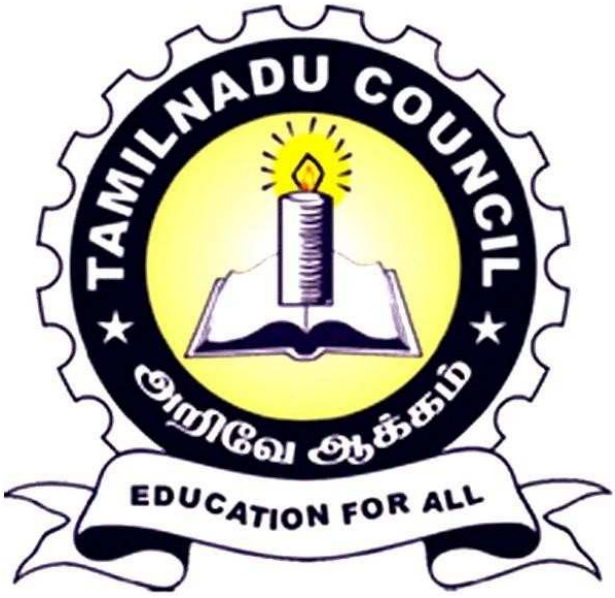

TAMILNADU COUNCIL FOR OPEN & DISTANCE LEARNING

Accredited by International Council for Open & Distance Learning

(ICDE), Oslo, Norway

Internationally Accredited Institution Registered under Tamilnadu Govt Act

DIPLOMA IN ELECTRICAL & ELECTRONICS

TAMILNADU COUNCIL FOR OPEN AND DISTANCE LEARNING

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DIPLOMA IN ELECTRICAL & ELECTRONICS (Chartered Diploma) - FIRST YEAR

Sl.No	Subject Code	Subject Name	Max. Marks
1	CDEE-F1	English – I	100
2	CDEE-F2	Applied Mathematics	100
3	CDEE-F3	Applied Physics	100
4	CDEE-F4	Applied Chemistry	100
5	CDEE-F5	Applied Mechanics	100
6	CDEE-F6	Basics of Mechanical Engineering	100
7	CDEE-F7	Engineering Drawing	100
8	CDEE-F8	Concepts in Information Technology	100
9	CDEE-F9	Workshop Technology	100
10	CDEE-F10	Business Communication	100

1. ENGLISH-I

1. Functional Grammar: Patterns & Parts of speech Subject, Predicate, Noun, Pronoun, Adjective, Adverb, Verb, Verb phrases, Conjunction, Interjection.

2. Vocabulary: Word formation, Prefix, Suffix, Compound words, Conversion, Synonyms, Antonyms, Homophones and Homonyms, How to look up a dictionary.

3. Communication: Meaning & importance of communication, Barriers to effective communication, Channels of communication, Language as a tool of communication.

4. Requisites of Sentence writing: Fragmented sentences, A good sentence, expletives, Garbled sentences, Rambling sentences, Loaded sentences, Parallel Comparison, Squinting construction, Loose & periodic sentences.

2. APPLIED MATHEMATICS

1. Quadratic Equations
2. Arithmetic Progressions
3. Geometric Progressions
4. Partial Fractions
5. Permutations
6. Combinations
7. Binomial Theorem (For Positive Integral Index)
8. Binomial Theorem (For Fractional Index)
9. Measurement of Angles
10. Trigonometric Functions
11. Trigonometric Functions of Sum and Difference of Two Angles
12. Transformation Formulae
13. Trigonometric Functions of Multiple and Sub-Multiple Angles
14. Relations Between the Sides and the Trigonometric Ratios of the Angles of a Triangle
15. Area of a Triangle
16. Solution of Triangles
17. Cartesian Coordinates (Two Dimensions)
18. Locus
19. Straight Lines
20. Circles

21. Plotting of Curves
22. Translation of Axes
23. Parabolas
24. Ellipses
25. Hyperbolas
26. Polar Coordinates

3. APPLIED PHYSICS

1. Units and Dimensions: Fundamental and Derived Units in SI System, Dimensions of Physical Quantities, Principle of Homogeneity Dimensional Equation, Applications of Dimensional Analysis: Checking the Correctness of Physical Equations, Derivation of Simple Physical Relations, Limitation of Dimensional Analysis, Significant Figures and Error Analysis.

2. Force and Motion: Scalars and Vectors, Velocity & acceleration, Equations of Motion, Newton's Law of Motion, Force & its Derivation from Newton's Laws of Motion, Composition and resolution of forces, Parabolic Motion Horizontal Projection and Projection at an angle, Time of Flight, Horizontal Range and Maximum Horizontal Range, Simple Problems, Centripetal Acceleration, Centripetal and Centrifugal Forces, Concept of Friction and its Application, Application to Banking of roads.

