

Faculty of Engineering & Technology
P.K.University
Shivpuri (MP)



Evaluation Scheme & Syllabus for
Department of Electrical Engg.

DIPLOMA ELECTRICAL ENGINEERING
(I to VI Semester)

(Effective from session 2019-20)

Evaluation Scheme (2022-23)

DIPLOMA ELECTRICAL ENGINEERING

Study And Evaluation Scheme For Diploma Electrical Engineering												
Year- 1 st /Semester -1 st												
Subject Code	Subjects Name	Study Scheme Periods/Week			Credits	Marks in Evaluation Scheme						Total Marks of Internal & External
						Internal Assessment			External Assessment			
		L	T	P		Th	Pr	Total Internal	Th	Pr	Total External	Grand Total
DCOMMEE101	Communication Skills-I	2	0	0	2	30	-	30	70	-	70	100
DAPPLEE102	Applied Mathematics –I	3	1	0	4	30	-	30	70	-	70	100
DAPPLEE103	Applied Physics –I	2	1	0	3	30	-	30	70	-	70	100
DAPPLEE104	Applied Chemistry	2	1	0	3	30	-	30	70	-	70	100
DELECEE105	Electrical & Electronics Engineering Materials	3	0	0	3	30	-	30	70	-	70	100
DCOMMEE106	Communication Skills-I Lab	0	0	2	1	-	25	25	-	25	25	50
DAPPLEE107	Applied Physics- I Lab	0	0	2	1	-	25	25	-	25	25	50
DAPPLEE108	Applied Chemistry Lab	0	0	2	1	-	25	25	-	25	25	50
DGENEEE109	General Workshop Practice-I Lab	0	0	4	2	-	25	25	-	25	25	50
Total		12	3	10	20	150	100	250	350	100	450	700
For pass the candidate is required to obtain 40% marks in each paper and 50% marks in aggregate.												350

Department of Electrical Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
Diploma I Year I Semester

DCOMMEE101
COMMUNICATION SKILLS – I
(Common to all branch of Diploma engineering)

DETAILED CONTENTS

1 Basics of Communication

(13 periods)

L	T	P
2	0	0

- 1.1 Definition and process of communication
- 1.2 Types of communication - formal and informal, oral and written, verbal and non-verbal
- 1.3 Communications barriers and how to overcome them
- 1.4 Barriers to Communication, Tools of Communication

2 Application of Grammar

(18 periods)

- 2.1 Parts of Speech (Noun, verb, adjective, adverb) and modals
- 2.2 Sentences and its types
- 2.3 Tenses
- 2.4 Active and Passive Voice
- 2.5 Punctuation
- 2.6 Direct and Indirect Speech

3 Reading Skill

(10 periods)

Unseen passage for comprehension (one word substitution, prefixes, suffixes, antonyms, synonyms etc. based upon the passage to be covered under this topic)

4 Writing Skill

(15 periods)

- 4.1 Picture composition
- 4.2 Writing paragraph
- 4.3 Notice writing

RECOMMENDED BOOKS

- 1. Communicating Effectively in English, Book-I by RevathiSrinivas; Abhishek Publications, Chandigarh.
- Communication Techniques and Skills by R. K. Chadha; DhanpatRai Publications, New Delhi.
- High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd.Delhi.
- Excellent General English-R.B.Varshnay, R.K. Bansal, Mittal Book Depot, Malhotra
- The Functional aspects of Communication Skills – Dr. P. Prasad, S.K. Katria & Sons, New Delhi
- Q. Skills for success – Level & Margaret Books, Oxford University Press.
- e-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.
- Websites for Reference:

[http://www.mindtools.com/](http://www.mindtools.com/page 8.html) page 8.html – 99k

<http://www.letstalk.com.in>

<http://www.englishlearning.com>

<http://learnenglish.britishcouncil.org/en/>

<http://swayam.gov.in>

Department of Electrical Engineering
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Diploma I Year I Semester

DAPPLEE102
APPLIED MATHEMATICS I
[Common to All Diploma Engineering Courses]

L	T	P
3	1	0

ALGEBRA-I :

1.1 Series : AP and GP; Sum, nth term, Mean

1.2 Binomial theorem for positive, negative and fractional index (without proof). Application of Binomial theorem.

1.3 Determinants : Elementary properties of determinant of order 2 and 3, Multiplication system of algebraic equation, Consistency of equation, Cramer's rule

2. ALGEBRA-II:

2.1 Vector algebra : Dot and Cross product, Scaler and vector triple product.

2.2 Complex number : Complex numbers, Representation, Modulus and amplitude, De Moivre's theorem, its application in solving algebraic equations, Mod. function and its properties..

3. TRIGONOMETRY :

3.1 Relation between sides and angles of a triangle : Statement of various formulae showing relationship between sides and angle of a triangle.

3.2 Inverse circular functions : Simple case only

4. DIFFERENTIAL CALCULUS - I :

4.1 Functions, limits, continuity, - functions and their graphs, range and domain, elementary methods of finding limits (right and left), elementary test for continuity and differentiability. 4.2 Methods of finding derivative, - Function of a function, Logarithmic differentiation, Differentiation of implicit functions.

5. DIFFERENTIAL CALCULUS -II :

5.1 Higher order derivatives, Leibnitz theorem.

5.2 Special functions (Exponential, Logarithmic, Inverse circular and function), Definition, Graphs, range and Domain and Derivations of each of these functions.

