J. S. UNIVERSITY, SHIKOHABAD

DIPLOMA

1st Semester & 2nd Semester

(Electrical Engineering)

SCHEME
&
SYLLABUS

[Effective from the session 2015-16]

STUDY AND EVALUATION SCHEME FOR
THREE YEAR DIPLOMA COURSE IN
ELECTRICAL ENGG.

SEMESTER - First

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	DAS-11	Professional Communication	4	1	-	-	20	50	70	2.5
2	DAS-12	Applied Mathematics-I	4	1	-	-	20	50	70	2.5
3	DAS-13	Applied Physics-I	4	1	-	-	20	50	70	2.5
4	DAS-14	Applied Chemistry	4	1	-	-	20	50	70	2.5
5	DEE-11	Electrical & Electronics Engineering Material	4	1	-	-	20	50	70	2.5
PRACTICA/DRAWING SUBJECTS										
5	DWP-11P	Workshop Practice	-	-	10	-	30	60	90	3
6	DAS-11P	Professional Communication	-	-	4	-	10	20	30	3
7	DAS-14P	Applied Chemistry	-	-	4	-	20	40	60	3
Games//Social and Cultural Activities + Discipline (15 + 10)									25	
								Grand Total	555	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

STUDY AND EVALUATION SCHEME FOR
THREE YEAR DIPLOMA COURSE IN
ELECTRICAL ENGG.

SEMESTER - Second

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	DAS-22	Applied Mathematics-II	4	1	-	-	20	50	70	2.5
2	DAS-23	Applied Physics-II	4	1	-	-	20	50	70	2.5
3	DEE-21	Basic Electrical Engg	4	1	-	-	20	50	70	2.5
4	DEC-21	Electronics - I	4	1	-	-	20	50	70	2.5
5	DDW-21	Engineering Drawing	-	-	-	8	20	50	70	3
PRACTICA/DRAWING SUBJECTS										
6	DAS-23P	Applied Physics-II Lab	-	-		-	20	40	60	3
7	DEE-21P	Basic Electrical Engg Lab	-	-	4	-	20	40	60	3
8	DEC-21P	Electronics – I Lab	-	-	4	-	30	60	90	3
Games//Social and Cultural Activities + Discipline (15 + 10)									25	
								Grand Total	585	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

[DAS-11] Professional Communication

1. PART I - COMMUNICATION IN ENGLISH

1.1 Concept of communication, importance of effective communication, types of communication, formal, informal, verbal and nonverbal, spoken and written. Techniques of communication, listening, reading, writing and speaking,

Barriers in communication, Modern tools of communication- Fax, e-mail, Telephone, telegram, etc.

1.2 Technical communication Vs. General Communication: Development of comprehension and knowledge of English through the study of text material and language exercises based on the prescribed text book of English.

1.3 Development of expression through:

1.3.1 Paragraph writing, Essay writing, Proposal writing.

1.3.2 Business and personal correspondence (Letters): Kinds of letters:- Official, demi-official, unofficial , for reply or in reply, quotation, tender and order giving letters. Application for a job, Resume.

1.3.3 Report writing and Note making and minutes writing.

1.4 Functional Grammar: Study of sentences and parts of speech (word class), Preposition, Verb, Articles, Abbreviations.

1.5 Vocabulary Building: Homophones, One word substitution, Idioms and Phrases.

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

2. PART II - COMMUNICATION IN HINDI

2.1 Development of comprehension and knowledge of Hindi usage through rapid reading and language exercises based on prescribed text material developed by IRDT.

2.2 Development of expression through ; Letter writing in Hindi: Kinds of letters:- Official, demi-official, unofficial , for reply or in reply, quotation, tender and order giving letters, Application for a job, Press release in Hindi, Report writing.

Note: Paper should be in two parts, part I - English and part II -Hindi.

REFERENCE BOOKS

1. Bookshelf worksheet of Professional Communication, New Delhi: Bookshelf 2008

2. Functional Skills in language and literature by R. P. Singh, New Delhi: Oxford University Press.

3. Oxford English Hindi English Dictionary, New Delhi: Oxford 2008

[DAS-11P] Professional Communication Lab

For the practice/exercise the following is suggested:

1. A. Phonetic transcription

   B. Stress and intonation:

(At least 10 word for writing and 10 word for pronunciation)

2. ASSIGNMENT: (Written Communication)

Two assignments of approximately 400 word each decided by the teacher concerned.

