Integral University, Lucknow
Department of Polytechnic
Study and Evaluation Scheme

Program: Diploma in Electrical Engineering

Semester IInd

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-201	Applied Mathametics-1(B)		03	01	00	40	20	60	40	100	3:1: 0	4	Y		Y				
2	DPH-201	Applied Physics (B)		03	01	00	40	20	60	40	100	3 :1: 0	4	Y	Y	Y		Y		
3	DCH-201	Applied Chemistry (B)		03	01	00	40	20	60	40	100	3: 1: 0	4	Y	Y	Y		Y		
4	DEE-201	Basic Electrical Engineering–II	Core	03	01	00	40	20	60	40	100	3: 1: 0	4	Y		Y				
5	DEM-201	Electrical & Electronics Engineering Materials	Core	03	01	00	40	20	60	40	100	3: 1: 0	4	Y	Y			Y		
6	DPC-201	Professional Communication		03	01	00	40	20	60	40	100	3: 1: 0	4	Y	Y	Y			Y	Y
PRACTICAL																				
1	DPH-251	Applied Physics Lab		00	00	02	40	20	60	40	100	0 :0: 1	1	Y	Y	Y		Y		
2	DEC-251	Basic Electronics–I Lab		00	00	02	40	20	60	40	100	0: 0 :1	1	Y	Y	Y				
3	DEE-251	Basic Electrical Engineering Lab	Core	00	00	02	40	20	60	40	100	0: 0: 1	1	Y	Y	Y				
4	DPC-251	Professional Communication Lab		00	00	02	40	20	60	40	100	0: 0: 1	1	Y	Y	Y				Y
5	GP-251	General Proficiency		-	-	-	-	-	60	-	60								Y	Y
		Total		18	06	08	-	-	-	-	**1060**		**28**							

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

(Common to All Diploma Engineering Courses)

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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]

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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

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. 5

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

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.

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

Classification :

Classification of materials into conducting,semiconducting and insulating materials with reference to their atomic structure. 2

UNIT-II

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. 8

UNIT-III

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. 8

UNIT-IV

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. 12

UNIT-V

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. 10

References :

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

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

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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)

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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)

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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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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