5.3 Application - Finding Tangents, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration, Errors and approximation.

Department of Electrical Engineering
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Diploma I Year I Semester

DAPPLCE103
APPLIED PHYSICS-I
[Common to All Diploma Engineering Courses]

L	T	P
2	1	0

1. UNITS AND DIMENSIONS (4 MARKS)

S.I. Units & Dimensions of physical quantities, Dimensional formula and dimensional equation. Principle of homogeneity of dimensions and applications of homogeneity principle to: (i) Checking the correctness of physical equations, (ii) Deriving relations among various physical quantities, (iii) Conversion of numerical values of physical quantities From one system of units into another. Limitations of dimensional analysis.

2. ERRORS AND MEASUREMENT (4 Marks)

Errors in measurements, accuracy and precision, random and systematic errors, estimation of probable errors in the results of measurement(Combination of errors in addition, subtraction, multiplication and powers). Significant figures, and order of accuracy in respect to instruments,

3. CIRCULAR MOTION (5 MARKS)

Central forces. Uniform Circular motion (Horizontal and Vertical cases), angular velocity, angular acceleration and centripetal acceleration. Relationship between linear and angular velocity and acceleration. Centripetal and centrifugal forces. Practical applications of centripetal forces. Principle of centrifuge.

4. MOTION OF PLANETS AND SATELLITES :(5 Marks)

Gravitational force, Acceleration due to gravity and its variation w.r. to height and depth from earth, Kapler's Law, Escape and orbital velocity, Time period of satellite, Geo- stationary, Polar satellites.

DYNAMICS OF RIGID BODY (ROTATIONAL MOTION) (6 MARKS)

Rigid body, Rotational motion, Moment of inertia, Theorems(Perpendicular and Parallelaxis) of moment of inertia (Statement). Expression of M.I. of regular bodies (Lamina, Sphere, Disc, Cylinder), Concept of Radius of gyration, angular momentum, Conservation of angular momentum, Torque, Rotational kinetic energy. Rolling of sphere on the slant plane . Concept of Fly wheel.

6. FLUID MECHANICS :(5 MARKS)

Surface tension, Capillary action and determination of surface tension from capillary rise method, Equation of continuity ($A_1V_1=A_2V_2$), Bernoulli's theorem, and its application stream line and Turbulent flow, Reynold's number.

7. FRICTION :(4 MARKS)

Introduction, Physical significance of friction, Advantage and disadvantage of friction and its role in every day life. Coefficients of static and dynamic friction and their measurements. viscosity, coeff. of viscosity, & its determination by stoke's method.

8. HARMONIC MOTION (6 MARKS)

Periodic Motion , characteristics of simple harmonic motion; equation of S.H.M. and determination of velocity and acceleration. Graphical representation. Spring-mass system. Simple pendulum. Derivation of its periodic time. Energy conservation in S.H.M.. Concept of phase, phase difference, Definition of free, forced, undamped and damped vibrations, Resonance and its sharpness, Q-factor.

9. HEAT & THERMODYNAMICS: (6 MARKS)

Modes of heat transfer (Conduction, Convection and Radiation), coefficient of thermal conductivity Isothermal and adiabatic process. Zeroth First, Second Law of Thermodynamics and Carnot cycle, Heat Engine (Concept Only).

10. ACOUSTICS (5 MARKS)

Definition of pitch, loudness, quality and intensity of sound waves. Echo, reverberation and reverberation time. Sabine's formula without Derivation. Control of reverberation time (problems on reverberation time). Acoustics of building defects and remedy.

[Common to All Diploma Engineering Courses]

Department Of Electrical Engineering
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P.K. University, Shivpuri (MP)
I Year I Semester

DAPPLEE104
APPLIED CHEMISTRY

[Common to All Diploma Engineering Courses]

L	T	P
2	1	0

- 1. ATOMIC STRUCTURE :** Basic concept of atomic structure, Matter wave concept, Quantum number, Haiseinberg'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 bases : Bronsted, Arrhenius and Lewis theory. Concept of pH and numericals. 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 promoters 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, Diesel and Petrol), Benzol and Power alcohol. Knocking, Anti-knocking agents, Octane number and Cetane number. Cracking and its type, Gasolining from hydrogenation of coal (Bergius process and Fischer tropesch'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 Soda lime, Zeolite and Ion exchange resin process). Disadvantage of hard water in different industries, scale and sludge formation, Corrosion, Caustic embrittlement, 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 absorpition, 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, Dehydrohalogenation 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.
- 3. **EXPLOSIVES:** TNT, RDX, Dynamite.
- 4. Paint and Varnish

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I Year I Semester

DELECEE105
ELECTRICAL AND ELECTRONICS ENGG. MATERIALS

L	T	P
3	0	0

(10 Periods)

1. Classification

Classification of materials into conducting, semi conducting and insulating materials through a brief reference to their atomic structure and energy bands

2. Conducting Materials

(12 Periods)

2.1 Introduction

2.2 Resistance and factors affecting it such as alloying and temperature etc

2.3 Classification of conducting material as low resistivity and high resistivity materials, low resistance materials

2.3.1 Copper:

General properties as conductor: Resistivity, temperature coefficient,

density, mechanical properties of hard-drawn and annealed copper,

Corrosion, contact resistance. Application in the field of electrical engineering.