THE FOLLOWING MODEL IS PROPOSED:

1. A picture/photograph

2. An opening sentence or phrase

3. A newspaper/magazine clipping or report

4. Factual writing which should be informative or argumentative.

(The students may refer to "Bookshelf worksheet" for technical communication)

3. Oral Conversation:

1. Short speeches/declamation: Bid farewell, felicitate somebody, celebrate a public event, and Offer condolences

2. Debate on current problems/topics

3. Mock Interview: Preparation, Unfolding of personality and expressing ideas effectively

4. Group discussion on current topics/problems

5. Role Play/ general conversation: Making polite enquiries at Railway Station, Post Office, Banks and other Public places, replying to such enquiries, enquiring about various goods sold in the market and discussing their prices. Complaining about service at Hotel, restaurant, Offering apologies in reply to such complaints, complain to a company about a defective product you have brought, reply to such complaints.

6. Presentation skill, Use of OHP and LCD.

7. through drilling of model words involving different phonetic symbols (Vowels, Consonants, and Diphthongs).

4. Aural : Listening to conversation/talk/reading of short passage and then writing down the relevant or main points in the specified number of words and answering the given questions The assignments/project work are to be evaluated by the internal/ external examiner. The distribution of 30 marks e.g.

10 marks for assignment (Given by subject teacher as sessional marks)

10 marks for conversation and viva-voce

10 marks for phonetic transcription

[DAS-12] APPLIED MATHEMATICS - I

Unit -1: Algebra-I

1. Arithmetic Mean: nth term, sum, Mean
2. Geometric Mean: nth term, sum, Mean
3. Binomial Theorem for positive, negative and fractional index (without proof)
4. Determinants: Elementary properties of determinants of order 2 and 3, system of linear
   equations and solution, Cramer`s Rule

. Unit -2: Algebra-II

1. Vector Algebra: Dot and cross product, Scalar and vector triplet product
2. Complex Numbers: Representation, Modulus and Amplitude, De-Moivre theorem application in solving algebraic equations.

Unit -3: Trigonometry

1. Relation between sides and angles of a triangle: Statement of various formula showing relationship between sides and angles of a triangle.
2. Inverse Circular Functions

Unit -4: Differential Calculus-I

1. Functions, limits, continuity, elementary methods of finding limit (right and left)
2. Differentiability, method of finding derivatives, functions of a function, Logarithmic
   Differentiation, Differentiation of Implicit functions.

Unit -5: Differential Calculus-II

1. Higher order derivatives
2. Derivatives of Special Functions (Exponential, Logarithmic, and Inverse circular functions)
3. Application: Finding Tangent, Rate Measure, Velocity and Acceleration

[DAS-13] APPLIED PHYSICS-I

Topic Wise Distribution

S.no.	Topics	Marks Distribution
1	Unit &Dimensions	4
2	Errors & Measurement	4
3	Heat & Thermodynamics	5
4	Friction	4
5	Circular Motion	5
6	Motion of Planets & satellites	5
7	Dynamic of Rigid Body	6
8	Fluid Mechanics	6
9	Harmonic Motion	6
10	Acoustics	5
	Total	**50**

Detailed Contents

1. UNIT AND DIMENSION

Physical quantity and its types, Unit and its types, Definition of SI units, Dimensions of physical quantities, Dimensional formula and dimensional equation, Principle of homogeneity and its applications, Limitations of dimensional analysis

2. ERRORS AND MEASUREMENTS

Errors, Accuracy and Precision, Types of errors in measurement, Combination of errors, Significant figures, Rounding off

3. HEAT AND THERMODYNAMICS

Modes of heat transfer, Coefficient of thermal conductivity, Conduction through compound medium, Isothermal and Adiabatic process, Zeroth and First law of thermodynamics

4. FRICTION

Introduction, Physical significance of friction, Advantage and disadvantage of friction and its role in daily life, Coefficient of static and dynamic friction and their measurement, Angle of friction, Angle of repose, Motion of a body on a inclined plane

5. CIRCULAR MOTION

Uniform circular motion, Angular velocity and acceleration, centripetal acceleration, Relation between linear and angular velocity and acceleration, Centripetal and centrifugal forces, Practical applications of centripetal forces

6. MOTION OF PLANETS AND SATELLITES

Gravitational force, Acceleration due to gravity and its variation with respect to height and depth from earth, Kapler's law, Escape and orbital velocity, Time period of satellite, Geo-stationary satellite