3. Work, Power and Energy: Work and its Units, Work Done on Bodies Moving on Horizontal and Inclined Planes (Consider Frictional Forces Also). Concept of Power and its Units, Calculations of Power (Simple Cases), Concept of Kinetic Energy and Potential Energy Expressions for P.E and K.E, Conservation of Energy in the Case of Freely Falling Bodies, Principle of Conservation of Energy.

4. Rotational and Simple Harmonic Motions: Definition of Moment of Inertia, Moment of Inertia of Disc, Ring, & Sphere, Torque and Angular Momentum and Their Inter Relation, Principles of Conservation
(Angular Momentum and its Applications). Kinetic Energy of Rolling Body, S.H.M – Derivation of Displacement, Velocity, Acceleration, Time Period and Frequency, Motion of Cantilever, Free, Forced and Resonant Vibrations (No Derivation).

5. Heat- Temperature and its Measurement: Concept of Heat and Temperature on the Basis of K.E. of Molecules, Unit of Heat Basic Principles of Measurement of

Temperature, Thermocouple, Bimetallic and Resistance, Pyrometers and Thermometers Criteria for the Selection of Thermometers.

6. Expansion of Solids: Coefficient of Linear, Surface and Cubical Expansions and Relation Amongst Them, Thermal Stresses (Qualitative Only) and their Applications.

7. Heat Transfer: Three Modes of Transfer of Heat, Coefficient of Thermal Conductivity, its Determination by Searle's Method and Lee's Disc Method, Conduction Through Compound Media (Series and Parallel for Two Materials Only), Heat Radiation, Characteristics of Heat Radiations, Prevost's Theory of Heat Exchange, Black Body Radiations, Emissivity and Absorptivity Kirchhoff's Law and Stefan's Law of Radiation.

4. APPLIED CHEMISTRY

1. Structure of Atom: Chemistry as Important Branch of Science, Basic Concept of Elements Mixture and Compound, Chemical Equation, its Balancing, Implications and Limitations, Recapitulation of Fundamental Particles of Atom i.e., Electron, Proton and Neutron, Bohr's Model of Atom, Line Spectrum of Hydrogen, Modern Concept of Atom-Four Quantum Numbers, Shells, Subshells, Orbital (Shapes of s & p Orbital), Pauli's Exclusion Principle, Aufbau Energy Ranking Rule, Orbital Concept Types of bonds co-valency, formation of s-s, s-p, p-p, bonding with examples, Hybridization sp, sp2, sp3, (Consider BeF2, BF3, CH4) molecules, Brief Concept of Modern Periodic Table of Elements.

2. Chemical Equation, Oxidation & Reduction: Concept of Oxidation & Reduction, Electronic Concept of Oxidation & Reduction, Redox Reactions (Direct and Indirect), Oxidation Number Balancing of Simple Redox Reactions by Oxidation Number.

3. Ionic Equilibrium: Ionization, Degree of Ionization, Focus Effecting Ionization, Ionization of Water, Ionization Equilibrium in Aqueous Solutions, Common Ion Effect.

4. Acids and Bases: Concept of Acids and Bases, Their Strength in Ionization Constant, PH Value, Acid Base Titration, Choice of Indicators, Hydrolysis, Buffer Solution.

5. Electrolysis: Concept of Electrolysis, Faraday's Law of Electrolysis, Engineering Applications (Electro-Metallurgy, Electroplating & Electro-Refining)

6. Water: Hard and Soft Water, Removal of Hardness by: Soda Lime Process, Permutit's Process, Ion Exchange Method., Disadvantages of Hard Water in Industrial User, Boiler Scales, Priming, Foaming Corrosion and Caustic Embrittlement, Expressing the Degree of Hardness of Water in (With Simple Problems): Clark's Degree, O' Hener's Method, Determination of Degree of Hardness by (With Simple Problems): Soap Titration Method, O' Hener's Method: Water for Drinking Purposes.

7. Solutions & Colloids: Solute, Solvent, Solution & Colloids, Particle Size and Colloidal State, Tyndell Effect, Brownian movement, Coagulation.

5. APPLIED MECHANICS

1. Introduction: Concept of Mechanics and Applied Mechanics, Explanation of Mechanics and Applied Mechanics, Its Importance and Necessity, Giving Suitable Examples on Bodies at Rest and in Motion, Explanation of Branches of this Subject, Concept of Rigid Bodies.

2. Laws of Forces: Force and its Effects, Units and Measurement of Force, Characteristics of Force Vector Representation, Bow's Notation, Types of Forces, Action and Reaction, Tension, Thrust and Shear Force, Force Systems: Coplanar and Space Force Systems, Coplanar Concurrent and Non-Concurrent Forces, Free Body Diagrams, Resultant and Components Concept of Equilibrium, Parallelogram Law of Forces, Equilibrium of Two Forces, Superposition and Transmissibility of Forces, Newton's Third Law, Triangle of Forces, Different Cases of Concurrent Coplanar, Two Force Systems, Extension of Parallelogram Law and Triangle Law to Many Forces Acting at One Point-Polygon Law of Forces, Method of Resolution into Orthogonal Components for Finding the Resultant, Graphical Methods, Special Case of Three Concurrent, Coplanar Forces, Lami's Theorem.

