduction to Microprocessor, Evolution of Microprocessors, Memory map & Addresses, Address bus, Data Bus, Control Bus, Bus Structure, Memory Word Size, The 8085 Microprocessor Unit, Architecture & Description. 8

UNIT-II

Pin Diagram of 8085, Addressing Modes of 8085, Data Transfer operations, Arithmetic operations, Logic Operations, Branch operation, Writing assembly language programs, Programming techniques: looping, counting and indexing, Additional data transfer and 16 bit arithmetic instruction, Arithmetic operations related to memory, Logic operation: rotate, compare, counter and time delays. 8

UNIT-III

Timing Diagram: Opcode Fetch, Memory Read Cycle, Memory Write Cycle, I/O Read & I/O Write. 8085 Interrupts: 8085 Vectored interrupts, Restart as Software instructions,

RIM, SIM. 8

UNIT-IV

Programs: 8-bit Addition, 16-bit Addition, 8-bit Subtraction, 16-bit subtraction, Subtraction with carry, Multiplication & Division. 8

UNIT-V

8255 Programmable peripheral interface: Block Diagram, Control Word, BSR Mode, Zero Mode. Introduction to 8086 microprocessor: Architecture of 8086, Flag Register of 8086, Register Organisation, Introduction to Microcontroller. 8

References:

1. Microprocessor Architecture Programming & Application with 8085: R.S. Gaonkar
2. Microprocessor & Application: B. Ram
3. Microprocessor Development & Application: Majeedi

INDUSTRIAL MANAGEMENT AND

ENTREPRENEURSHIP DEVELOPMENT

(DIM-601)

L T P
3 1 0

UNIT-I
PRINCIPLES OF MANAGEMENT

Definition of management, Administration organisation, Functions management, Planning, Organizing, Co-ordination and control, Structure and function of industrial organisations, Leadership- Need for leadership, Factors to be considered for accomplishing effective leadership, Communication -Importance, Processes, Barriers to communication, Making communication, Effective, formal and informal communication, Motivation - Factors determining motivation, Positive and negative motivation, Methods for improving motivation, Incentives, Pay promotion and rewards, Controlling - Just in time, Total quality management, Quality circle, Zero defect concept. Concept of Stress

Management.

UNIT-II
HUMAN RESOURCE DEVELOPMENT AND HUMAN AND INDUSTRIAL RELATIONS;

Introduction, Staff development and career development, Training strategies and methods. Human relations and performance in organisation, Understand self and others for effective behaviour, Industrial relation and disputes, Characteristics of group behaviour and Trade unionism, Mob psychology, Labour welfare, Workers participation in management.

UNIT-III
PERSONNEL AND FINANCIAL MANAGEMENT

Responsibilities of human resource management - Policies and functions, Selection - Mode of selection -Procedure - training of workers, Job evaluation and Merit rating -
Objectives and importance wage and salary administration - Classification of wage, Payment schemes, Components of wage, Wage fixation. Fixed and working capital - resource of capital, Shares, types preference and equity shares, Debenture types, Public deposits, Factory costing, Direct cost, Indirect cost, Factory over head, Fixation of selling price of product, Depreciation- Causes, Methods.

UNIT-IV

MATERIAL MANAGEMENT, LABOUR, INDUSTRIAL AND TAX LAWS

Objective of a good stock control system - ABC analysis of inventory, Procurement and consumption cycle, Reorder level, Lead time, Economic order quantity, Purchasing procedure, Stock keeping, Bin card. Importance and necessity of industrial legislation, Types of labour laws and dispute, Factory Act 1948, Payment of Wages Act 1947, Employee State Insurance Act 1948, Various types of taxes - Production Tax, Local Tax, Trade tax, Excise duty, Income Tax.

UNIT-V

ENTREPRENEURSHIP DEVELOPMENT AND
INTELLECTUAL PROPERTY RIGHTS :

Concept of entrepreneurship, need of entrepreneurship in context of prevailing employment conditions of the country. Successful entrepreneurship and training for entrepreneurship development. Idea of project report preparation.

Introduction to IPR (Patents, Copy Right, Trade Mark), Protection of undisclosed information, Concept and history of patents, Indian and International Patents Acts and Rules, Patentable and Nonpatentable invention including product versus Process.

POWER ELECTRONICS-II LAB
(DEE-652)

L T P
0 0 3

Perform any ten experiments of the following

1. Study of voltage commutated chopper
2. Study of a Bedford inverter
3. Study of a single phase PWM inverter using MOSFET and IGBT
4. To understand the function of inverter trainer
5. To study the inverter circuit
6. To study the different faults and their troubleshooting in inverter circuit
7. To understand the function of inverter in presence of main supply and understand the charging of battery
8. Study of three phase half wave AC voltage controller with R load
9. Study of three phase full wave AC voltage controller with R load
10. Study of the application of SCR as a lamp flasher
11. Study the application of TRIAC as a lamp Dimmer

ELECTRICAL DRAWING LAB

(DEE-653)

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L T P

0 0 3

1. Earthing	1 sheet
2. Commercial and industrial building	2 sheet
3. Stays , line crossings, line earthing , end pole and terminal pole, junction pole/ towers and transposition pole/ tower	2 sheet
4. Power wiring layout and circuit	2 sheet.
5. Service connection domestic , industrial And agriculture	2 sheet
6. Substation layout and busbar arrangement	2 sheet
7. Machine drawing induction and synchronous Machine	2 sheet
8. Winding of induction motor	2 sheet
9. Winding of synchronous machine 3 phase	2 sheet
10. Reading and interpreting practical Drawing of wiring installation and Control	2 sheet

Microprocessor Development Lab
(DEE-654)

L T P
0 0 3

List of Practical:

1. To perform addition of two 8 bit numbers using 8085.
2. To perform addition of two 16 bit numbers using 8085.
3. To perform addition of two 16 bit numbers using 16-bit instruction.
4. To perform subtraction of two 8 bit numbers using 8085.
5. To perform multiplication of two 8 bit numbers using 8085.
6. To perform logic AND operation of two 8 bit numbers.
7. To perform logic NAND operation of two 8 bit numbers.
8. To perform logic OR operation of two 8 bit numbers.
9. To perform logic NOR operation of two 8 bit numbers.
10. To perform the division of two 8 bit numbers using 8085.

UNIVERSITY POLYTECHNIC
INTEGRAL UNIVERSITY, LUCKNOW
DIPLOMA IN ELECTRICAL ENGINEERING

Program Educational Objectives (PEOs)	
PEO-1	To prepare students to excel in industrial and/or higher education field by providing a strong foundation in mathematics, science and engineering.
PEO-2	To prepare a technically qualified engineer to solve complex problems and be able to apply learned skills in engineering careers.
PEO-3	To develop communication skills, ethical attitude and team work in order to succeed in their personal and professional life.
PEO-4	To equip the students with the knowledge on theory and design of core areas of Electrical Engineering in order to develop & troubleshoot modern electrical equipments.
PEO-5	Motivate students to become a good human being and responsible citizen for the overall welfare of the society.

UNIVERSITY POLYTECHNIC
INTEGRAL UNIVERSITY, LUCKNOW
DIPLOMA IN ELECTRICAL ENGINEERING

Program Specific Outcomes (PSOs)	
PSO-1	To prepare the students to successfully contribute in various Industrial and Government organizations both at the National and International level.
PSO-2	To prepare and inspire the students to become future researchers with innovative ideas for a sustainable development.
PSO-3	Broad theoretical and practical knowledge of construction and working of electrical machines.
PSO-4	Design, drawing, estimate and troubleshooting of electrical machines, electrical installations and switchgear systems.
PSO-5	Onhand practice on construction and working of various types of converters.
PSO-6	Able to communicate and work in team with understanding.