7. DYNAMIC OF RIGID BODY

Rigid body, Rotational motion, Moment of inertia, Theorems (parallel and perpendicular) of moment of inertia, Expression of M.I. of regular bodies (lamina ,disc, sphere, cylindrical), Radius of gyration, Angular momentum, Conservation of angular momentum, Torque, Rotational kinetic energy, Rolling of sphere on the slant plane

8. FLUID MECHANICS

Surface tension, Capillary action and determination of surface tension from capillary rise method, Equation of continuity, Bernoulli's theorem and its application, Stream line and Turbulent flow, Viscosity, Stokes law, Reynold's number

9. HARMONIC MOTION

Periodic function, Characteristics of SMH, Equation of SMH and determination of velocity and acceleration, Simple pendulum and derivation of its periodic time, Spring-mass system, Energy conservation of SHM, Concept of phase, Definition of free, forced, damped and un-damped vibrations, Resonance and its application, Q-factor

10. ACOUSTICS

Definition of pitch, loudness, quality and intensity of Sound waves, Echo, Reverberation and reverberation time, Sabine's formula without derivation, Acoustics of building defects and remedy.

[DAS-14] APPLIED CHEMISTRY

1. ATOMIC STRUCTURE:

Basic concept of atomic structure, Matter wave concept, Quantum number, Heisenberg's Uncertainty Principle, Shapes of orbitals.

2. CHEMICAL BONDING:

Covalent bond, Ionic & Co-ordinate, Hydrogen bonding, Valence bond theory, Hybridisation, VSEPR theory, Molecular orbital theory

3. CLASSIFICATION OF ELEMENTS:

Modern classification of elements (s p d and f block elements), Periodic properties : Ionisation potential electro negativity, Electron affinity.

4. ELECTRO CHEMISTRY-I:

Arrhenius Theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of Acid and base: Bronsted, Arrhenius and Lewis theory. Concept of pH based numerical. Buffer solutions,

Indicators, Solubility product, Common ion effect with their application,

5. ELECTRO CHEMISTRY-II:

Redox reactions, Electrode potential (Nernst Equation), Electro-chemical cell (Galvanic and Electrolytic). EMF of a cell and free energy change, Standard electrode potential, Electro chemical series and its application. Chemical and Electrochemical theory of corrosion, Galvanic Series. Prevention of corrosion by various method.

6. CHEMICAL KINETICS:

Law of mass action, order and molecularity of reaction. Activation energy, rate constants, 1st order reactions and 2nd order reactions.

7. CATALYSIS:

Definition Characteristics of catalytic reactions, Catalytic promotors and poison , Autocatalysis and Negative catalysis, Theory of catalysis, Application.

8. SOLID STATE:

Types of solids (Amorphous and Crystalline), Classification (Molecular, Ionic, Covalent, Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of Crystals, FCC, BCC, Crystal imperfection.

9. FUELS:

Definition, its classification, high & low Calorific value. Determination of calorific value of solid and liquid fuels by Bomb calorimeter. Liquid fuel - Petroleum and its refining, distillate of petroleum (Kerosene oil, Disel and Petrol), Benzol and Power alchol. Knocking, Anti-knocking agents, Octane number and Cetane number. Cracking and its type, Gasoling from hydrogenation of coal (Bergius process and Fischer tropsch's process) Gaseous Fuel - Coal gas, Oil gas, Water gas, Producer gas, Bio gas, LPG and CNG. Numerical Problems based on topics

10. WATER TREATMENT:

Hardness of water, Its limits and determination of hardness of water by EDTA method. Softening methods (Only Sods lime, Zeolote and Ion exchange resin process). Disadvantage of hard water in different industries, scale and sludge

formation, Corrosion, Caustic embritlement, primming and foarming in biolers. Disinfecting of Water By Chloramine-T, Ozone and Chlorine. Advantage and disadvantage of chlorinational, Industrial waste and sewage, Municipality waste water treatment, Definition of BOD and COD. Numerical Problems based on topics.

11. COLLOIDAL STATE OF MATTER:

Concept of collidal 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, Electro phoresis and coagulation. relative stability of hydrophillic and hydrophobie colloids. Protection and protective colloids. Emulsion, Types, preparation,properties and uses. Application of colloids chemistry in different industries.

12. LUBRICANTS:

Definition, classification, Necessasity and various kinds of lubricants. Function and mechanism of action of lubricants and examples. Properties of lubricants, Importance of additive compunds in lubricants, Synthetic lubricants and cutting fluids. Industrial application, its function in bearing.