3. Moments: Concept of Moment, Varigon's Theorem- Statement Only, Principle of Moments- Application of Moments to Simple Mechanism, Parallel Forces, Calculation of their Resultant, Concept of Couple Properties and Effect, Moving a Force Parallel to its Line of Action, General Cases of Coplanar Force System, General Conditions of Equilibrium of Bodies Under Coplanar Forces.

4. Friction: Concept of Friction, Laws of Friction, Limiting Friction and Coefficient of Friction, Sliding Friction.

5. Centre of Gravity: Concept of Gravity, Gravitational Force, Centroid and Center of Gravity, Centroid for Regular Lamina and Center of Gravity for Regular Solids, Position of Center of Gravity of Compound Bodies and Centroid of Composition Area, CG of Bodies with Portions Removed.

6. Laws of Motion: Concept of Momentum, Newton's Laws of Motion, Their Application, Derivation of Force Equation from Second Law of Motion, Numerical Problems on Second Law of Motion, Piles, Lifts, Bodies Tied with String, Newton's Third Law of Motion and Numerical Problems Based on it, Conservation of Momentum, Impulsive Force (Definition Only).

7. Simple Machines: Concept of Machine, Mechanical Advantage, Velocity Ratio and Efficiency of a Machine, their Relationship, Law of Machine, Simple Machines (Lever, Wheel and Axle, Pulleys, Jacks Winch Crabs Only).

6. BASICS OF MECHANICAL ENGINEERING

1. Source of Energy: Introduction, Types of Energy.

2. Steam and its Properties: Introduction to Steam, Terms Related to Steam Formation.

3. Boiler: Classification of Boilers, Merits and Demerits, Boiler Mounting.

4. Prime Movers: Definition of Prime Movers, Impulse and Reaction Turbines, Open and Close Cycle Gas Turbine.

5. Internal Combustion Engines: Heat Engine, External and Internal Combustion Engine, Classification of IC Engines, Principle Parts of IC Engines.

6. Refrigeration and Air Conditioning: Types of Refrigeration System, VCRS, Air Conditioning.

7. Welding, Soldering and Brazing: Welding, Classification of Plastic and Fussion Welding, Arc Welding, Types of Electrode, Brazing and Soldering.

8. Machine Tools: Introduction, Classification of Lathes, Major Parts of a Lathe, Specification of Lathe, Drilling Machine Operations, Milling and Down Milling, Grinding Machines.

9. Lubrication and Bearings: Introduction to Lubrication, Function and Properties of Lubricants Classification of Bearings.

10. Power Transmission: Belt Drives, Belt Material, Gear Train, Types of Gears, Compound Gear Train.

11. Mechatronics: Concept of Mechatronics System, Elements of Measurement System, Types of Control Systems, Microprocessor Based Controllers.

7. ENGINEERING DRAWING

1. Drawing Office Practice: Importance of Engineering Drawing, Importance of Legible Lettering and Numbering, Dimensioning, Scales, Geometrical Construction, Conics, Geometric Curves.

2. Orthographic Projections, Projection of Simple Objects in three views.

3. Projection of Solids and Section of Solids: Projection of Simple Solids, Sectional View.

4. Pictorial Drawing: Isometric Drawings.

5. Development of Surfaces.

6. Practice on AutoCAD: AutoCAD Commands, Exercise.

8. CONCEPTS IN INFORMATION TECHNOLOGY

1. Information Concepts & Processing: Definition of Information, Data VS Information, Introduction to Information System, Information Representation Digital Media, Images, Graphics, Animation, Audio, Video etc. Need a Value & Quality of Information the concept of Information entropy & Numerical.

2. Computer Appreciation: Definition of electronic Computer, History, Generation, Characteristics & Application of Computers, Classification of Computers, RAM, ROM, Computer Hardware, CPU, Various I/O Devices, Peripherals, Storage Media, Software Definition and Concepts.

3. Data Communication & Networks: Computer Networks, Networking of Computers, Introduction to LAN, WAN, MAN, Network Topologies, Basic Concepts in Computer Networks, Introduction to GPRS, CDMA, GSM & FM Technologies.

4. Introduction to Internet Technologies: HTML, DHTML, WWW, FTP, TELNET, Web Browser, Net Surfing, Search Engines, E-Mail, ISP, E-Commerce, Public Key, Private Key, Safety of Business Transaction on Web.

5. Concepts in Operating System: Elementary Concepts in Operating System, GUI, Introduction to DOS, MS Windows.

9. WORKSHOP TECHNOLOGY - I

1. Carpentry and Painting Shop: Introduction to Wood Work, Preparation of Dovetail Joint, Preparation of Mitre Joint, Preparation of Lengthening Joint etc...