UNIVERSITY POLYTECHNIC
INTEGRAL UNIVERSITY, LUCKNOW
DIPLOMA IN ELECTRICAL ENGINEERING

Program Outcomes (POs)	
PO-1	To inculcate students with strong communication skill, environmental awareness, ethics and moral values so they can work as an individual and team leaders.
PO-2	To provide the knowledge of applied science and mathematics in general and Electrical Engineering in particular so as to develop the necessary skills to analyze and synthesize electrical circuits and systems.
PO-3	To provide indepth theoretical and practical knowledge of corresponding subjects so students can install, operate and do maintenance, performance analysis of different electrical equipments and machines.
PO-4	To instill students about the importance of engineering drawing so students can understand the installation plan and can take different projects in their professional life.
PO-5	Design, drawing, estimate and troubleshooting of electrical machines, electrical installations and switchgear systems.
PO-6	Knowledge of analog and power electronics devices and components, their uses in converters.
PO-7	Generation, transmission, distribution, protection and utilization of electrical energy in industrial, commercial and residential applications in efficient manner.
PO-8	To understand the principle of operation, construction and working of electrical devices and machines so they can install, operate, run, test and troubleshoot them.
PO-9	To develop the knowledge of interdisciplinary skills so students can excel in their profession.
PO-10	To equip the students about the knowledge of electrical instruments and measurements and their applications in testing of electrical machines and equipments.
PO-11	Use of power electronics devices and converters to meet the power quality and applications in electric drives.
PO-12	To analyze the stability of the system by using different techniques.
PO-13	To learn the operation of logic gates, combinational and sequential circuits.
PO-14	Study of hierarchical development of microprocessor system and simple programming.

SUBJECT NAME: Applied Mathematics-I(A)

SUBJECT CODE: DMA-101

YEAR/SEMESTER: $1^{st}/1^{st}$

COURSE OUTCOMES	
CO-1	Arithmetic Progression and Geometric Progression can be applied in real life by analyzing a certain pattern that we see in our daily life.
CO-2	Trigonometry is widely used in several fields. Some of it's uses are Measuring heights and distances, in construction and architecture, flight engineering, marine biology, application of Physics, electrical engineering, manufacturing industry, gaming industry.
CO-3	The concept of Complex Number is used in the field of Computer Science. It is also used in coding and programming.
CO-4	Coordinate Geometry has application in the field of construction. The sketch of a building is a pure geometry. It is also used for finding the distance between places and in geography also it has many applications. It is also used in Astrophysics to find the distance between planets.
CO-5	Three dimensional geometry is used in various fields like in computer graphics, biotechnology and medical sciences and in different projects also.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	3	3	3	2	2	-	-	-	3	-	-	-	-	-
CO-2	1	1	3	1	-	1	-	-	-	-	-	-	-	-
CO-3	3	3	3	1	-	1	-	1	2	-	1	-	-	-
CO-4	3	3	-	1	1	-	1	1	1	1	-	1	-	-
CO-5	1	3	2	1	-	1	2	1	3	2	2	3	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Applied Physics (A)

SUBJECT CODE: DPH-101

YEAR/SEMESTER: $1^{st}/1^{st}$

COURSE OUTCOMES	
CO-1	Students learn to convert one unit to different unit and they use conversation factor which is numerically quantity that we multiply or divide to the quantity. Student learns accuracy of the lab instrument with the help of significant figure
CO-2	In this student learn investigate the effect of gravity and friction on the motion of machines (mechanical) instrument etc.
CO-3	Students learn to introduce and explain fundamental of fluids mechanics which is used in the application of aerodynamics, hydraulics, marine, dynamic etc.
CO-4	Students learn energy transfer to one gear to another gear in machine and instrument etc.
CO-5	Students learn to analyses some real problem and to formulate the condition of theory of elasticity and application.
CO-6	The student learns to formulate the 1^{st} law of thermodynamics for a close system and arrangement the change in energy in the closed system via heat and work transfer.
CO-7	Distinguish heat transfer by conduction, convection and radiation and calculate the amount of heat energy transfer.
CO-8	Calculate the change in moving boundary work, electrical work shop in close system.
CO-9	Student learns about different thermal process.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	3	3	3	-	-	-	-	-	3	3	-	-	1	-
CO-2	2		2	-	-	-	-	-	3	-	-	2	-	-
CO-3	1	2	2	-	-	-	-	-	3	-	-	-	-	-
CO-4	1	-	3	-	-	2	1	1	3	1	1	-	-	-
CO-5	1	-	3	1	-	-	-	-	3	-	-	-	-	-
CO-6	-	1	2	-	-	1	1	1	3	1	1	-	-	-
CO-7	1	-	2	-	-	-	1	-	3	-	3	-	-	-
CO-8	-	1	3	-	1	1	-	-	3	-	-	-	-	-
CO-9	-	-	1	-	-	-	1	-	3	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Applied Chemistry (A)

SUBJECT CODE: DCH-101

YEAR/SEMESTER: $1^{st}/1^{st}$

COURSE OUTCOMES	
CO-1	Basic concept of atomic structure, Matter wave concept determination of quantum numbers, periodicity of elements in periodic table
CO-2	Idea of various types of chemical bonding, VSEPR theory, Valence bond theory and Molecular orbital theory
CO-3	Concept of acid base theory, pH scale, buffer solution, indicators, common ion effect, electrode potential, Galvanic cell and electrolytic cell, applications of electrochemical series, corrosion and its prevention
CO-4	Rate of reaction, rate constant, molecularity and order of reaction; Understanding of catalyst and their use in various types of reactions; different types of solid and band theory of solids; types of crystal and imperfection of crystal
CO-5	Understanding of soft and hard water; types of hardness present in water; analysis of water hardness and their softening by using Soda-Lime, Zeolite and Ion exchange method; disadvantage of hard water in different industry; disinfection of water: Municipality waste water treatment

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	3	1	-	1	-	2	1	1	-	-	-	-	-
CO-2	-	3	1	-	-	-	1	-	1	-	-	-	-	-
CO-3	-	3	1	-	2	1	1	1	1	2	2	-	-	-
CO-4	-	3	2	-	2	1	1	2	1	2	1	-	-	-
CO-5	-	3	-	-	-	-	-	-	1	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Basic Electrical Engineering-I

SUBJECT CODE: DEE-101

YEAR/SEMESTER: $1^{st}/1^{st}$

COURSE OUTCOMES	
CO-1	Conceptualize the fundamental of current, voltage and power and would be able to utilize in electrical heating and mechanical work
CO-2	Characterization of material on the basis of their conductivity and permeability for the use in the field electrical and electronic engineering.
CO-3	Study the basic laws and DC network theorem which will apply to analyse the different electrical machines and network problems
CO-4	Battery maintenance, care and grouping of cell to get required Ah.
CO-5	Classification of different types of capacitors. And to know influence dielectric as well series parallel combination on capacitance value.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1		3	2	-	1	1	1	-	-	-	-	-	-	-
CO-2		2	2	-	1	-	-	-	2	-	-	-	-	-
CO-3		2	2	3	2	-	2	2	1	2	1	-	-	-
CO-4		2	2	-	-	2	-	2	2	1	-	-	-	-
CO-5		2	3	-	-	-	2	-	2	3	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Basic Electronics-1

SUBJECT CODE: DEC-101

YEAR/SEMESTER: $1^{st}/1^{st}$

COURSE OUTCOMES	
CO-1	Identification of semiconducting materials, different types of diodes and its applications.
CO-2	Analysis of transistor and its operations.
CO-3	Operation of transistor and its application as amplifier.
CO-4	Analysis of single stage and multi stage amplifier.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	1	1	-	-	3	-	-	2	-	-	-	-	-
CO-2	-	1	1	-	-	3	-	-	2	-	-	-	-	-
CO-3	-	1	1	-	-	3	-	-	2	-	-	-	-	-
CO-4	-	1	1	-	-	3	-	-	2	-	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Engineering Drawing