13. HYDROCARBONS:

A. Classification and IUPAC nomeuclature of organic compounds hamologous series (Functional Group)

B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.

14. ORGANIC REACTIONS & MECHANISM:

1. Fundamental auspects -

A. Electrophiles and nucleophiles, Reaction Intermediates, Free radical, Carbocation, Carbanion

B. Inductive effect, Mesomeric effect, Electromeric effect.

2.A. Mechanism of addition reaction (Markonicove's Rule, Cyanohydrin and Peroxide effect),

B. Mechanism of Substitution reactions; (Nucleophillic) hydrolysis of alkyle halide, electrophillic substitution halogenation, Sulphonation, Niration and friedel-Craft reaction.

C. Mechanism of Elimination reaction - Dehydration of primary alcohol, Dehyrohalogenation of primary alkyl halide.

15. POLYMERS :

1. Polymers and their classification. Average degree of polymerisation, Average molecular weight, Free radical polymerisation (Mechanisms)

2. Thermosetting and Thermoplastic resen -

A. Addition polymers and their industrial application-Polystyrene, PVA, PVC, PAN, PMMA, Buna-S, Buna-N, Teflon.

B. Condensation polymer and their industrial application : Nylon 6, Nylon 6,6, Bakelite, Melamine formaldehyde,

Urea formaldehyde, Terylene or Decron, Polyurethanes.

3. General concept of Bio polymers, Biodegradable polymers and inorganic polymers (Silicon).

16. SYNETHETIC MATERIALS:

A. Introduction - Fats and Oils

B. Saponification of fats and oils , Manufacturing of soap.

C. Synthetic detergents, types of detergents and its manufacturing.

3. EXPLOSIVES: TNT, RDX, Dynamite.

4. Paint and Varnish

[DAS-14P] CHEMISTRY LAB

1. To analyse 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^{--}

2. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.

3. To determine the total hardness of water sample in terms of CaCO3 by EDTA titration method using Eriochroma black-T indicator.

4. To determine the strength of given HCl solution by titration against NaOH solution using Phenolphthalium as indicator.

5. To determine the Chloride content in supplied water sample by using Mohr's methods.

6. Determination of temporary hard ness of water sample by OHener's method.

[DEE-11] ELECTRICAL AND ELECTRONICS ENGG. MATERIALS

1. Classification

Classification of materials with reference to their atomic structure.

2. Conducting Materials

(i) Resistivity and factors affecting resistivity, such as temperature, alloying and mechanical stressing.

(ii) Super conductivity and super conducting material.

(iii) Low resistivity materials e.g. copper, aluminium and steel, their general properties as conductor e.g. resistivity, temperature co-efficient,mechanical properties, corrosion,contact resistance and practical application. Uses of mercury as conducting material.

(iv) Comparison of copper, aluminium and steel for various applications as electrical conductor.

(v) Low resistivity copper alloys: brass, bronze (cadmium and beryllium), their practical application.

(vi) High resistivity materials : manganin, constantan nichrome, carbon, tungsten, their practical applications.

(vii) Electric lamp materials.

(viii) Brush contact materials.

(ix) Soldering materials.

(x) Thermocouple materials, Fuse materials.

3. 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 :- Hygrscoopcity 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.

(iii) Insulating materials and their application-

- Definition and classification - Thermo setting materials e.g. Phenol Formaldehyde, Resins (i.e. Backelite), Amino resins (Ureca formaldehyde and Malamine formaldehyde), Epoxy resins their properties, Applications and Commerical names. - Thermo Plastic materials e.g. Polyvinyl Chloride (P.V.C.), Poly Ethelene Silicons their properties application and commerical names. Brief description of extrusion and moulding process of using plastic

materials in electrical engineering. - Natural Insutaling Materials- Mica and Mica products, Asbestos and Asbestos products, Ceramic materials (Porcelain and Stealite), Glass and glass products, Cotton, Silk, Jute, Paper (Dry and impregnated), Rubber Butuman, Mineral and insulating oil for transformer, switch gear, capactors, high voltage cables, insulating varnishes for coating and impregnation, Enamels for winding wires, Glass fibre sleeves Gasous Materials e.g. Air, Hydrogen, Nitrogen and SF6.

4. 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.

5. 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.

6. 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 therir practical applications.