2.3.2 Aluminium:

General properties as conductor: resistivity, temperature coefficient, density, mechanical properties of hard and annealed aluminium, solderability, contact resistance. Applications in the field of electrical engineering.

2.3.3 Steel:

Mechanical properties of steel, applications in the field of electrical engineering.

2.3.4 Introduction to bundle conductors and its applications.

2.3.5 Low resistivity copper alloys: Brass, Bronze (cadmium and Beryllium), their practical applications with reasons for the same

2.4 Applications of special metals e.g. Silver, Gold, and Platinum etc.

2.5 High resistivity materials and their applications e.g., manganin, constantan, Nichrome, mercury, platinum, carbon and tungsten
Superconductors and their applications

3. Review of Semi-conducting Materials

Semi-conductors and their properties, Materials used for electronic components like resistors, capacitors, diodes, transistors and inductors etc.

4. Insulating materials; General Properties: (10 Periods)

- 4.1 Electrical Properties:
Volume resistivity, surface resistance, dielectric loss, dielectric strength (breakdown voltage) dielectric constant
- 4.2 Physical Properties:
Hygroscopicity, tensile and compressive strength, abrasive resistance, brittleness
- 4.3 Thermal Properties:
Heat resistance, classification according to permissible temperature rise. Effect of overloading on the life of an electrical appliance, increase in rating with the use of insulating materials having higher thermal stability, Thermal conductivity, Electro-thermal breakdown in solid dielectrics
- 4.4 Chemical Properties:
Solubility, chemical resistance, weather ability
- 4.5 Mechanical properties, mechanical structure, tensile structure

5. Insulating Materials and their applications: (10 Periods)

- 5.1 Plastics
 - 5.1.1 Definition and classification
 - 5.1.2 Thermosetting materials:
Phenol-formaldehyde resins (i.e. Bakelite) amino resins (urea formaldehyde and Melamine-formaldehyde), epoxy resins - their important properties and applications
 - 5.1.3 Thermo-plastic materials:
Polyvinyl chloride (PVC), polyethylene, silicones, their important properties and applications
- 5.2 Natural insulating materials, properties and their applications
 - Mica and Mica products
 - Asbestos and asbestos products
 - Ceramic materials (porcelain and steatite)
 - Glass and glass products
 - Cotton
 - Silk
 - Jute
 - Paper (dry and impregnated)
 - Rubber, Bitumen
 - Mineral and insulating oil for transformers switchgear capacitors, high voltage insulated cables, insulating varnishes for coating and impregnation
 - Enamels for winding wires
 - Glass fibre sleeves
- 5.3 Gaseous materials; Air, Hydrogen, Nitrogen, SF₆- their properties and applications

6. Magnetic Materials: (10 Periods)

- 6.1 Introduction - ferromagnetic materials, permeability, B-H curve, magnetic saturation, hysteresis loop including coercive force and residual magnetism, concept of eddy current and hysteresis loss, Curie temperature, magnetostriction effect.
- 6.2 Soft Magnetic Materials:
 - 6.2.1 Alloyed steels with silicon: High silicon, alloy steel for transformers, low silicon alloy steel for electric rotating machines
 - 6.2.2 Cold rolled grain oriented steels for transformer, Non-oriented steels for rotating machine
 - 6.2.3 Nickel-iron alloys

7. Soft Ferrites (10 Periods)

- 7.1 Hard magnetic materials
Tungsten steel, chrome steel, hard ferrites and cobalt steel, their applications

8. Special Materials (10 Periods)

Thermocouple, bimetals, leads soldering and fuses material and their applications, thermistor, sensistor, varistors and their practical applications.

9. Materials for Electrical Machines (10 Periods)

Introduction to various engineering materials necessary for fabrication of electrical machines such as motors, generators, transformers etc

RECOMMENDED BOOKS

- 1. Electrical and Electronic Engineering Materials by SK Bhattacharya, Khanna Publishers, New Delhi
- 2. Electronic Components and Materials by Grover and Jamwal, Dhanpat Rai and Co., New Delhi
- 3. Electrical Engineering Materials by Sahdev, Uneek International Publications, Jalandhar
- 4. Electronic Components and Materials by SM Dhir, Tata Mc Graw Hill, New Delhi

***Department Of Electrical Engineering
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P.K. University, Shivpuri (MP)
I Year I Semester***

**DCOMMEE106
COMMUNICATION SKILLS – I LAB
[Common to All Diploma Engineering Courses]**

L	T	P
0	0	2

LIST OF PRACTICALS

1. Listening and Speaking Exercises
2. Self and peer introduction
3. Newspaper reading
4. Just a minute session-Extempore
5. Greeting and starting a conversation
6. Leave taking
7. Thanking
8. Wishing well
9. Talking about likes and dislikes
10. Group Discussion
11. Listening Exercises.

INSTRUCTIONAL STRATEGY

Student should be encouraged to participate in role play and other student centred activities in class room and actively participate in listening exercises

MEANS OF ASSESSMENT

Assignments and quiz/class tests, mid-semester and end-semester written tests

Actual practical work, exercises and viva-voce

Presentation and viva-voce.