SUBJECT CODE: DED-101

YEAR/SEMESTER: $1^{st}/1^{st}$

COURSE OUTCOMES	
CO-1	Students' ability in legible writing letters and numbers will be improved.
CO-2	Students' ability to perform basic sketching techniques, instrumental and electrical circuit drawing will be improved.
CO-3	Students will develop good communication skills and team work.
CO-4	Students will become familiar with practice and standards in technical drawing.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	3	2	3	-	-	2	-	-	-	-	-	-	-	-
CO-2	2	3	-	-	3		2	-	-	3	-	-	-	-
CO-3	3	3	2	-	-	-	-	-	-	-	-	-	-	-
CO-4	2	3	-	-	2	-	-	-	3	-	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Applied Chemistry Lab

SUBJECT CODE: DCH-151

YEAR/SEMESTER: $1^{st}/1^{st}$

COURSE OUTCOMES	
CO-1	Analysis of acidic and basic radical of inorganic mixture
CO-2	Determination of chloride content by Mohr's method in supplied water
CO-3	Testing of total hardness of water sample by EDTA titration method in terms of $CaCO_3$
CO-4	Analysis of temporary hardness in water sample through O'Hener's method.
CO-5	Dissolve oxygen analysis in water sample
CO-6	Analysis of strength of HCl solution through NaOH solution by using pH meter

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	3	2	-	-	-	-	-	1	-	-	-	-	-
CO-2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO-3	-	3	-	-	-	-	-	-	1	-	-	-	-	-
CO-4	-	3	-	-	-	-	-	-	1	-	-	-	-	-
CO-5	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO-6	-	3	1	-	-	-	-	-	1	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Basic Computer Aided Design Lab

SUBJECT CODE: DCAD-151

YEAR/SEMESTER: $1^{st}/1^{st}$

COURSE OUTCOMES	
CO-1	Learn basic Auto-Cad skills.
CO-2	Students learn how to operate Auto Cad and transform sketches and technical data into electronic drawings.
CO-3	Understand modeling of curves, surfaces and solids
CO-4	Transform, manipulate the object and understand rapid prototyping and tooling concept in any real life application.
CO-5	Understand FEM based problems.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	2	-	2	1	1	-	-	2	3	-	2	2	-	-
CO-2	2	2	2	1	-	1	-	2	2	-	2	1	-	-
CO-3	2	2	-	2	-	1	-	-	1	-	1	-	-	-
CO-4	2	1	2	-	1	-	-	2	-	-	1	-	-	-
CO-5	2	1	1	-	-	1	-	1	-	-	2	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Computer Application Lab

SUBJECT CODE: DCS-151

YEAR/SEMESTER: $1^{st}/1^{st}$

COURSE OUTCOMES	
CO-1	Bridge the fundamental concepts of computers with the present level of knowledge of the students.
CO-2	Familiarize operating systems, programming languages, peripheral devices, networking, multimedia and internet.
CO-3	Understand binary, hexadecimal and octal number systems and their arithmetic and programming data types
CO-4	Understand how logic circuits and Boolean algebra forms as the basics of digital computer. To prepare students in understanding ICT basics and to make aware of Office automation using MS- Office
CO-5	To Train students with basic concepts of programming using C.
CO-6	To prepare students in understanding ICT basics and to make aware of Office automation using MS- Office.To Train students with basic concepts of programming using C.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	3	2	2	1	-	-	-	-	-	-	-	-	-	-
CO-2	1	1	-	3	-	-	-	-	2	-	-	-	-	3
CO-3	1	-	-	1	2	-	-	-	-	1	-	-	1	3
CO-4	1	2	2	-	-	-	-	-	-	-	-	-	3	2
CO-5	1	-	2	1	2	-	-	-	-	2	1	-	-	3
CO-6	1	1	-	-	-	-	-	2	-	-	-	-	1	3

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Workshop Practice

SUBJECT CODE: DWS-151

YEAR/SEMESTER: $1^{st}/1^{st}$

COURSE OUTCOMES	
CO-1	To acquire skills in basic engineering practice.
CO-2	To identify the hand tools and instruments.
CO-3	To acquire measuring skills.
CO-4	To acquire practical skills in the trades.
CO-5	To provides the knowledge of job materials in various shops.
CO-6	To provides the knowledge of core technical subjects for making and working of any type of project.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	1	_	_	1	_	_	_	_	_	_	_	3	_	_
CO-2	1	_	_	2	_	_	_	_	_	_	_	_	_	_
CO-3	1	_	_	1	_	_	_	_	_	_	_	2	_	_
CO-4	1	_	_	1	_	3	_	--	_	2	_	2	_	_
CO-5	2	_	_	2	_	_	_	_	_	_	_	_	_	_
CO-6	3	_	_	1	_	2	_	_	_	_	_	_	_	_

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Applied Mathematics-I(B)

SUBJECT CODE: DMA-201

YEAR/SEMESTER: 1st/2nd

COURSE OUTCOMES	
CO-1	Here students are getting the knowledge of Graphs, continuity, and differentiation by which they will be able to find areas of any surface.
CO-2	By getting full knowledge of Tangent and normal students will be able to use it in daily lives and further studies in Architecture Engineering, Civil Engineering etc.
CO-3	Definite and Indefinite integral knowledge makes students wide in solving problems related to big summations and areas related problems. Regarding applications students will be able to solve problems like finding areas bounded by sample curves, length of simple curves, Volume of solids of revolution, mean value, mean square value and root mean square value of function will be easily solved.
CO-4	Applications of Integration will lead students to get a good knowledge of finding areas, volume etc
CO-5	Some different rules like Newton-Cote's Quadrature formula, Trapezoidal rule, Simpson's 1/3rd rule and 3/8th rule, Students will be able to solve big Integral problems in a very easy pattern.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	1	3	3	3	3	-	-	-	-	-	-	-	-	-
CO-2	2	3	3	1	2	-	-	-	-	-	-	-	-	-
CO-3	1	3	2	3	3	2	1	-	1	2	1	-	-	-
CO-4	3	3	2	1	1	-	-	-	-	-	-	-	-	-
CO-5	-	3	3	1	-	-	-	2	-	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Applied Physics (B)

SUBJECT CODE: DPH-201

YEAR/SEMESTER: 1st/2nd

COURSE OUTCOMES	
CO-1	Student learn to analysis to effect of building acoustic condition
CO-2	Student learn about application of ultrasound in various field like SONAR, medical and research work and sound signal etc.
CO-3	The student learn to introduce and overview of optical fiber and process of transmission of signal and application of various field.
CO-4	Student learns to investigate broken telegraph wire with the help of post office box.
CO-5	Student learn to simplify the complicated circuit by using Kirchhoff's law
CO-6	Student will be able to distinguish among various materials in the basis of magnetic properties like Diamagnetic, Paramagnetic and Ferromagnetic and build the temporary and permanent magnet.
CO-7	Student learns about LASER and various applications in various fields like medical etc.
CO-8	Student learns about basic electronics which promote to learn the characteristics of transistor (amplifier).
CO-9	X-ray and various properties in various field like medical engineering and research center etc