[DWS-11P] WORKSHOP PRACTICE

1. Carpentry Shop :

EX-1 Introduction & demonstration of tools used in carpentry shop and different types of joints, types of wood, seasoning and preservation of wood

EX-2 Planing and sawing practice

EX-3 Making of lap joint

EX-4 Making of mortise and tenon joint

Ex-5 Making of any one utility article such as woodenpicture frame, hanger, peg, name plate, etc.

2. Painting and Polishing Shop:

EX-1 Introduction of paints, varnishes, Reason for surface preparation, Advantange of painting, other method of surface coating i.e. electroplating etc.

EX-2 To prepare a wooden surface for painting apply primer on one side and to paint the same side. To prepare

french polish for wooden surface and polish the other side.

Ex-3 To prepare metal surface for painting, apply primer and paint the same.

EX-4 To prepare a metal surface for spray painting,first spray primer and paint the same by spray painting gun and compressor system.

3. Sheet Metal and Soldering Shop :

EX-1 Introduction and Types of sheets, measuring of sheets

EX-2 Study and sketch of various types of stakes/anvil.

EX-3 Introduction & demonstration of tools used in Sheet metal working shop.

EX-4 Cutting, shearing and bending of sheet.

EX-5 To prepare a soap case by the metal sheet.

4. Fitting Shop, Plumbing Shop & Fastening Shop:

EX-1 Study of materials, limits, fits and toterances.

EX-2 Introduction & demonstration of tools used in Fitting Shop.

EX-3 Hacksawing and chipping of M.S. flat. Filing and squaring of chipped M.S. job. Filing on square or rectangular M.S. piece.

EX-4 Making bolt & nut by tap and die set and make its joints

Ex-5 To drill a hole in M.S. Plate and taping the same to creat threads as per need.

5. Foundry Work

Ex-1 Study of metal and non metals

Ex-2 Study & sketch of the foundry tools.

Ex-3 Study & sketch of cupula & pit furnace.

Ex-4 To prepare the green moulding sand and to prepare moulds (single piece and double piece pattern sweep mould)

Ex-5 Casting of non ferous (lead or aluminium) as per exercise 3.

6. Smithy Shop :

EX-1 Study & Sketch of Tools used in smithy shop.

EX-2 To prepare square or rectangular piece by the M.S. rod.

EX-3 To make a ring with hook for wooden doors.

EX-4 Utility article-to preapre a ceiling fan hook.

7. Welding Shop :

EX-1 Introduction to welding, classinfication of welding, types of weld joints.

EX-2 Welding practice-gas and electric.

EX-3 Welding for lap joint after preparing the edge.

EX-4 Welding of Butt joint after preparation of the edge.

EX-5 'T' joint welding after preparation of edge.

8. Machine Shop

EX-1 Study & sketch of lathe machine.

EX-1 Study & sketch of grinders, milling M/c, Drilling M/c and CNC Machines

Ex-2 Plain and step turning & knurling practice.

Ex-3 Study and sketch of planning/Shaping machine and to plane a Ractangle of cast iron.

DAS-22 Mathematics - II

Unit -1: Integral Calculus-I

Methods of finding indefinite integral
1. Integration by substitution
2. Integration by parts
3. Integration by partial fraction
4. Integration of special functions

Unit-2: Integral Calculus-II

1.Definite integral: definition and properties, Evaluation of integrals
2. Applications of definite integrals: Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution,
3.Numerical Integration: Trapezoidal rule, Simpson`s 1/3rd rule and Simpson`s 3/8 th rule

Unit-3: Coordinate Geometry-I

1.Circle : Equation of circle in standard form, centre –radius form , diameter form and two intercept form.
2. Standard form of curves and their simple properties:
   Parabola
   Ellipse
   Hyperbola

Unit-4: Coordinate Geometry-II

1.Distance between two points in space , direction cosines and direction ratios, Finding equation of a straight line and shortest distance between two lines.
2. Sphere

[DAS-23]   Applied Physics-II

1. Optics
Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Deotructive), Diffraction and Polarization (Concept Only), Law of Mallus and Polaroids.

2. Introduction To Fibre Optics :
Critical angle, Total internal reflection, Principle of fibre optics, Optical fibre, Pulse dispersion in step-index fibres, Graded index fibre, Single mode fibre, Optical sensor.

3. Lasers and its Applications
Absorbtion and Emission of energy by atom, Spontaneous and Stimulated Emission, Poluation inversion, Main component of laser and types of laser- Ruby Laser, He-Ne laser and their applications. Introduction to MASER.