2. Fitting Shop: Drill, Taps and Dies, Using a Hand Tap, Care and Maintenance of Measuring Tools, Height Gauge, Files, Preparation of Job Involving Threads, Using a Pipe Threading Set, Care of Pipe Cutters and Threading Sets.

3. Welding Shop: Gas Welding, Operation and Maintenance of Oxygas Equipment, Equipment Setup, Maintaining the Equipment, Oxygas Welding Techniques, Common Welding Joints Generally Made by Gas Welding, Proper Edge Preparation and Fit Up, Welding Procedure.

4. Electric Shop: Importance of Three Phase Wiring and Its Effectiveness, Two-Wattmeter Method of Power Measurement in a Three Phase Circuit, Connecting Single Energy Meter and testing it, Reading and Working out the Power and costing of Energy in a Single Phase Circuit.

5. Electronic Shop: Wire Rope, Various Types of Plugs, Sockets, Connectors Suitable for General Purpose Audio Video Use, Demonstrate the skill to make Facilities Solder Joint, Installation and Soldering of Printed Circuit Components, Soldering of PCB Components, Application of Solder and Soldering Iron Tip.

10. BUSINESS COMMUNICATION

1. Corresponding: (Official, Business and Personal): One Letter from Each Category.
2. Grammar: Tenses, Narration, Punctuation.
3. Essay.
4. Reports.
5. Notices.
6. Note-Making and Summarizing.
7. Business Correspondence.

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Sl.No	Subject Code	Subject Name	Max. Marks
1	CDEE-S1	Applied Mathematics – II	100
2	CDEE-S2	Civil Engineering	100
3	CDEE-S3	Electrical Instruments & Measurements	100
4	CDEE-S4	Electrical Estimating & Costing	100
5	CDEE-S5	Electrical Engineering Design & Drawing – I	100
6	CDEE-S6	Computer Application For Engineering	100
7	CDEE-S7	Electronic Devices And Circuits	100
8	CDEE-S8	Electrical Power	100
9	CDEE-S9	Electrical Machine	100
10	CDEE-S10	Internship & Training	100

1. APPLIED MATHEMATICS – II

UNIT I: Algebra I

Series : AP and GP; Sum, nth term, MeanBinomial theorem for positive, negative and fractional index (without proof).Application of Binomial theorem.Determinants : Elementary properties of determinant of order 2 and 3,Multiplication system of algebraic equation, Consistency of equation,Crammer's rule

UNIT II: Algebra- II

Vector algebra : Dot and Cross product, Scaler and vector triple product. Complex number.Complex numbers, Representation, Modulus and amplitude Demoivretheorem, its application in solving algebraic equations, Mod.Functionand its properties.

UNIT III: Trigonometry

Relation between sides and angles of a triangle : Statement of various formulaeshowing relationship between sides and angle of a triangle. Inverse circular functions: Simple case only

UNIT IV: Differential Calculus - I

Functions, limits, continuity, - functions and their graphs, range and domain,elementary methods of finding limits (right and left), elementary test forcontinuity and differentiability.Methods of finding derivative, Trigonometric functions, exponential function,Function of a function, Logarithmic differentiation, Differentiation of Inversetrigonometric function, Differentiation of implicit functions.

UNIT V: Differential Calculus - II

Higher order derivatives, Leibnitz theorem (without proof). Simpleapplications.Application - Finding Tangents, Normal, Points of Maxima/Minima,Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration,Errors and approximation.

2. CIVIL ENGINEERING

UNIT I: Construction Materials

Properties and uses of various construction materials such as stones, bricks, lime, content and timber with their properties, physical/field testing, elements of brick masonry.

UNIT II: Foundations

Bearing capacity of soil and its importance bearing capacity of soil and its importance. Types of various foundations and their salient features, suitability of various foundations for heavy, light and vibrating machines.

UNIT III: Concrete

Various ingredients of concrete, different grades of concrete, water cement ratio, workability, physical/field testing of concrete, mixing of concrete, placing and curing of concrete.

UNIT IV: RCC

Basics of reinforced cement concrete and its use (elementary knowledge), introduction to various structural elements of a building.

3.ELECTRICAL INSTRUMENTS AND MEASUREMENTS

UNIT I: Measuring Instruments

Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type – Extension of range of E.S. Voltmeters.

UNIT II: Instrument transformers

CT and PT – Ratio and phase angle errors – design considerations Type of P.F. Meters – dynamometer and moving iron type – 1-ph and 3-

ph meters – Frequency meters – resonance type and Weston type – synchroscopes.

UNIT III: Measurement of Power

Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems.

UNIT IV: Measurement of Energy

Single phase induction type energy meter – driving and braking torques – errors and compensations – testing by phantom loading using R.S.S. meter. Three phase energy meter – trivector meter, maximum demand meters.