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	3	3	3	-	-	-	-	-	3	3	-	-	1	-
CO-2	2		2	-	-	-	-	-	3	-	-	2	-	-
CO-3	1	2	2	-	-	-	-	-	3	-	-	-	-	-
CO-4	1	-	3	-	-	2	1	1	3	1	1	-	-	-
CO-5	1	-	3	1	-	-	-	-	3	-	-	-	-	-
CO-6	-	1	2	-	-	1	1	1	3	1	1	-	-	-
CO-7	1		2	-	-	-	1	-	3	-	3	-	-	-
CO-8	-	1	3	-	1	1	-	-	3	-	-	-	-	-
CO-9	-	-	1	-	-	-	1	-	3	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Applied Chemistry (B)

SUBJECT CODE: DCH-201

YEAR/SEMESTER: 1st/2nd

COURSE OUTCOMES	
CO-1	Classification and properties of good fuels, calorific value and its determination, refining of petroleum, Benzol, power alcohol, Knocking of engine and anti-knocking agents used to reduce knocking, octane and cetane number, Bergius and Fischer Tropsch's method for hydrogenation of coal, Preparation and uses of Coal gas , oil gas, water gas biogas, LPG and CNG
CO-2	Concept of Colloidal state of matters, preparation of colloids by physical and chemical method, protective colloids, properties of colloids: Brownian movement, Tyndal effect, Electrophoresis and Coagulation. Preparation of emulsion and its application; Lubricants and their types; Function, mechanism and its application in different industry; additive compounds in lubricant
CO-3	IUPAC nomenclature of organic compounds, preparation and uses of ethane, ethane, ethyne, benzene and toluene.
CO-4	Concept of electrophiles and nucleophiles, reaction intermediates: free radical, carbocation, carbanion mechanism of electrophilic and nucleophilic substitution reaction, addition, and elimination reactions.
CO-5	Polymers, synthesis properties and uses of addition and condensation polymers, biopolymers, manufacturing of soap, detergents, Preparation and uses of explosives: TNT, RDX, Dynamite, Synthesis and use of paint and varnish

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	2	-	-	-	-	-	-	-	1	-	-	-	-
CO-2	-	3	-	-	1	-	-	1	-	2	-	-	-	-
CO-3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO-4	-	3	-	-	-	-	-	-	1	-	-	-	-	-
CO-5	-	3	2	-	1	-	1	1	2	2	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Basic Electrical Engineering–II

SUBJECT CODE: DEE-201

YEAR/SEMESTER: $1^{st}/2^{nd}$

COURSE OUTCOMES	
CO-1	Develop the concept of magnetic flux and analogy between electric and magnetic circuit used in all engineering field.
CO-2	Develop the concept of electromagnetic induction laws which is required for electrical machines.
CO-3	Importance of power factor and resonance in RLC circuit.
CO-4	To impart knowledge of poly phase system and its application.
CO-5	To impart the knowledge the harmful effect of magnetic field and benefits to medical science as well engineering field.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	1	3	2	-	2	-	2	2	-	-	-	-	-	-
CO-2	1	-	2	-	1	2		3	1	-	1	-	-	-
CO-3	1	-	2	-	1	-	2	-	-	-	-	-	-	-
CO-4	-	-	-	-	2	-	3	-	2	2	-	-	-	-
CO-5	1	-	-	-	2	-	-	-	2	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Electrical & Electronics Engineering Materials

SUBJECT CODE: DEM-201

YEAR/SEMESTER: 1st/2nd

COURSE OUTCOMES	
CO-1	Properties of conducting material and its application in Electrical and Electronics engineering.
CO-2	Properties and application of insulating materials with respect to the application in engineering fields.
CO-3	Selection of magnetic materials and their applications.
CO-4	Electrical, mechanical, physical and thermal properties of insulating materials.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	2	-	-	-	1	2	-	2	1	-	-	-	-
CO-2	-	2	-	-	-	1	2	-	2	-	-	-	-	-
CO-3	-	2	2	-	2	-	1	-	2	-	-	-	-	-
CO-4	-	2	-	-	-	2	2	-	2	2	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Professional Communication

SUBJECT CODE: DPC-201

YEAR/SEMESTER: 1st/2nd

COURSE OUTCOMES	
CO-1	Introduction of the concept of communication, types skills, modern tools, etc..
CO-2	The CO of this unit is to make inquiry about people, product, price etc. with the expansion of business operations of a business, importance of business letter is also increasing. To take right decisions: Taking right decisions require accurate information.
CO-3	The CO of this unit is to control sentence-level error (grammar, punctuation, and spelling).
CO-4	It's outcome is to employ techniques of active reading, critical reading, and informal reading response for inquiry, learning, and thinking.
CO-5	Learning objectives focus on student performance. Action verbs that are specific, such as list, describe report, compare, demonstrate, and analyze, should state the behaviors students will be expected to perform in Hindi.
CO-6	The conclusion of this subject is to increase the students' English communication skills by: Improving fluency through regular practice and speaking drills. Understanding of basic grammar structures - like nouns, verbs and adjectives - through class reading and speaking tasks.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	2	3	1	-	1	-	-	-	-	1	-	-	-	-
CO-2	1	1	-	-	2	-	-	-	-	3	-	-	-	-
CO-3	1	-	-	3		-	-	-	-	1	2	-	-	-
CO-4	-	-	1	2	3	-	-	-	-	-	-	-	-	-
CO-5	1	1	-	-	-	-	-	-	-	3	2	-	-	-
CO-6	-	-	-	-	-	-	-	2	3	1	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Applied Physics Lab

SUBJECT CODE: DPH-251

YEAR/SEMESTER: 1st/2nd

COURSE OUTCOMES	
CO-1	To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
CO-2	Experience and understand basic physical fundamentals and the key vocabulary to describe them: basic Electronics & Electrical, kinematics, dynamics, work and energy, gravitation, fluids.
CO-3	Develop skills in observation, interpretation, reasoning, synthesis, generalizing, predicting and questioning as a way to learn new knowledge.
CO-4	Apply conceptual understanding of the physics to general real-world situations.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	3	3	-	-	-	-	-	2	1	-	-	-	-
CO-2	-	3	3	-	-	-	-	-	2	1	-	-	-	-
CO-3	-	3	3	-	-	-	-	-	1	-	-	-	-	-
CO-4	1	3	3	-	-	1	-	-	1	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Basic Electronics–I Lab

SUBJECT CODE: DEC-251

YEAR/SEMESTER: 1st/2nd

COURSE OUTCOMES	
CO-1	Plotting the characteristic of semiconductor diode and its application in rectifier.
CO-2	Measuring the parameters of single stage and multi stage amplifier like common emitter and RC coupled amplifier.
CO-3	Identification of ICs with its pin configuration.
CO-4	Measurement Of electrical quantities by CRO and multimeter

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	-	3	-	-	3	-	-	1	-	-	-	-	-
CO-2	-	-	3	-	-	-	-	-	1	-	-	-	-	-
CO-3	-	-	3	-	-	-	-	-	1	-	-	-	-	-
CO-4	-	-	3	-	-	-	-	-	1	3	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Basic Electrical Engineering Lab

SUBJECT CODE: DEE-251

YEAR/SEMESTER: 1st/2nd

COURSE OUTCOMES	
CO-1	Familiarization of different electrical measuring instruments (Analog and Digital)
CO-2	Verifying laws of series and parallel connection of circuit elements.
CO-3	Verifying different DC network theorems.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	-	2	-	-	-	-	3	1	3	-	-	-	-
CO-2	-	1	3	-	2	-	-	-	1	-	-	-	-	-
CO-3	-	1	3	-	2	-	-	-	1	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Professional Communication Lab