4. Electrostatics :
Coutomb's Law, Electric field, Electric potential, Potentialenergy, Capacator, Energy of a charged capacitor, Effect of dielectric on capacators.

5. D.C. Circuits
Ohm's Law, Kirchoff's Law and their simple application, Principle of Wheat Stone bridge and application of this principle in measurement of resistance (Meter bridge and Post Office Box); Carey Foster's bridge, potentiometer.

6. Magnetic Materials and Their Properties:
Dia, Para and Ferro-magnetism, Ferrites, Magnatic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics
Concept of Energy bands in soldis, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semiconductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.

8. Junction Diode and Transister :
Majority and Minority charge carriers,P-N junction formation, barrier voltage, Forward and reverse biasing of a junction diode, P-N junction device characteristics, Formation of transistor, transistor-action, Base, emitter and collector currents and their relationship LED's.

9. Introduction To Digital Electronics :
Concept of binary numbers, Interconversion from binary to decimal and decimal to binary. Concepts of Gates (AND, NOT,OR).

10. Non-conventional energy sources:
(a) Wind energy : Introduction, scope and significance, measurement of wind velocty by anemometer, general principle of wind mill.
(b) Solar energy: Solar radiation and potentiality of solar radiation in India, uses of solar energy: Solar Cooker, solar water heater, solar photovoltaic cells, solar energy collector.

[DAS-23P]   Applied Physics-II

Note: Any 5 experiments are to be performed.

1. Determination of coefficient of friction on a horizontal plane.
2. Determination of 'g' by plotting a graph T2 verses l and using the formula g=4n2/Slope of the graph line
3. Determine the force connstant of combinationof springs incase of 1. Series 2. Parallel.
4. To verify the series and parallel combination of Resistances with the help of meter bridge.
5. To determine the velocity of sound with the help of resonance tube.
6. Determination of viscosity coefficient of a lubricant by Stoke's law.
7. Determination of E1/E2 of cells by potentio meter.
8. Determination of specific resistance by Carry Foster bridge.
9. Determination of resitivity by P.O.Box.
10. Verification of Kirchoff's Law.
11. To draw Characteristics of p-n Junction diode.

[DEE-21] Basic Electrical Engg

1. Basic Terminology and their concepts

1.1 Current, EMF, potential difference (Voltage), resistance, resistivity their units conductors & insulators, Insulation resistance of a cable.

1.2 Effect of temperature on the resistance of conductors, semiconductors (C, Si, Ge) and insulators.

1.3 Electrical power, energy and their units (SI), Heating effect of electric current and its practical examples.

1.4 Relationship between electrical, mechanical and thermal SI units of work, power and energy.

2. D.C. Circuits

2.1 Kirchoff's laws.

2.2 Simple numerical problems based on Kirchoff's laws.

2.3 Introduction to Thevenin and Superposition theorem, Norton's theorem

3. Batteries

3.1 Construction, chemical changes during charging and discharging of lead acid cells.

3.1(a) Indications of a fully charged battery.

3.2 Capacity and efficiency of lead acid cell / battery.

3.3 Charging of 6 V., 12 V. commercial batteries.

3.3(a) Grouping of cells.

3.4 Care and maintenance of commercial batteries.

3.5 Problems/defects in lead acid betteries.

3.6 Concept of Nickel-Iron and Nickel Cadmimum Batteries.

3.7 Concept of solid sealed maintenance free batteries (SMF batteries), Oxygen recombiniation principle.

4. Capacitors

4.1 Concept of capacitor, types of capacity of parallel plate capacitor, Composite capacitor and effect of physical parameters.

4.1 Energy stored in a capacitor, dielectric and its influence on capaitance of a capacitor, dielectric constant dielectric breakdown and dielectric strength. Dielectric loss.

4.3 Series and parallel combination of capacitors.

4.3(a) Capacitance of multi-plate capacitors.

4.4 Variable capacitors.

4.5 Charging and discharging of capacitors.

4.6 Simple problems on capacitors.

5. Electromagnetism

5.1 Concept of magnetic flux, flux density, magnetic field intensity ,permeability and their units.

5.2 Magnetic circuits, concept of reluctance and mmf and simple problems.

5.3 Analogy between electric and magnetic circuits.

5.4 B-H curve and magnetic hysteresis (No mathematical derivation).

5.5 Elementary ideas about hysteresis loss.

5.5(a) Lifting powers of a magnet.