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I Year I Semester

DAPPLEE107

APPLIED PHYSICS LAB

[Common to All Diploma Engineering Courses]

L	T	P
0	0	2

List of Experiments:- (Any eight)

Vernier Calipers: To determine the volume of a spherical / cylindrical body and a test tube by measuring its dimensions using vernier calipers.

Screw gauge: To determine diameter of a wire, a solid ball and thickness of glass plate using screw gauge.

Spherometer: To determine radius of curvature of a spherical surface using a spherometer

Mercury thermometer: To measure room temperature and temperature of a hot bath using mercury thermometer and convert it into different scales.

5 To find the time period of a simple pendulum and determine acceleration due to gravity

6. Stoke's law: To find the coefficient of viscosity of a given liquid by measuring the terminal velocity of a spherical body.

7. Parallelogram law of forces: To verify parallelogram law of forces and find the mass of the given body.

8. Moment bar: To determine the mass of the given body using moment bar.

9. U-tube apparatus: To determine the relative density of liquid using U-tube apparatus.

10. Flywheel: To find the moment of inertia of a flywheel.

11. Simple pendulum: To determine acceleration due to gravity at a place by measuring the time period of a simple pendulum

12. Resonance column: To determine the velocity of sound in air at room temperature using resonance column apparatus

13. Cantilever: To find the time period of oscillations of a cantilever

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I Year I Semester

DAPPLEE108
APPLIED CHEMISTRY LAB

[Common to All Diploma Engineering Courses]

L	T	P
0	0	2

LIST OF PRACTICALS

1. To analyze inorganic mixture for two acid and basic radicals from following radicals

A. Basic Radicals :
NH₄⁺, Pb⁺⁺, Cu⁺⁺, Bi⁺⁺⁺, Cd⁺⁺, As⁺⁺⁺, Sb⁺⁺⁺, Sn⁺⁺, Al⁺⁺⁺, Fe⁺⁺⁺, Cr⁺⁺⁺, Mn⁺⁺, Zn⁺⁺
Co⁺ Ni⁺⁺, Ba⁺⁺, Sr⁺⁺, Ca⁺⁺, Mg⁺⁺

B. Acid Radicals :

CO₃⁻⁻, S⁻⁻, SO₃⁻⁻, CH₃COO⁻, NO₂⁻, NO₃⁻, Cl⁻, Br⁻, I⁻, SO₄⁻⁻

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 Phenolphthalein as indicator.

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

6. Determination of temporary hardness of water sample by O-Henry's method.

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I Year I Semester

DAPPLEE109
General Workshop Practice -1 Lab

L	T	P
0	0	4

DETAILED CONTENTS

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 wooden- picture frame, hanger, peg, name plate, etc.

2. Painting and Polishing Shop:

- EX-1 Introduction of paints, varnishes, Reason for surface preparation, Advantages 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.
 - * The sequence of polishing will be as below:
 - i) Abrasive cutting by leather wheel.
 - ii) Polishing with hard cotton wheel and with polishing material.
 - iii) Buffing with cotton wheel or buff wheel.

3 Fitting Shop, Plumbing Shop & Fastening Shop:

- EX-1 Study of materials, limits, fits and tolerances.
- 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 tapping the same to create threads as per need.
- EX-6 Utility article-to prepare double open mouth spanner for 18" hexagonal head of a bolt.
- EX-7 Cutting and threading practice for using socket, elbow and tee etc. and to fit it on wooden practice board.
- EX-8 Study of-bib cock, cistern or stop cock, wheel valve and gate valve etc.
- EX-9 Practice of bolted joints
- EX-10 To prepare a rivetted joint
- EX-11 To make a pipe joint
- EX-12 To make a threaded joint
- EX-13 Practice of sleeve joint

Faculty of Engineering & Technology

P.K.University

Shivpuri (MP)



**Evaluation Scheme & Syllabus for
Department of Civil Engg.**

**Diploma-(Civil Engg.)
(II Semester)**

(Effective from session 2019-20)

DIPLOMA - ELECTRICAL ENGINEERING

STUDY AND EVALUATION SCHEME												
YEAR-1 st /SEMESTER -2 nd												
SUBJECTCODE	SUBJECTS NAME	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DAPPLEE201	Applied Mathematics –II	3	1	-	4	30	-	30	70	-	70	100
DAPPLEE202	Applied Physics –II	2	1	-	3	30	-	30	70	-	70	100
DBASIEE203	Basic Electrical Engineering	3	1	-	4	30	-	30	70	-	70	100
DELECEE204	Electronics-I	2	1	-	3	30	-	30	70	-	70	100
DENGIEE205	Engineering Drawing	3	0		3	30	-	30	70	-	70	100
DAPPLEE206	Applied Physics- II Lab	0	0	2	1	-	25	25	-	25	25	50
DELECEE207	Electronics-I Lab	0	0	2	1	-	25	25	-	25	25	50
DBASIEE208	Basic Electrical Engineering	0	0	2	1	-	25	25	-	25	25	50
		13	4	6	20	150	75	225	350	75	425	650

Department Of Electrical Engineering
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P.K. University, Shivpuri (MP)
I Year II Semester

DAPPLEE201
APPLIED MATHEMATICS -II
(Common to all branch of Diploma engineering)

L	T	P
3	1	0

1. INTEGRAL CALCULUS - I : Methods of Indefinite Integration :-1.1

Integration by substitution.