UNIT V: Potentiometers

Principle and operation of D.C. Crompton's potentiometer – standardization – Measurement of unknown resistance, current, voltage.

UNIT VI: Resistance Measurements

Method of measuring low, medium and high resistance – sensitivity of Wheatstone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method.

UNIT VII: A.C. Bridges

Measurement of inductance, Quality Factor - Maxwell's bridge, Hay's bridge, Anderson's bridge, Owen's bridge. Measurement of capacitance and loss angle - Desautybridge. Wien's bridge – Schering Bridge.

UNIT VIII: Magnetic Measurements:

Ballistic galvanometer – equation of motion – flux meter –

constructional details, comparison with ballistic galvanometer. Determination of B-H Loop methods of reversals six point method – A.C. testing – Iron loss of bar samples– core loss measurements by bridges and potentiometers.

4.ELECTRICAL ESTIMATING AND COSTING

UNIT I: GENERAL PRINCIPLES OF ESTIMATION

Introduction to estimation & costing, Electrical Schedule, Catalogues, Market Survey and source selection, Recording of estimates, Determination of required quantity of material, Labour conditions, Determination of cost material and labour, Contingencies, Overhead charges, Profit, Purchase system, Purchase enquiry and selection of appropriate purchase mode, Comparative statement, Purchase orders, Payment of bills, Tender form, General idea about IE rule, Indian Electricity Act and major applicable I.E rules.

UNIT II: RESIDENTIAL BUILDING ELECTRIFICATION

General rules guidelines for wiring of residential installation and positioning of equipments, Principles of circuit design in lighting and power circuits, Procedures for designing the circuits and deciding the number of circuits, Method of drawing single line diagram, Selection of type of wiring and rating of wires and cables, Load calculations and selection of size of conductor, Selection of rating of main switch, distribution board, protective switchgear ELCB and MCB and wiring accessories, Earthing of residential Installation, Sequence to be followed for preparing estimate, Preparation of detailed estimates and costing of residential installation.

UNIT III: ELECTRIFICATION OF COMMERCIAL INSTALLATION

Concept of commercial installation, Differentiate between electrification of residential and commercial installation, Fundamental

considerations for planning of an electrical installation system for commercial building, Design considerations of electrical installation system for commercial building, Load calculation and selection of size of service connection and nature of supply, Deciding the size of the cables, busbar and bus bar chambers, Mounting arrangements and positioning of switchboards, distribution boards main switch etc, Earthing of the electrical installation, Selection of type wire, wiring system and layout, Sequence to be followed to prepare estimate, Preparation of detailed estimate and costing of commercial installation.

UNIT IV: SERVICE CONNECTION, INSPECTION AND TESTING OF INSTALLATION

Concept of service connection, Types of service connection and their features, Method of installation of service connection, Estimates of underground and overhead service connections, Inspection of internal wiring installations, Inspection of new installations, Testing of installations, Testing of wiring installations, Reason for excess recording of energy consumption by energy meter.

UNIT V: ELECTRICAL INSTALLATION FOR POWER CIRCUITS

Introduction, Important considerations regarding motor installation wiring, Determination of input power, Determination of input current to motors, Determination of rating of cables, determination of rating of fuse, Determination of size of Condit, distribution Board main switch and starter.

UNIT VI: ESTIMATION OF OVERHEAD TRANSMISSION & DISTRIBUTION LINES

Introduction, Typical AC electrical power system, Main components of overhead lines, Line supports, Factors governing height of pole, Conductor materials, Determination of size of conductor for overhead

transmission line, Cross arms, Pole brackets and clamps, Guys and Stays, Conductors configuration spacing and clearances, Span lengths, Overhead line insulators, Insulator materials, Types of insulators, Lightning Arrestors, Phase plates, Danger plates, Anti climbing devices, Bird guards, Beads of jumpers, Muffs, Points to be considered at the time of erection of overhead lines, Erection of supports, Setting of stays, Fixing of cross arms, Fixing of insulators, Conductor erection, Repairing and jointing of conductor , Dead end clamps, Positioning of conductors and attachment to insulators, Jumpers, Tee-offs, Earthing of transmission lines, Guarding of overhead lines, Clearances of conductor from ground, Spacing between conductors, Testing and commissioning of overhead distribution lines, Some important specifications.

UNIT VII DESIGN AND ESTIMATION OF SUBSTATIONS

Introduction, Classification of substation, Indoor substations, Outdoor substations, Selection and location of site for substation, Main Electrical Connections, Graphical symbols for various types of apparatus and circuit elements on substation main connection diagram, Key diagram of typical substations, Equipment for substation and switchgear installations, Substation auxiliaries supply, Substation Earthing

5. ELECTRICAL ENGINEERING DESIGN & DRAWING-I

1. Engineering Drawing and Importance of Drawing: Drawing Board, Drawing Sheet Paper and Layout, Drawing Pins, U Chips and Cello Tape, T-Square, Set Square, Compass, French Curves, Templet, Divider, Protractor, Free Hand Sketch and Lettering.