6. Electromagnetic Induction

6.1 Faraday's laws of electromagnetic induction. Lenz's law, simple problem. Dynamically induced emf.

6.2 Self induced emf, inductance, its role in electrical circuits. Simple problems.

6.3 Mutually induced emf, mutual inductance,its role in electrical circuits. Simple problems.

6.4 Energy stored in magnetic circuit.

6.5 Rise and decay of current in inductors.

6.6 Force on a current carrying conductor placed in a magnetic field and its applications.

6.7 Elementary idea about eddy current loss.

7. A.C.Circuits

7.1 Recapitulation of terminology, instantaneous value, maximum (peak) value, cycle, frequency, alternate current and voltage. Difference between AC and DC.

7.2 Equation of an alternating voltage and current and wave shape varying sinusoidally.

7.3 Average and RMS value of alternating voltage and current. Importance of RMS value. Simple problems.

7.4 Concept of phase, phase difference and phasor representation of alternating voltage and current.

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

7.6 R-L series circuit, idea of impedance and calculations.

7.7 Apparent power, reactive power and active power,power factor, its importance and simple problems.

7.8 R-C series circuit , simple problems.

7.9 R-L-C series circuit , simple problems.

7.10 Solution of simple parallel A-C ciruits by

(a) Phasor diagram method,

(b) Admittance method.

7.11 Solution of AC circuits series/parallel by j method.

7.12 Resonance (Series and parallel) and practical application, simple problems.

8. Polyphase System

8.1 Introduction to polyphase system. Advantage of three phase system over single phase system.

8.2 Star and Delta connections. Relationship between phase and line value of currents and voltage.Power in polyphase circuits. Simple problems of balanced circuits only.

[DEE-21P] BASIC ELECTRICAL ENGG. LAB

i) To show the variation of resistance of a lamp with temperature by plotting a V-I curve for 60W and 100W filament lamps.

ii) To verify the Kirchoff's laws.

iii) To observe the B-H curve for a ferro-magnetic core on CRO.

iv) To find the relationship between voltage and current for R-L series circuit for variable resistances & variable inductance.

v) To determine the variation in the values of inductance of a coil for different positions of the movable iron core.

vi) To measure the power factor in a single phase AC circuit by using voltameter, ammeter & wattmeter.

vii) To test a battery for charged and discharged condition and to charge a battery.

viii) Verification of voltage and current relations in Star and delta connected systems.

ix) To cahrge and discharge a capacitor and to show the graph on C.R.O.

x) Verification of laws of capacitors in series and parallel.

[DEC-21] Electronics – I

1. Semiconductor Diodes

Semiconductor materials N type and P Type P.N. junction, its forward and reversed biasing; junction diode characteristics. Diode (P-N junction) as , half wave, full wave rectifier including bridge rectifier, relationship between D.C. output voltage and A.C. input voltage, rectification efficiency and ripple factor for rectifier circuits, filter circuits, shunt capacitor, series inductor, capacitor input filter. Different types of diodes, brief idea of characteristics and typical applications of power diodes, zener diodes, varactor diodes, point contact diode, tunnel diodes, LEDs and photodiodes. Important specifications of rectifier diode and zener diode.

2. Bipolar Junction Transistor :

Concept of bipolar junction transistor, PNP and NPN transistor,s their symbols and mechanisms of current flow, explanation fundamental current relations. Concept of leakage current (I cbo) effect of temperature on leakage current. Standard notation for current and voltage polarity; CB, CE, and CC configurations. Transistor input and output characterstics, concept of active, cut off and saturation region. Common emitter configuration: current relations in CE configuration, collector current in terms of base current and leakage current (Iceo), relationship between the leakage current in CB and CE configuration, ;input and output characteristics, determination of dynamic input and output resistances and current amplification factor from the characteristics.

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

4. FIELD EFFECT TRANSISTOR (FET), MOSFET & CMOS

A. FET :

- Construction, operation, characteristics and Biasing of Junction FET.

- Analysis of Single stage CB, CG and CD amplifier.

B. MOSFET :

- Construction, operation, characteristics and Biasing of MOSFET in both depletion and enhancement modes.

- Analysis of Single stage CB, CG and CD amplifier.

C. CMOS :

- Construction, operation, characteristics of CMOS in in both depletion and enhancement modes.

- Use of CMOS as Invertor, Different Application of CMOS, CMOS IC.

- Comparison of JEET, MOSFET and Bipolar transistor.