1.2 Integration by rational function.

1.3 Integration by partial fraction.

1.4 Integration by parts.

2. INTEGRAL CALCULUS -II :

2.1 Meaning and properties of definite integrals, Evaluation definite integrals. Integration of special function.

2.2 Application : Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution, centre of mean of plane areas.

2.3 Simposns 1/3rd and Simposns3/8th rule and Trapezoidal Rule : their application in simple cases.

3. CO-ORDINATE GEOMETRY (2 DIMENSION):

3.1 CIRCLE: Equation of circle in standard form. Centre - Radius form, Diameter form, Two intercept form.

3.2 Standard form and simple properties

Parabola $x^2=4ay$, $y^2=4ax$,

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

Hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

4. CO-ORDINATE GEOMETRY (3 DIMENSION):

4.1 Straight lines and planes in space - Distance between two points in space, direction cosine and direction ratios, Finding equation of a straight line and Plane (Different Forms),

4.2 Sphere $x^2 + y^2 + z^2 + 2gx + 2fy + 2wz = d$ (Radius, Centre and General Equation)

Department Of Electrical Engineering
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I Year II Semester

L	T	P
2	1	0

DAPPLEE202
APPLIED PHYSICS-II
(Common to all branch of Diploma engineering)

1. Optics :

Nature of light, Laws of Reflection and Refraction, Snell's Law, Interference (Constructive and Destructive), Diffraction and Polarization (Concept Only), Law of Malus and Polaroid's.

2. Introduction To 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.

3. Lasers and its Applications :

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

4. Electrostatics :

Coulomb's Law, Electric field, Electric potential, Potential energy, Capacitor Energy of a charged capacitor, Effect of dielectric on capacitors.

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, Magnetic Hysteresis Curve and its utility. Basic idea of super conductivity, Meissner's effect.

7. Semiconductor Physics :

Concept of Energy bands in solids, 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, P-type and N-type semiconductors.

8. Junction Diode and Transister :

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

9. Introduction To Digital Electronics :

Concept of binary numbers, Inter conversion 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 velocity 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.

Department Of Electrical Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

DBASIEE203
BASIC ELECTRICAL ENGINEERING

L	T	P
3	1	0

1. Overview of DC Circuits
periods)

(08

- 1.1 Definition of basic terms, such as current, EMF, Potential Difference (PD); Ohm's Law and its limitations; Factors affecting resistors and capacitors; simple problems on series and parallel combinations of resistors with their wattage considerations.
- 1.2 Application of Kirchhoff's current law and Kirchhoff's voltage law to simple circuits. Star – Delta connections and their conversion.

2. DC Circuit Theorems

(06 periods)

Superposition principle, Maximum Power Transfer Theorem, Thevenin's theorem, Norton's theorem, application of network theorems in solving D.C. circuit problems.

3. Voltage and Current Sources

(04 periods)

- 3.1 Concept of voltage source, symbol and graphical representation characteristics of ideal and practical sources.
- 3.2 Concept of current sources, symbol, characteristics and graphical representation of ideal and practical current sources.
- 3.3 Inter Conversion of Voltage-Source and Current Source.

4. Electro Magnetic Induction

(10 periods)

- 4.1 Concept of electro-magnetic field produced by flow of electric current, magnetic circuit, concept of magneto-motive force (MMF), flux, reluctance, permeability, analogy between electric and magnetic circuit.\
- 4.2 Faraday's laws of electro-magnetic induction, principles of self and mutual induction, self and mutually induced e.m.f, simple numerical problems.
- 4.3 Concept of current growth, decay and time constant in an inductive (RL) circuit.
- 4.4 Energy stored in an inductor, series and parallel combination of inductors.

5. Batteries

(08 periods)

- 5.1 Basic idea of primary and secondary cells
- 5.2 Construction, working principle and applications of Lead-Acid, Nickel-Cadmium and Silver-Oxide batteries
- 5.3 Charging methods used for lead-acid battery (accumulator)
- 5.4 Care and maintenance of lead-acid battery

- 5.5 Series and parallel connections of batteries
- 5.6 General idea of solar cells, solar panels and their applications
- 5.7 Introduction to maintenance free batteries.

6. AC Fundamentals (10 periods)

- 6.1 Concept of alternating quantities
- 6.2 Difference between ac and dc
- 6.3 Concepts of: cycle, frequency, time period, amplitude, instantaneous value, average value, r.m.s. value, maximum value, form factor and peak factor.
- 6.4 Representation of sinusoidal quantities by phasor diagrams.
- 6.5 Equation of sinusoidal wave form for an alternating quantity and its derivation
- 6.6 Effect of alternating voltage applied to a pure resistance, pure inductance and pure capacitance.

7. AC Circuits (18 periods)

- 7.1 Concept of inductive and capacitive reactance
- 7.2 Alternating voltage applied to resistance and inductance in series.
- 7.3 Alternating voltage applied to resistance and capacitance in series.
- 7.4 Introduction to series and parallel resonance and its conditions
- 7.5 Power in pure resistance, inductance and capacitance, power in combined RLC circuits. Power factor, active and reactive power and their significance, definition and significance of power factor.
- 7.6 Definition of conductance, susceptance, admittance, impedance and their units
- 7.7 Introduction to polyphase a.c. systems, advantages of polyphase system over single phase system. Relations between line and phase value of voltages and currents for star and delta connections and their phasor diagram, power in polyphase circuits.