2. Indian Electricity Rules and Specification: Introduction, Specification.

3. Electrical and Electronics Symbols: Common Symbols, Wiring, Switches, Socket Outlets, Lighting Fixtures, Electrical Appliances, Clock

and Fire Alarms, Indicating Instruments, Semiconductor Devices, Transistors, Electron Tube.

4. Study of Hand Tolls for Wiring: Introduction, Hand Tools for Wiring.

5. Simple Household Circuits: Simple Light Circuit, Staircase Circuit, Single and Double Staircase Circuit, Light and Fan Circuit.

6. Alarm circuit without and With Relays: Circuit for Controlling one bell Using two push Buttons, Circuit for two Ordinary Bells, Bell Response Circuit for Three Rooms, Circuit for Traffic control at Road Crossings.

7. Orthographic Projections of Electrical Parts: End Cover of an Induction Motor, Rotor of a Squirrel – cage Induction Motor, Motor Body Slip Rings, Pin – Type Insulator.

6. COMPUTER APPLICATION FOR ENGINEERING

1. Information Storage and Retrieval

- Need for Information storage and retrieval.
- Creating database file.
- Querying database file on Single and Multiple Keys.
- Ordering the data on a selected key.
- Programming a very simple application.

2. Programming in 'C'

- Basic Structure of C Programs.
- Executing C programs.
- Constants, variables and Data Types.
- Operators and expressions.
- Managing Input-Output operations like reading a character, writing a character, formatted input, Output through Print, Scan getch, putch statements etc.

- Decision making and branching using IF…….else, switch go to statements.
- Decision Masking and looping using do-while and for statements.
- Array-one dimensional and two dimensional.
- File

3. Computer Application Overview

- Commercial and Business data Processing application.
- Engineering Computation.
- CAD, CAM, CAE, CAI

4. Typical Applications

- Use of Various application Software available in the field of Electronics Engineering.

7. ELECTRONIC DEVICES AND CIRCUITS

UNIT I: Semiconductor Diodes

Introduction, Semiconductor materials, covalent bond and intrinsic materials, energy levels, extrinsic materials: p-type and n-type semiconductors, semiconductor diodes, ideal versus practical diodes, resistance levels, diode equivalent circuits, transition and diffusion capacitance, reverse recovery time, diode specification sheet, zener diode, Light Emitting diode, Tunnel diode, schottky diode, varicap diode

UNIT II: Diode Circuits

Introduction, Load –line Analysis, Series Diode configuration, Parallel and series-parallel configurations, Typical diode circuits, Half-wave & Full wave rectifier, Clippers, Clampers, Zener Diode as voltage regulators, Voltage multiplier circuits, Practical Applications of diode circuits

UNIT III: Bipolar Junction Transistor

Introduction, Transistor construction, Operation, Common-base configuration & characteristic, Transistor Amplifying action, Common-Emitter configuration & characteristic, Common collector configuration & characteristic, Limits of operation, study of Transistor data sheet

UNIT IV: DC-biasing of Bipolar Junction Transistors

Introduction, operating point, Fixed biased configuration, Emitter-bias configuration, Voltage divider bias configuration, collector feedback configuration, Emitter follower configuration, Miscellaneous configuration, Design operations, current mirror circuits, current source circuits, PNP transistors, Transistor switching networks, bias stabilization of transistors, Practical applications

UNIT V: AC analysis of Bipolar Junction Transistors

Introduction, Application in AC domain, BJT Transistor modelling, re Transistor model of Common-Emitter fixed bias configuration, voltage divider bias, CE emitter-bias, Emitter follower, Common-base, Collector feedback , Collector DC feedback configuration, Current gain, effect of RL and RSTwo port System Approach, cascaded systems, Darlington connection, Feedback pair, Hybrid equivalent model, approximate hybrid equivalent circuits, Hybrid π model, Practical Application

8. ELECTRICAL POWER

1. Transmission System: Layout of transmission system, Constructional features of line, Electrical features of line, HVDC transmission lines.

2. Distribution System: Layout of HT and LT distribution system, Construction of LT and HT undergone power cables, Estimation of LT and HT overhead distribution lines.

3. Sub Stations: Brief Idea of substations, Layout of 33/11 KV distribution substation and various accessories and equipments, Estimation of 11KV/400 V pole mounted substation.

4. Faults: Common type of faults in lines, Location and testing of faults in undergone lines, Maintenance schedule of lines.

9. ELECTRICAL MACHINE

1. General Treatment of Electrical Machines: Definition of Motor and generator, Torque due to alignment of fields and the concept of torque angle, Electromagnetic Force of an electrical machine.