5. MULTISTAGE & POWER AMPLIFIERS:

5.1 Need of multistage amplifier, different coupling schemes and their working, brief mention of application of each of the type of coupling.

5.2 Working of R.C. coupled and transformer coupled multistage amplifier, approximate calculation of voltage gain and frequency response for a two stage R-C coupled amplifier. Working principles of push pull amplifier circuits its advantages over single ended power amplifer.

6. Feedback in Amplifiers

Basic principles and types of feedback, derivation of expression for the gain of an amplifier employing feedback. Effect of negative feedback on gain,. stability, distortion, and band width.(only physical explanation) typical feedback circuits:

(a) RC coupled amplifiers with emitter by-pass capacitor removed.

(b) Emitter follower, complementary symmetry power amplifier and its applications.

7. Regulated Power Supply

7.1 Concept of regulation.

7.2 Basic regulator circuits (using zener diode).

7.3 Concept of series and shunt regulator circuits.

7.4 Three terminal voltage regulator Ics (positive negative and variable) application. Block diagram, Pin configuration and working of popular regulator IC.

8. OSCILLATORS:

8.1 Application of oscillators.

8.2 Use of positive feedback/negative resistance for generationof oscillation, barkhawn's criterion for oscillations.

[DEC-21P] ELECTRONICS I LAB

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 measurement of input and output voltage and plotting of input and output wave shapes:

i) Half wave rectifier

ii) Full wave rectifier (centre tapped and bridge rectifier circuits).

3. Plot the wave shapes of a full wave rectifier with shunt capacitor, series inductor, and filter circuit

4. 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.

5. 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.

6.(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.

7. To observe the effect of a bye-pass capacitor by measuring voltage gain and plotting frequency response for a single stage amplifier.

8. To measure input and output impedance of a feedback amplifier with and without by-pass capacitor.

9. Measurement of voltage gain, input and output impedance and plotting of frequency response of an emitter follower circuit.

10. Plot the FET characteristics and determination of its parameters from these characteristics.

11. To test adjustable IC regulator and current regulator.

12. Identification of Some Popular IC of 74 and 40 series with Pin Number and other details.

13. Application and use of Multimeter, CRO, Audio Oscillator and Power Supply (D.C.)

[DDW-21]   ENGINEERING DRAWING

1. Drawing, instruments and their uses.

    1.1 Introduction to various drawing, instruments.

    1.2 Correct use and care of Instruments.

    1.3 Sizes of drawing sheets and their layouts.

2. (a) 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.

   (b) Introduction to Scales   2 Sheet

Necessity and use, R F Types of scales used in general engineering drawing.Plane, diagonal and chord scales.

3. Conventional Presentation: 2 Sheet

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

4. (a) Principles of Projection   1 Sheet

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

(b) Projections of points, lines and planes.   2 Sheet

5 (a) Orthographic Projections of Simple Geometrical Solids   3 Sheet

Edge and axis making given angles with the reference planes. Face making given angles with reference planes. Face and its edge making given angles with reference planes.

(b) Orthographic views of simple composite solids from their isometric views.

(c) Exercises on missing surfaces and views

6. Section of Solids   2 Sheet

Concept of sectioning Cases involving cutting plane parallel to one of the reference planes and perpendicular to the others. Cases involving cutting plane perpendicular to one of the reference planes and inclined to the others plane,

true shape of the section

7. Isometric Projection.   1 Sheet

Isometric scale Isometric projection of solids.

8. Free hand sketching   1 Sheet

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

9. Development of Surfaces   2 Sheet

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

10. ORTHOGRAPHIC PROJECTION OF MACHINE PARTS: 3 Sheet

   Nut and Bolt, Locking device, Bush Bearing

11. PRACTICE ON AUTO CAD :   2 Sheet

Concept of AutoCAD, Tool bars in AutoCAD, Coordinate System, Snap, Grid and Ortho mode. Drawing Command - Point, Line, Arc, Circle, Ellipse. Editing Commands - Scale, Erase, Copy, Stretch, Lengthen and Explode. Dimensioning and Placing text in drawing area. Sectioning and hatching. Inquiry for different parameters of drawing.

NOTE :

A. The drawing should include dimension with tolerance wherever necessary, material list according to I.S. code.

25% of the drawing sheet should be drawn in first angle projection and rest 75% drawing sheet should be in third angle figure

B. Practice on AutoCAD latest software is to be done in AutoCAD lab of Mechanical Engineering Department of the Institute.