8. Various Types of Power Plants (06 periods)

- 8.1 Brief explanation of principle of power generation practices in thermal, hydro and nuclear power stations and their comparative study. A Visit to a nearby Power Station(s) may be organized for better understanding and exposure.
 - 8.2 Elementary block diagram of above mentioned power stations
-

Department Of Electrical Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

L	T	P
2	1	0

DELECEE204
ELECTRONICS – I

1. Semiconductor Diodes (12 periods) Semiconductor materials N type and P Type P.N. junction its forward and reversed biasing; junction diode characteristics, static and dynamic resistances and their calculation from 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 photo diodes. Important specifications of rectifier diode and zener diode.

2. Bipolar Junction Transistor: (06 periods)

Concept of bipolar junction transistor as a two junction three terminal device having two kinds of charge carriers, PNP and NPN transistors 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 characteristics, 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 (I_{ceo}), 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 (10 periods)

Single stage CE amplifier with proper biasing circuit and its working as voltage amplifier. AC load line and its use.

- (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 (10 periods)

A. FET:

- Construction, operation, characteristics and Biasing of Junction FET.
- Analysis of Single stage CB, CG and CD amplifier. (Only Brief Idea)

B. MOSFET:

- Construction, operation, characteristics and Biasing of MOSFET in both depletion and enhancement modes.
- Analysis of Single stage CB, CG and CD amplifier.(Only Brief Idea)

C. CMOS:

- Construction, operation, characteristics of CMOS in both depletion and enhancement modes.
- Use of CMOS as Inverter, Different Application of CMOS, CMOS IC.
- Comparisons of JEET, MOSFET and Bipolar transistor.
-

5. MULTISTAGE & POWER AMPLIFIERS: (5 periods)

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 amplifier.

6. Feedback in Amplifiers (04 periods)

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:

- RC coupled amplifiers with emitter by-pass capacitor removed.
- Emitter follower, complementary symmetry power amplifier and its applications.

7. Regulated Power Supply (04 periods)

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: (04 periods)

8.1 Application of oscillators.

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

Department Of Electrical Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

DENGIEE205
ENGINEERING DRAWING

1. Introduction to Engineering Drawing

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(03 sheets)

- 1.1 Introduction to drawing instruments, materials, layout and sizes of drawing Sheets and drawing boards.
- 1.2 Different types of lines in engineering drawing as per BIS specifications
- 1.3 Practice of vertical, horizontal and inclined lines, geometrical figures such as triangles, rectangles, Circles, ellipses and curves, hexagonal, pentagon with the help of drawing instruments.
- 1.4 Free hand and instrumental lettering (Alphabet and numerals) – upper case (Capital Letter), single Stroke, vertical and inclined at 75 degree, series of 5,8,12 mm of free hand and instrumental Lettering of height 25 to 35 mm in the ratio of 7:4

2. Dimensioning Technique

(01 sheet)

- 2.1 Necessity of dimensioning, method and principles of dimensioning (mainly theoretical Instructions)
- 2.2 Dimensioning of overall sizes, circles, threaded holes, chamfered surfaces, angles, tapered Surfaces, holes, equally spaced on P.C.D., counter sunk holes, counter bored holes, cylindrical parts, narrow spaces and gaps, radii, curves and arches.

3. Scales

(02 sheets)

- 3.1 Scales –their needs and importance (theoretical instructions), type of scales, Definition of R.F. and length of scale
- 3.2 Drawing of plain and diagonal scales

4. Orthographic Projections

(06 sheets)

- 4.1 Theory of orthographic projections (Elaborate theoretical instructions)
- 4.2 Projection of Points in different quadrant 4.3 Projection of Straight Line (1st and 3rd angle)
 - 4.3.1. Line parallel to both the planes
 - 4.3.2. Line perpendicular to any one of the reference plane
 - 4.3.3. Line inclined to any one of the reference plane.
- 4.4 Projection of Plane – Different lamina like square, rectangular, triangular and circle inclined to one Plane, parallel and perpendicular to another plane in 1st angle only

4.5 Three views of orthographic projection of different objects. (At least one sheet in 3rd angle)

Identification of surfaces.

5. Projection of Solid (02 sheets)

5.1. Definition and salient features of Solid

5.2. Types of Solid (Polyhedron and Solid of revolution)

5.3 To make projections, sources, Top view, Front view and Side view of various types of Solid.

6. Sections (02 sheets)

6.1 Importance and salient features

6.2 Drawing of full section, half section, partial or broken out sections, Offset sections, revolved Sections and removed sections.

6.3 Convention sectional representation of various materials, conventional breaks for shafts, pipes, Rectangular, square, angle, channel, rolled sections 6.4 Orthographic sectional views of different Objects

6.4 Orthographic sectional views of different objects.

7. Isometric Views (02 sheets)

7.1 Fundamentals of isometric projections and isometric scale.

7.2 Isometric views of combination of regular solids like cylinder, cone, cube and prism.

8. Common Symbols and Conventions used in Engineering (02 sheets)

8.1 Civil Engineering sanitary fitting symbols

8.2 Electrical fitting symbols for domestic interior installations

9.. Introduction to AutoCAD (02 sheets)

Basic introduction and operational instructions of various commands in AutoCAD.