2. DC Machines: Main constructional features, Function of commentator for motoring and generating action, Factors determining induced elf, Trouble shooting on a dc motor.

3. Transformers (Single Phase): Definition and principle, application, Constructional features of transformer, EMF Equation, Phase diagram for a transformer on load, Voltage regulation and calculation.

4. Three Phase Transformers: Construction of three phase transformers: Construction of three phase transformers: Construction of three phase transformers, Type of three phase transformers, Difference between power and distribution transformers, Conditions for parallel operation, On load tap changer, Cooling of transformers, conservator, breather, bushing, temperature gauges etc.

10. INTERNSHIP & TRAINING

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DIPLOMA IN ELECTRICAL & ELECTRONICS (Chartered Diploma) - THIRD YEAR

Sl.No	Subject Code	Subject Name	Max. Marks
1	CDEE-T1	Digital Electronics	100
2	CDEE-T2	Utilization Of Electrical Energy	100
3	CDEE-T3	Modern Electric Traction System	100
4	CDEE-T4	Microprocessors	100
5	CDEE-T5	Generation, Protection Switchgear & Economics	100
6	CDEE-T6	Entrepreneurship Development & Management	100
7	CDEE-T7	Electrical Engineering Design & Drawing – II	100
8	CDEE-T8	Project Work	100
9	CDEE-T9	Internship & Training	100

1. DIGITAL ELECTRONICS

1. Multiplexers and De-Multiplexers:

- Basic Functions and Block Diagram of MUX and DEMUX. Different Types.

2. Latches and Flip Flops:

- Concept and Types of Latch With Their Working and Applications
- Operations Using Waveforms and Truth Tables of RS, T, D, JK, Master/ Slave JK Flip Flops.
- Difference between a Latch and a Flip Flop

3. Counters:

- Binary Counters
- Divide by N Ripple Counters (Including Design), Decade Counter.
- Pre Settable and Programmable Counters
- Down Counter, Up down Counter
- Synchronous Counters (Only Introduction)
- Difference between Asynchronous and Synchronous Counters
- Ring Counter with Timing Diagram

4. Shift Register:

- Introduction and Basic Concepts Including Shift Left right.
- Serial in Parallel Out, Serial in Serial Out, Parallel in Serial Out, Parallel in Parallel Out.
- Universal Shift Register
- Buffer Register, Tristate Buffer Register

5. Memories:

- Basic RAM Cell, N X M Bit RAM, Expansion of Word Length and Capacity, Static and Dynamic RAM. Basic idea of ROM, PROM, ERPOM, and EEPROM.

6. A/D and D/A Conversion:

- General Principle of A/D and D/A Conversion and Brief Idea of Their Applications. Binary Resistor Ladder Network Methods of D/A Conversion. Dual Slope and Successive Approximation Types of ADCs.

2. UTILIZATION OF ELECTRICAL ENERGY

1. Illumination: Nature of Light, Curve of Relative sensitivity of human eye and wave length, Definition, flux, solid angle, luminous intensity, Calculation of number of light points for interior illumination, Different sources of light, Main requirements of proper lighting, Principles of street lighting.

2. Electrical Heating: Introduction, Advantages of Electrical Heating, Heating Methods, Resistance Heating, Dielectric Heating.

3. Electric Welding: Welding methods, Principles of resistance welding, welding equipment, Principle of arc production, electric arc welding principle, characteristics of arc; carbon and metallic arc welding, power supply, advantages of coated electrode, comparison of AC and DC welding, welding control and welding control circuits.

4. Electrochemical Process: Need of electro-deposition, Applications of Faraday's laws in electro-deposition, Objectives of Electroplating, Factors governing electro deposition, Equipments and accessories and its applications, Principle of anodizing and its applications, Electroplating on non-conducting materials.

5. Electrical Circuits Used in Refrigeration and Air Conditioning and Water Coolers: Brief description of vapour compression refrigeration cycle, refrigerator, air-conditioner and water cooler.

6. Electrical Drives: Advantages of Electric Drives, Characteristics of Different mechanical loads, Types of motors used in electric drive, Electric braking, Plugging, Rheostatic Breaking.

3. MODERN ELECTRIC TRACTION SYSTEM

1. Electric Traction: Types of electric traction, system of track electrification, Traction mechanics – types of services, Speed time curve and its simplification, average and schedule speeds, Tractive effort specific energy consumption, diesel traction system.

2. Power Controlling Component: Salient features of traction drives, Series-parallel control of dc traction drives and energy saving, Power Electronic control of DC and AC traction drives.

3. Traction Drives: Electric Traction Systems, Speed time curves, preliminary investigation of energy consumption and ideal speed torque characteristics of Traction motors.

4. Protection of AC and DC Motors: Constructional and Design aspects of AC 1 phase and 3 phase induction motors, DC motors, constraints and comparison with respect to commercial machines.