SUBJECT CODE: DPC-251

YEAR/SEMESTER: 1st/2nd

COURSE OUTCOMES	
CO-1	Introduction of International Phonetic Alphabet and Pronunciation practice.
CO-2	From a psychological perspective, objective and outcome of self-description in formal communication situations means that you are focusing attention on you and your behavior, which allows you to evaluate what you see based on the standards and expectations that you have developed throughout your life.
CO-3	The CO of this unit is breeding fresh ideas and taking inputs from a particular group of students... Identify a solution to a specific problem or issue. Selecting candidates after their written test for hiring in a company.
CO-4	The key objectives outcomes that underline a good presentation often include the following: To establish credibility with your audience. To communicate information clearly to your audience. To persuade and/or influence your audience
CO-5	The CO of this unit is to establish credibility with your audience. To communicate information clearly to your audience. To persuade and/or influence your audience.
CO-6	The CO of this unit is to differentiate between views and facts, to formulate and delineate useful questions, to choose and apply suitable research methods, to look critically at acquired information and to doubt information that has been offered

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	3	2	1	-	-	-	-	-	-	1	-	-	-	-
CO-2	1	2	-	3	-	-	-	-	-	-	-	-	-	-
CO-3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-4	2	1	-	1	3	-	-	-	-	1	-	-	-	-
CO-5	1	-	-	1	2	-	-	-	-	3	1	-	-	-
CO-6	3	1	-	-	2	-	-	-	-	3	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Applied Mathematics-II(A)

SUBJECT CODE: DMA-301

YEAR/SEMESTER: $2^{nd}/3^{rd}$

COURSE OUTCOMES	
CO-1	The students learn about the application of Matrices.
CO-2	The students gain the skill of applying the known results of Matrix algebra for the study of structural properties of graphs and applications of graph theory such as electrical network analysis in expressing a problem.
CO-3	The students use matrix transforms in computer graphics. Software and hardware graphics processor uses matrices for performing operations such as scaling, translation and rotation.
CO-4	The students learn to form and solve problems using differential equations of Electrical circuits, decay of radioactive elements, Motion under gravity, Newton's law of cooling and simple Harmonic motion.
CO-5	To motivate students on the relevance of differential equations in various engineering disciplines for example one-dimensional transient heat conduction.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	3	-	-	-	-	-	-	1	-	-	-	-	-
CO-2	-	3	-	-	1	-	-	-	2	-	-	1	-	-
CO-3	-	3	-	-	1	-	1	-	1	-	-	-	-	-
CO-4	-	3	-	-	1	-	-	-	2	-	2	1	-	-
CO-5	-	3	-	-	-	-	-	-	1	-	2	1	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Electrical Design Drawing & Estimating-I

SUBJECT CODE: DEE-301

YEAR/SEMESTER: 2nd/3rd

COURSE OUTCOMES	
CO-1	Identification and sketching of symbols of electrical equipments and accessories which is needed in single and multiple line drawing of wiring systems.
CO-2	Effective and suitable cost analysis for domestic and power wiring installation for normal and specific conditions.
CO-3	Analyze, compare and controlling light and power circuit accessories of different types of wiring system from different locations according to particular need and condition.
CO-4	Learn to Calculate the load and decide the ratings of electrical equipment and accessories and also decide the number of light and power circuit will be required for Domestic wiring circuit according to IS specification.
CO-5	Design the layout of wiring installation of house and industry and calculation of length of wiring materials before actual wiring to reduce cost of labour charge and wastage.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1		2	2	3	2	-	1	3	-	2	-	-	-	-
CO-2		2	2	-	2	-	2	-	-	2	-	-	-	-
CO-3	-	2	2	2	-	-	-	2	2	-	-	-	-	-
CO-4	-	-	-	3	3	-	2	2	2	2	-	-	-	-
CO-5	2	-	2	3	3	-	-	-	-	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Electrical Instrument & Measurements-I

SUBJECT CODE: DEE-302

YEAR/SEMESTER: 2nd /3rd

COURSE OUTCOMES	
CO-1	Introduction to different parameters that defines the quality of instruments.
CO-2	Construction, working and application of PMMC and MI instruments.
CO-3	Power measurement in three phase circuit.
CO-4	Construction and working of CT and PT.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	-	2	-	-	-	-	-	2	3	-	-	-	-
CO-2	-	-	2	-	-	-	-	-	2	3	-	-	-	-
CO-3	-	-	2	-	-	-	-	-	2	3	-	-	-	-
CO-4	-	-	2	-	-	-	-	-	2	3	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Elementary Mechanical and Civil Engineering

SUBJECT CODE: DEE-303

YEAR/SEMESTER: 2nd /3rd

COURSE OUTCOMES	
CO-1	Students will be able to solve problems regarding mechanics such as beams, trusses, shear force and bending moment diagrams etc.
CO-2	Students will be able to find the mechanical efficiency of simple machines.
CO-3	Students will understand functions of boiler, gas turbine external and internal combustion engines etc.
CO-4	Students will understand the working of turbines and pumps, flow of water through and hydrostatic forces.
CO-5	Students will understand the basics of building materials such as cement, brick and concrete.
CO-6	Students will understand the basics of surveying and building foundations.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	-	3	-	-	-	2	-	-	-	3	-	-	-
CO-2	-	1	2	1	1	-	2	1	-	-	-	-	-	-
CO-3	-	1	-	-	-	-	3	2	1	-	1	-	-	-
CO-4	2	3	-	1	1	2	-	2	1	-	-	-	3	-
CO-5	2	3	-	-	1	2	-	1	2	-	-	-	3	-
CO-6	-	-	1	-	2	1	-	-	-	2	1	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Power system

SUBJECT CODE: DEE-306

YEAR/SEMESTER: 2nd/3rd

COURSE OUTCOMES	
CO-1	Study of basic structure of power system network.
CO-2	Different types of conductors and power cables for transmission and distribution
CO-3	Mechanical design characteristic of transmission line.
CO-4	Different performance parameters of overhead lines.
CO-5	Layout of substations equipments.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	-	-	1	-	-	-	-	-	-	-	-	-	-	-
CO-3	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO-4	-	-	-	-	-	-	3	-	-	-	-	-	-	-
CO-5	-	-	-	-	-	-	-	1	-	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Circuit Theory

SUBJECT CODE: DEE-307

YEAR/SEMESTER: $2^{nd}/3^{rd}$

COURSE OUTCOMES	
CO-1	Characteristics of ideal and practical energy sources and reducing the complexity of circuit by source transformation.
CO-2	Obtaining the values of voltage, current and power in series and parallel RLC circuit.
CO-3	Obtaining different two port network parameters in a given circuit and their interrelationship.
CO-4	Calculation of three phase power in poly phase circuits.
CO-5	Resonance condition in series and parallel RLC circuits and calculation of different parameters.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	-	3	-	-	-	2	-	-	-	-	1	2	-	-
CO-3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO-4	-	3	-	-	-	-	-	-	-	-	1	-	-	-
CO-5	-	3	-	-	-	-	-	-	-	-	2	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Electrical Wiring & Fabrication Shop

SUBJECT CODE: DEE-351

YEAR/SEMESTER: 2nd/3rd

COURSE OUTCOMES	
CO-1	Installation of different wiring schemes on board.
CO-2	On hand practice and testing of different wiring installation, MCB and ELCB in the wiring workshop.
CO-3	Conceptualize about the safety measure have to be taken during actual practice of electrical installations**.**

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	3	2	3	3	3	1	2	1	2	2	-	-	-	-
CO-2	2	2	3	-	2	-	2	2	-	-	-	-	-	-
CO-3	1	2	2	3	-	-	1	3	-	-	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Electrical Instruments & Measurements Lab