At least two sheets on AutoCAD of cube, cuboid, cone, pyramid, truncated cone and pyramid, sphere and combination of above solids.

*** Auto CAD drawing will be evaluated internally by sessional marks and not by final theory paper.**

RECOMMENDED BOOKS

1. A Text Book of Engineering Drawing by Surjit Singh; Dhanpat Rai & Co., Delhi
2. Engineering Drawing by PS Gill; SK Kataria & Sons, New Delhi
3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt; Charotar Publishing House Pvt. Ltd., Anand
4. Engineering Drawing I & II by JS Layall; Eagle Parkashan, Jalandhar
5. Engineering Drawing I by DK Goel, GBD Publication.

Department Of Electrical Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

DAPPLEE206
APPLIED PHYSICS-II LAB
(Common to all branch of Diploma engineering)

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LIST OF EXPERIMENTS:-

1. Determination of coefficient of friction on a horizontal plane.
2. Determination of 'g' by plotting a graph T^2 versus l and using the formula $g = 4\pi^2 / \text{Slope of the graph line}$
3. Determine the force constant of combination of springs in case 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 E_1/E_2 of cells by potentiometer.
8. Determination of specific resistance by Carry Foster Bridge.
9. Determination of resistivity by P.O.Box.
10. Verification of Kirchhoff's Law.
11. To draw Characteristics of p-n Junction diode.
12. To measure instantaneous and average wind velocity by indicating cup type anemometer/hand held anemometer.

Department Of Electrical Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
I Year II Semester

DELECEE207
ELECTRONICS-I LAB

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LIST OF EXPERIMENTS:-

1. Semiconductor diode: identification of types of packages, terminals and noting different ratings using data books for various types of semiconductor diodes (germanium, 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 different 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 load Vs output power characteristic 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 symmetry power amplifier.
7. To observe the effect of a by-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.

Department of Electrical Engineering
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P.K. University, Shivpuri (MP)
1st Year / 2nd Semester

DBASIEE208
BASIC ELECTRICAL ENGINEERING LAB

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LIST OF PRACTICALS

1. Operation and use of measuring instruments viz voltmeter, ammeter, CRO, Wattmeter, multi-meter and other accessories
2. Determination of voltage-current relationship in a dc circuit under specific physical conditions and to draw conclusions.
3. Measurement of resistance of an ammeter and a voltmeter
4. Verification of dc circuits:
 - a. Thevenin's theorem,
 - b. Norton's theorem,
5. Observation of change in resistance of a bulb in hot and cold conditions, using voltmeter and ammeter.
6. Verification of Kirchhoff's Current and Voltage Laws in a dc circuit
7. To find the ratio of inductance of a coil having air-core and iron-core respectively and to observe the effect of introduction of a magnetic core on coil inductance
8. Charging and testing of a lead - acid storage battery.
9. Measurement of power and power factor in a single phase R-.L-.C. Circuit and calculation of active and reactive powers in the circuit.

RECOMMENDED BOOKS

1. Basic Electrical Engineering by PS Dhogal, Tata Mc Graw-Hill Education Pvt Ltd., New Delhi.
2. Experiments in Basic Electrical Engineering by SK Bhattacharya, KM Rastogi; New Age International (P) Ltd.; Publishers New Delhi.
3. Electrical Technology by BL Theraja, S Chand and Co, New Delhi.
4. Basic Electrical Engineering by JB Gupta; SK Kataria and Sons, New Delhi.
5. Basic Electrical Engineering by Asfaque Husain, Jain Book Depot, New Delhi

P.K.UNIVERSITY, SHIVPURI (MP)
(FACULTY OF ENGINEERING & TECHNOLOGY)



EVALUATION SCHEME & SYLLABUS
FOR
DIPLOMA IN ELECTRICAL ENGINEERING
ON
CHOICE BASED CREDIT SYSTEM (CBCS)

[Effective from the Session: 2022-23]

DIPLOMA ELECTRICAL ENGINEERING

Study And Evaluation Scheme For Diploma Electrical Engineering

Year-2nd / Semester -3rd

Subject Code	Subjects Name	Study			Credits	Marks in Evaluation Scheme						Total Marks of Internal & External
		Scheme Periods/Week				Internal Assessment			External Assessment			
		L	T	P		Th	Pr	Total Internal	Th	Pr	Total External	Grand Total
DFUNCEE301	Functional Communication	3	0	0	3	30	-	30	70	-	70	100
DAPPLEE302	Applied Mathematics-III	3	1	0	4	30	-	30	70	-	70	100
DELECEE303	Electrical Instruments and Measurements	2	1	0	3	30	-	30	70	-	70	100
DELEMEE304	Elementary Mechanical & Civil Engineering	3	1	0	4	30	-	30	70	-	70	100
DELECEE305	Electrical Machine-I	3	0	0	3	30	-	30	70	-	70	100
DELECEE306	Electrical Instruments and Measurements Lab	0	0	2	1	-	25	25	-	25	25	50
DFUNCEE307	Functional Communication Lab	0	0	2	1	-	25	25	-	25	25	50
DELEMEE308	Elementary Mechanical & Civil Engineering Lab	0	0	2	1	-	25	25	-	25	25	50
DELECEE309	Electrical Machine-I Lab	0	0	2	1	-	25	25	-	25	25	50
DCOMPTEE310	Computer Application Lab	0	0	4	2	-	25	25	-	25	25	50
Total		14	3	12	23	150	125	275	350	125	475	750
For pass the candidate is required to obtain		40% marks in each paper and						50% marks in aggregate.				375