5. Applications: Battery operated vehicles for city service, light weight batteries, diesel-electric traction systems for main line service and controllers, mechanics of train movement.

4. MICROPROCESSORS

1. Introduction: A brief history of computers and networks, History of Microprocessor.

2. Basic of Computer Hardware: Parts of computer, processors, buses, register set, stack pointer, external storage, Input / Output overview, Data representation, Interrupts, Compiler, Interpreter, Assembler, Linker, Object and Source Code.

3. 8085 8-Bit Microprocessor: Pin and Functional Description, Basic System Timing, 8085 Instruction Format, Addressing Modes of 8085, Flow Charts, Designing of a Counter.

4. 80C86 CMOS 16-Bit Microprocessor: Pin and Functional Description, External Interface, Read / Modify / Write, Basic system timing, 8086 in maximum and minimum mode, 8088 8-bit Microprocessor, The 8088 Compared to the 8086.

5. GENERATION, PROTECTION SWITCHGEAR & ECONOMICS

1. Power Generation: Generating Electrical Energy, Generating Stations, Hydro Electric Power Station, Diesel Power Station, Nuclear Power Station.

2. Basics of Switchgear: Introduction, Fuses, Isolators, Earthing Switches, Contractors, Circuit Breaker, Insulating Fluids, Initiation of an Arch in circuit Breakers, Arc Interruption, Current Interruption, Parallel Capacitance, Current Chopping, Resistance Switching, Capacitance Current Breaking.

3. High Voltage Circuit Breakers: Introduction, Oil Circuit Breakers, Air Circuit Breakers, Air Blast Circuit Breaker, Vacuum Breaker, High Voltage Direct Breaker, Circuit Breaker Testing.

4. Protective Relays: Basic Idea of Relay Protection, Nature and Cause of Faults, Primary and Backup Protection, Operation of Protective System, Relay Classification, Principle Types of Electromagnetic Relays, Induction Relays, Torque, Equation of Electromagnetic Relays, Instantaneous Over Current Relays, Application of Time Current Relays.

5. Classification of Relays over their Construction: Attracted Armature Type Relay, Induction Disc, Induction Cup Relay, Moving Coil Relay, Thermal Rays, Transductor Relays, Static Relays, Semiconductor Diodes, Transistor, Bipolar Junction Diode, Rectifier Bridge Relay.

6. Economics of Power System: Cost of Electrical Energy, Expressions of Electrical Energy, Methods of Determining Depreciation, Tarrif Plans, Desirable Characteristics of a Tariff Plan, Describe the types of tariffs.

6. ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

1. Entrepreneurship: Definition of Entrepreneur, Internal and External Factors, Functions of an Entrepreneur, Entrepreneurial Motivation and Barriers, Classification of Entrepreneurship, Theory of Entrepreneurship, Concept of Entrepreneurship, Development of Entrepreneurship, Culture, Stages in Entrepreneurial Process.

2. Creativity and Entrepreneurship Plan: Idea Generation, Screening and Project Identification, Creative Performance, Feasibility Analysis: Economic, Marketing, Financial and Technical, Project Planning: Evaluation, Monitoring and Control Segmentation, Creative Problem Solving: Heuristics, Brainstorming, Synectics, Value Analysis, Innovation.

3. International Entrepreneurship Opportunities: The Nature of International Entrepreneurship, Importance of International Business to the Firm, International Versus Domestics' Entrepreneurship, Stages of Economic Development, Institutional Support for New Ventures: Supporting Organizations, Incentives and Facilities, Financial Institutions and Small Scale Industries, Govt. Policies for SSIs.

4. The Personal Enterprise Environment: Family and Non Family Entrepreneur, Role of Professionals, Professionalism Vs Family Entrepreneurs, Role of Woman Entrepreneur, Venture Capital, Nature and Overview, Venture Capital Process, Locating Venture Capitalists.

7. ELECTRICAL ENGINEERING DESIGN & DRAWING - II

1. House Wiring: Definition and Positioning of Equipment, Arrangement of Apparatus, Locations of Various Outlets in House Wiring, Selection of Wires, Sub – circuits, Dividing the Electrical Installation into Sub – Circuits and Preparing an Installation Board.

2. Service Line Connections: Service Line, Types of Service Connections, Schedule of Material and Cost for Giving Service Connections.

3. Wiring of Motors: Wiring of Motors, Main Components used in Industrial Power Wiring, RCCB, ELCB, Mccb, Load Changeover Switches, Power Wiring Estimate, Lighting / Fan Wiring.

4. Conductor Control Circuits: Control Circuits, Conductor Control Circuit Components, Motor Control Circuits, Star – Delta Starters.

5. Sub – Stations: Classification of Sub-Stations, Lighting Arresters (LA) or Surge Diverters, Isolators, Circuit Breakers, Instrument Transformers, Bus Bars.

8. PROJECT WORK

9. INTERNSHIP & TRAINING