SUBJECT CODE: DEE-352

YEAR/SEMESTER: 2nd /3rd

COURSE OUTCOMES	
CO-1	Conversion and extension of ranges of voltmeter and ammeter.
CO-2	Identification of different types of bridges.
CO-3	Measurement of power in single phase and three phase system.
CO-4	Application of CRO for the measurement of different electrical quantities.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	-	2	-	-	-	-	-	2	3	-	-	-	-
CO-2	-	-	2	-	-	-	-	-	2	3	-	-	-	-
CO-3	-	-	2	-	-	-	-	-	2	3	-	-	-	-
CO-4	-	-	2	-	-	-	-	-	2	3	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Elementary Mechanical Engineering Lab

SUBJECT CODE: DEE-353

YEAR/SEMESTER: 2nd/3rd

COURSE OUTCOMES	
CO-1	Understand the basic concept of Bernoulli theorem
CO-2	Student should be aware with properties of materials.
CO-3	Student should be able learn M.A and V.R of different lifting machine.
CO-4	Understand the working of different hydraulics machine.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	3	3	-	-	-	1	3	-	1	1	1	-	1	-
CO-2	3	1	3	3	1	-	3	1	-	-	-	-	-	1
CO-3	2	-	1	2	2	3	3	1	-	3	3	-	2	-
CO-4	3	2	-	1	1	-	-	1	2	-	-	2	-	1

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Applied Mathematics II-(B)

SUBJECT CODE: DMA-401

YEAR/SEMESTER: $2^{nd}/4^{th}$

COURSE OUTCOMES	
CO-1	Jacobians are used in designing and forging a robot.
CO-2	Vector calculus or vector analysis is used in the description of electromagnetic fields.
CO-3	A simple Laplace transform is conducted while sending signals over any two-way communication medium (FM/AM stereo-2-way radio sets, cellular phones.)
CO-4	Fourier series is used in signal processing.
CO-5	Probability models are useful anywhere that you cannot model a situation deterministically.
CO-6	Robotics also have vector calculus application. In the discipline of electronics/ electrical when there is a requirement of calculating length, area, volume involving vector as parameters.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	3	-	-	-	-	1	1	-	-	-	-	-	-
CO-2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO-3	-	3	-	-	-	-	1	-	-	-	1	2	-	-
CO-4	-	3	-	-	-	-	1	-	-	-	1	2	-	-
CO-5	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO-6	-	3	1	-	1	-	-	-	-	-	-	1	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Electronics-II

SUBJECT CODE: DEE-401

YEAR/SEMESTER: 2^{nd} /4^{th}

COURSE OUTCOMES	
CO-1	Different number systems and their conversions.
CO-2	Operation on different logic gates and familiarization of different logic families.
CO-3	Develop design capability of combinational circuit and sequential circuit.
CO-4	Operation of op-amp and its application.
CO-5	Identification of different ICs and its pin diagram configuration.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	1	-	-	--	-	-	-	2	-	-	-	3	-
CO-2	-	1	-	-	-	-	-	-	2	-	-	-	3	-
CO-3	-	1	-	-	-	-	-	-	2	-	-	-	3	-
CO-4	-	1	-	-	-	-	-	-	2	-	-	-	3	-
CO-5	-	1	-	-	-	-	-	-	2	-	-	-	3	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Electrical Instrument & Measurements–II

SUBJECT CODE: DEE-402

YEAR/SEMESTER: $2^{nd}/4^{th}$

COURSE OUTCOMES	
CO-1	Study of different types of energy meters for domestic and commercial purpose.
CO-2	Working and applications of miscellaneous measuring instruments like megger, power factor meter, frequency meters etc.
CO-3	Basic idea and application of electronic instruments like CRO, multi-meters and VTVM.
CO-4	Measurement of electrical quantities using different bridges.
CO-5	Study process instrumentation system and various sensors/transducers.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	1	-	-	-	-	-	-	-	1	-	-	-	-
CO-2	-	-	1	-	-	-	-	-	-	3	-	-	-	-
CO-3	-	-	-	-	-	2	-	-	-	-	-	-	-	-
CO-4	-	2	-	-	-	-	-	-	-	1	-	-	-	-
CO-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Electrical Machines-I

SUBJECT CODE: DEE–403

YEAR/SEMESTER: 2nd/4th

COURSE OUTCOMES	
CO-1	Features of different types of rotating electrical DC machines.
CO-2	Characterization of DC machine according to their characteristics and application.
CO-3	Speed control of DC motor and their applications.
CO-4	Working of transformer and its performance.
CO-5	Interconnection of alternator and its synchronization.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	2	2	2	-	-	2	3	-	2	-	-	-	-
CO-2	-	2	2	2	-	-	2	3	-	2	-	-	-	-
CO-3	-	2	1	2	-	-	2	3	-	1	-	-	-	-
CO-4	-	2	2	2	-	-	2	3	-	2	-	-	-	-
CO-5	-	2	1	2	-	-	2	3	-	2	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Transmission & Distribution of Electrical Power

SUBJECT CODE: DEE-406

YEAR/SEMESTER: $2^{nd}/4^{th}$

COURSE OUTCOMES	
CO-1	To study about general structure and various methods of power transmission and distribution system.
CO-2	Design of electrical and mechanical aspects of transmission and distribution system.
CO-3	Concept of power line carrier communication and its applications.
CO-4	Power factor improvement and its importance.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	-	2	-	1	-	3	-	-	-	-	-	-	-
CO-2	-	-	-	2	3	-	3	-	-	-	-	-	-	-
CO-3	-	-	-	-	-	2	3	-	-	-	1	-	-	-
CO-4	-	-	-	-	-	-	2	1	-	3	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Power Plant Engineering

SUBJECT CODE: DEE-407

YEAR/SEMESTER: 2nd/4th

COURSE OUTCOMES	
CO-1	Conventional power plants, their operation and accessories used in operation.
CO-2	Nuclear power plant as a base load power plant and diesel power plant as peak load plant, operation and working of different accessories.
CO-3	Considering environmental issues, introduction of non-conventional and renewable energy sources like solar, biomass, wind, tidal etc.
CO-4	Selection of power plant depending upon availability of resources.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	2	1	3	-	-	-	3	-	-	-	-	-	-	-
CO-2	2	1	3	-	-	-	3	-	-	-	-	-	-	-
CO-3	2	1	3	-	-	-	3	-	-	-	-	-	-	-
CO-4	2	1	3	-	-	-	3	-	-	-	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Electrical Machine-I Lab

SUBJECT CODE: DEE-451

YEAR/SEMESTER: $2^{nd}/4^{th}$

COURSE OUTCOMES	
CO-1	N/I_a characteristics of DC series shunt and compound motors.
CO-2	Polarity test of transformer.
CO-3	Reversal of direction of rotation of compound motor.
CO-4	Study of cumulative and differential compound motors.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	2	2	2	-	-	2	2	-	2	-	-	-	-
CO-2	-	2	3	2	-	-	-	2	-	2	-	-	-	-
CO-3	-	3	2	2	-	-	2	2	-	2	-	-	-	-
CO-4	-	2	2	-	-	-	3	-	-	3	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Electronics-II Lab

SUBJECT CODE: DEE-452

YEAR/SEMESTER: $2^{nd}/4^{th}$

COURSE OUTCOMES	
CO-1	Identification of different ICs.
CO-2	Verification of truth table of different logic gates.
CO-3	Operation of op-amp for different mathematical operations.
CO-4	Verification of logic circuit of adder, subtractor and flip-flop.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	-	2	-	-	-	-	-	2	-	-	-	3	-
CO-2	-	-	2	-	-	-	-	-	2	-	-	-	3	-
CO-3	-	-	2	-	-	2	-	-	2	-	-	-	3	-
CO-4	-	-	2	-	-	-	-	-	2	-	-	-	3	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Elementary Civil Engineering Lab.

SUBJECT CODE: DEE-453

YEAR/SEMESTER: $2^{nd}/4^{th}$

COURSE OUTCOMES	
CO-1	Identify the different instruments for linear measurement
CO-2	Know the working of linear measurement
CO-3	Identify the different instruments for levelling
CO-4	Record and observing necessary observation with the survey instruments

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	1	1	2	-	-	-	-	-	-	-	-	-	-
CO-2	-	1	1	2	-	-	-	-	-	-	-	-	-	-
CO-3	-	1	1	2	-	-	-	-	-	-	-	-	-	-
CO-4	-	1	1	2	-	-	-	-	-	-	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Switch Gear and Protection

SUBJECT CODE: DEE-501

YEAR/SEMESTER: $3^{rd}/5^{th}$

COURSE OUTCOMES	
CO-1	Analysis of symmetrical and unsymmetrical faults in power system.
CO-2	Understand different types of circuit breakers and its application.
CO-3	Analysis of different types of relay characteristics.
CO-4	Protection schemes of power system equipments.
CO-5	Methods of grounding and their applications.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	2	-	-	2	-	2	-	-	-	-	-	-	-
CO-2	-	2	1	-	2	-	2	1	-	-	-	-	-	-
CO-3	-	2	1	-	2	-	1	1	-	-	-	-	-	-
CO-4	-	2	1	-	2	-	2	1	-	-	-	-	-	-
CO-5	-	2	1	-	2	-	2	2	-	-	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Electrical Machine-II

SUBJECT CODE: DEE-504

YEAR/SEMESTER: $3^{rd}/5^{th}$

COURSE OUTCOMES	
CO-1	Learn the construction and principle of operation of different kinds of rotating AC machines.
CO-2	Analyze theoretically, the performance characteristics for different electrical machines and obtain simple equivalent circuit for the machine.
CO-3	Develop phasor diagram and examine performance of synchronous machines.
CO-4	Study different types of single phase motors.
CO-5	Selection of motor for particular job.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO--11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	-	2	-	1	-	-	3	-	-	-	-	-	-
CO-2	-	-	2	-	1	-	-	3	-	-	-	-	-	-
CO-3	-	-	2	-	1	-	-	3	-	-	-	-	-	-
CO-4	-	-	2	-	-	-	-	3	-	-	-	-	-	-
CO-5	-	-	2	-	-	-	-	3	-	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Installation Maintenance and Repair of Electrical Machines

SUBJECT CODE: DEE-505

YEAR/SEMESTER: 3rd/5th

COURSE OUTCOMES	
CO-1	Guidelines for loading, unloading, installation, testing and commissioning of electrical installation.
CO-2	Maintenance of electrical machines and switch gears.
CO-3	Trouble shooting of electrical machines and underground cables.
CO-4	Need and procedure of different types of earthing for electrical installations

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	-	1	-	1	-	-	1	-	-	-	-	-	-
CO-2	-	-	2	-	3	-	-	-	-	-	-	-	-	-
CO-3	-	-	-	-	2	-	-	3	-	-	-	-	-	-
CO-4	-	-	1	-	1	-	-	-	-	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Utilization of Electrical Energy

SUBJECT CODE: DEE-506

YEAR/SEMESTER: 3rd/5th

COURSE OUTCOMES	
CO-1	To impart the knowledge of different methods of illumination, electric heating and welding.
CO-2	Design various lighting scheme for domestic, industrial and commercial installation.
CO-3	Conservation and management of energy considering environmental issues.
CO-4	To impart knowledge of AC and DC electric traction system.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	-	1	-	-	-	3	2	-	-	-	-	-	-
CO-2	-	-	-	-	2	-	3	1	-	-	-	-	-	-
CO-3	3	1	-	-	-	-	2	-	1	-	-	-	-	-
CO-4	-	-	2	-	-	-	2	1	-	-	3	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Power Electronics-I

SUBJECT CODE: DEE-507

YEAR/SEMESTER: 3rd/5th

COURSE OUTCOMES	
CO-1	Concept of power electronics and thyristor family.
CO-2	Study and characteristics of high power switching devices.
CO-3	Analysis of uncontrolled rectifier for different types of loads.
CO-4	Analysis of different types of controlled rectifier for various combinations of loads.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	2	-	-	-	-	-	2	-	-	-	-	-	-
CO-2	-	-	2	-	-	-	-	-	-	-	3	-	-	-
CO-3	-	-	-	1	-	-	-	-	-	-	-	-	-	-
CO-4	-	-	-	-	-	3	-	-	-	-	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Environmental Education and Disaster Management

SUBJECT CODE: DEV-501

YEAR/SEMESTER: 3rd/5th

COURSE OUTCOMES	
CO-1	Understand the natural environment and its relationships with human activities.
CO-2	Characterize and analyze human impacts on the environment.
CO-3	Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems
CO-4	Capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels.
CO-5	Capacity to obtain, analyze, and communicate information on risks, relief needs and lessons learned from earlier disasters in order to formulate strategies for mitigation in future scenarios.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	3	-	-	-	-	-	-	-	2	-	-	-	-	-
CO-2	3	-	-	-	-	-	-	-	2	-	-	-	-	-
CO-3	3	-	-	-	-	-	-	-	2	-	-	-	-	-
CO-4	3	-	-	-	-	-	-	-	1	-	-	-	-	-
CO-5	3	-	-	-	-	-	-	-	2	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Power Electronics-I lab

SUBJECT CODE: DEE-553

YEAR/SEMESTER: $3^{rd}/5^{th}$

COURSE OUTCOMES	
CO-1	Application and verification of characteristic of power electronic components.
CO-2	Study and performance of different rectifier circuits.
CO-3	Different methods for triggering of SCR.
CO-4	Application and verification of characteristic of power electronic components.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	2	-	-	-	-	-	2	-	-	-	-	-	-
CO-2	1	-	-	-	-	-	-	-	-	2	-	-	-	-
CO-3	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO-4	-	-	-	-	-	3	-	-	-	-	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Electrical Machine-II Lab

SUBJECT CODE: DEE-554

YEAR/SEMESTER: 3rd /5th

COURSE OUTCOMES	
CO-1	Performance characteristic of single phase Induction motor.
CO-2	Performance characteristic of three phase Induction motor.
CO-3	Acquire hands on experience of conducting various tests on three phase synchronous machines and obtaining their performance.
CO-4	Operation of Universal motor under different types of supply.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	-	3	-	1	-	-	3	-	1	-	-	-	-
CO-2	-	-	3	-	1	-	-	3	-	1	-	-	-	-
CO-3	-	-	3	-	1	-	-	3	-	1	-	-	-	-
CO-4	-	-	3	-	1	-	-	3	-	1	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Installation Maintenance Lab

SUBJECT CODE: DEE-555

YEAR/SEMESTER: 3rd /5th

COURSE OUTCOMES	
CO-1	Application of different types of instruments used for electrical installation.
CO-2	Application of megger for fault identification.
CO-3	Troubleshooting of different starters, circuit breakers and electrical machines.
CO-4	Routine and daily maintenance of different electrical installation

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO-2	-	-	-	-	-	-	-	-	-	1	-	-	-	-
CO-3	-	-	-	-	3	-	-	-	-	2	-	-	-	-
CO-4	-	-	2	-	1	-	-	-	-	-	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Field Exposure

SUBJECT CODE: DEE-557

YEAR/SEMESTER: 3rd /5th

COURSE OUTCOMES	
CO-1	Field exposure of various electrical systems and their operation like substation, power plant etc.
CO-2	To realize and see the design and trouble shooting of electrical machines, installation and switchgear.
CO-3	For experiencing real life working in industry.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	-	-	2	2	-	2	3	-	-	-	-	-	-
CO-2	-	-	-	2	3	-	-	3	-	1	-	-	-	-
CO-3	3	-	-	1	-	-	-	-	-	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Electrical Design Drawing and Estimating-II

SUBJECT CODE: DEE-603

YEAR/SEMESTER: $3^{rd}/6^{th}$

COURSE OUTCOMES	
CO-1	Marketing survey for price comparison and selection of best quality material.
CO-2	Different method of earthing according to IE rules for the safety of instruments and human being.
CO-3	Estimation of wiring installation for commercial and industrial buildings.
CO-4	Estimation of costs and Main components of overhead line and underground distribution lines.
CO-5	Costing calculation of material for small substations.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	2	2	3	2	2	-	2	-	2	-	-	-	-	-
CO-2	1	-	2	2	3	-	1	-	2	-	-	-	-	-
CO-3	1	2	-	1	-	2	2	-	2	2	-	-	-	-
CO-4	-	2	-	-	3	-	3	-	-	-	-	-	-	-
CO-5	1	3	2	3	-	-	3	-	-	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Microprocessor Development System

SUBJECT CODE: DEE-604

YEAR/SEMESTER: $3^{rd}/6^{th}$

COURSE OUTCOMES	
CO-1	Study the concept of memory mapping with the use of address line and explain the Microprocessor's internal architecture and its operation within the area of performance
CO-2	Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the Microprocessor.
CO-3	Design Electronic circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
CO-4	Analyze assembly language programs; select appropriate assemble into machine a cross Assembler utility of a Microprocessor.
CO-5	Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	-	-	-	-	-	-	-	1	-	-	-	-	3
CO-2	-	-	-	-	-	-	-	-	2	-	-	-	-	3
CO-3	-	-	-	-	-	-	-	-	1	-	-	-	-	2
CO-4	-	-	-	-	-	-	-	-	2	-	-	-	-	3
CO-5	-	-	-	-	-	-	-	-	1	-	-	-	-	3

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Power Electronics-II

SUBJECT CODE: DEE-605

YEAR/SEMESTER: $3^{rd}/6^{th}$

COURSE OUTCOMES	
CO-1	Concept of power electronics and thyristor family.
CO-2	Study and characteristics of high power switching devices.
CO-3	Analysis of uncontrolled rectifier for different types of loads.
CO-4	Analysis of different types of controlled rectifier for various combinations of loads.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	2	-	-	-	3	-	-	-	-	-	-	-	-
CO-2	-	-	2	-	-	-	-	-	-	-	3	-	-	-
CO-3	-	-	-	1	-	-	-	-	-	-	-	-	-	-
CO-4	-	-	-	-	2	-	-	-	-	-	-	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Control System

SUBJECT CODE: DEE-606

YEAR/SEMESTER: $3^{rd}/6^{th}$

COURSE OUTCOMES	
CO-1	Identify open and closed loop control system.
CO-2	Formulate mathematical model for physical systems.
CO-3	Simplify representation of complex systems using reduction techniques.
CO-4	Analyze the system response and stability in both time-domain and frequency domain.
CO-5	Use standard test signals to identify performance characteristics of second-order systems.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO-2	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO-3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO-4	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO-5	-	-	-	-	-	-	-	-	-	-	-	3	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Industrial Management & Entrepreneurship Development

SUBJECT CODE: DIM-601

YEAR/SEMESTER: $3^{rd}/6^{th}$

COURSE OUTCOMES	
CO-1	The course will increase the skills in the students like communication skills, presentation, Human skills, Leadership skills, Managerial skills etc. after the completion of the course.
CO-2	Increase students' capabilities and confidence to handle administrative, managerial and financial activities.
CO-3	The course will assist in developing intellectual skills like creative thinking, Decision making, Leadership, Brain Storming, Motivation, etc.
CO-4	The course will introduce skills in the students like team work, leadership skills, communication skills, body languages, positive attitude, etc.
CO-5	This course is designed to develop understanding of various functions of management, role of workers and engineers and providing knowledge about industrial and tax laws.
CO-6	It also provides the knowledge about the Entrepreneurship, Intellectual property Rights, Project and Project Report, Inventory control in manufacturing process.

CO-PO MAPPING														
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	3	-	-	-	-	-	-		3	-	-	-	-	-
CO-2	3	-	-	-	-	-	1	-	3	-	-	-	-	-
CO-3	3	-	-	-	-	-	-	-	3	-	-	-	-	-
CO-4	3	-	2	-	-	-	-	-	3	2	-	-	-	-
CO-5	3	-	-	-	-	-	-	-	3	-	-	-	-	-
CO-6	3	-	-	-	-	-	-	1	3	-	2	-	-	-
3: Strong contribution, 2: Average contribution, 1: Low contribution														

SUBJECT NAME: Power Electronics-II Lab

SUBJECT CODE: DEE-652

YEAR/SEMESTER: $3^{rd}/6^{th}$

COURSE OUTCOMES	
CO-1	Operation of chopper in voltage commutated mode.
CO-2	Application of MOSFET and IGBT for PWM inverter.
CO-3	Different types of faults and trouble shooting in inverter.
CO-4	Study and verification of three phase AC voltage controller for resistive load

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	-	2	-	-	-	-	-	2	-	-	-	-	-	-
CO-2	-	-	-	1	-	-	-	-	-	2	-	-	-	-
CO-3	-	-	-	-	2	-	-	-	-	-	-	-	-	-
CO-4	-	-	-	-	-	3	-	-	-	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Electrical Drawing Lab

SUBJECT CODE: DEE-653

YEAR/SEMESTER: $3^{rd}/6^{th}$

COURSE OUTCOMES	
CO-1	Knowledge of specific difference between earthing of commercial and industrial buildings and equipments
CO-2	Develop the drawing skill of AC machines.
CO-3	Impart the knowledge of drawing and control of electrical installation.
CO-4	Imparting knowledge of safety before any installation to avoid hazards of electricity

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	2	2	3	1	-	-	3	-	1	-	-	-	-	-
CO-2	-	1	1	3	3	-	2	-	2	-	-	-	-	-
CO-3	-	2	3	-	3	-	-	-	-	-	-	-	-	-
CO-4	1	2	3	-	-	-	2	-	2	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Microprocessor Development Lab

SUBJECT CODE: DEE-654

YEAR/SEMESTER: $3^{rd}/6^{th}$

COURSE OUTCOMES	
CO-1	Identify relevant information for programming with the Microprocessor
CO-2	Set up programming strategies and select proper mnemonics and run their program on the training boards.
CO-3	Practice different types of programming keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations.
CO-4	Develop testing and experimental procedures on Microprocessor and analyze their operation under different cases.

CO-PO MAPPING

	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**	**PO-8**	**PO-9**	**PO-10**	**PO-11**	**PO-12**	**PO-13**	**PO-14**
CO-1	-	-	-	-	-	-	-	-	1	-	-	-	-	3
CO-2	-	-	-	-	-	-	-	-	1	-	-	-	-	3
CO-3	-	-	-	-	-	-	-	-	1	-	-	-	-	3
CO-4	-	-	-	-	-	-	-	-	1	-	-	-	-	3

3: Strong contribution, 2: Average contribution, 1: Low contribution

SUBJECT NAME: Project

SUBJECT CODE: DEE-656

YEAR/SEMESTER: 3rd/6th

COURSE OUTCOMES	
CO-1	Identification of area in which project of diploma engineering level can be developed.
CO-2	Assembly of components for the demonstration of same project.
CO-3	To prepare report of the working and performance of the project.

CO-PO MAPPING

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PO-13	PO-14
CO-1	2	-	1	3	1	1	1	1	1	1	1	1	1	1
CO-2	-	2	1	3	1	1	1	1	1	1	1	1	1	1
CO-3	3	-	-	-	-	-	-	-	-	-	-	-	-	-

3: Strong contribution, 2: Average contribution, 1: Low contribution