Department of Electrical Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
2nd Year /3rd Semester
DFUNCEE301: FUNCTIONAL COMMUNICATION

L T P

DETAILED CONTENTS
Section “A” (English) Text Lessons

Unit I. On Communication (25 Periods)

Unit.II Exploring Space

Unit.III Sir C.V. Raman

Unit.IV Professional Development of Technicians

Unit.V Buying a Second Hand Bicycle

Unit.VI Leadership and Supervision

Unit.VII First Aid

Unit.VIII the Romanance of Reading

Unit.IX No Escape from Computers

Unit.X Bureau of Indian Standards

Section “B” Hindi (35 Periods)

1. स्वरोजगार
2. भारतीय वैज्ञानिकों की तकनीक और विकास में योगदान
3. ग्राम्य विकास
4. परिवार नियंत्रण
5. सामाजिक सुधार
6. जन जन और जन कल्याण
7. भारत में प्रमुख की विकास का
8. हरित क्रांति
9. पर्यावरण और मानव प्रदूषण
10. श्रमिक कल्याण
11. भारत में श्रमिक आन्दोलन

Department of Electrical Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
2nd Year /3rd Semester

DAPPLEE302 APPLIED MATHEMATICS - III

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3	1	0

DETAILED CONTENTS

1. Matrices (16 Periods)

- 1.1 Algebra of Matrices, Inverse
Addition, Multiplication of matrices, Null matrix and a unit matrix, Square matrix, Symmetric, Skew symmetric, Hermitian, Skew hermitian, Orthogonal, Unitary, diagonal and Triangular matrix, Determinant of a matrix. Definition and Computation of inverse of a matrix.
- 1.2 Elementary Row/Column Transformation
Meaning and use in computing inverse and rank of a matrix.
- 1.3 Linear Dependence, Rank of a Matrix
Linear dependence/independence of vectors, Definition and computation of rank of matrix. Computing rank through determinants, Elementary row transformation and through the concept of a set of independent vectors, Consistency of equations.
- 1.4 Eigen Pairs, Cayley-Hamilton Theorem
Definition and evaluation of eigen values and eigen vectors of a matrix of order two and three, Cayley-Hamilton theorem (without Proof) and its verification, Use in finding inverse and powers of a matrix.

2. Differential Calculus (15 Periods)

- 2.1 Function of two variables, identification of surfaces in space, coincides
- 2.2 Partial Differentiation
Directional derivative, Gradient, Use of gradient f, Partial derivatives, Chain rule, higher order derivatives, Euler's theorem for homogeneous functions, Jacobians.
- 2.3 Vector Calculus
Vector function, Introduction to double and triple integral, differentiation and integration of vector functions, gradient, divergence and curl, differential derivatives.

3. Differential Equation (15 Periods)

- 3.1 Formation, Order, Degree, Types, Solution Formation of differential equations through physical, geometrical, mechanical and electrical considerations, Order, Degree of a differential equation, Linear, nonlinear equation.
- 3.2 First Order Equations
Variable separable, equations reducible to separable forms,
Homogeneous equations, equations reducible to homogeneous forms,
Linear and Bernoulli
Form exact equation and their solutions.
- 3.3 Higher Order Linear Equation :
Property of solution, linear differential equation with constant coefficients (PI for $X = e^{ax} \sin ax, \cos ax, x^n, e^{ax} V,$
 XV
- 3.4 Simple Applications
LCR circuit, Motion under gravity, Newton's law of cooling,
radioactive decay, Population growth, Force vibration of a mass
point attached to spring with and without damping effect.
Equivalence of electrical and mechanical system.

4. **Integral Calculus-II** **(12 Periods)**

- 4.1 Beta and Gamma Functions
Definition, Use, Relation between the two, their use in evaluating integrals.
- 4.2 Fourier Series
Fourier series of $f(x), -n < x < n$, Odd and even function, Half range series.
- 4.3 Laplace Transform
Definition, Basic theorem and properties, Unit step and Periodic
functions, inverse Laplace transform, Solution of ordinary
differential equations.

5. **Probability and Statistics** **(12 Periods)**

- 5.1 Probability
Introduction, Addition and Multiplication theorem and simple problem.
- 5.2 Distribution
Discrete and continuous distribution, Binomial Distribution, Poisson
distribution, Normal Distribution.

RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
2. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
3. Applied Mathematics-III by Chauhan and Chauhan, Krishna Publications, Meerut.
4. Applied Mathematics-II by Kailash Sinha and Varun Kumar; Aarti Publication, Meerut.
5. Ebooks/etools/relevant software to be used as recommended by
AICTE/UBTE/NITTTR, Chandigarh.

Department of Electrical Engineering

(Faculty of Engineering & Technology)

P.K. University, Shivpuri (MP)

2nd Year / 3rd Semester

L	T	P
2	1	2

DELECEE303: ELECTRICAL INSTRUMENTS AND MEASUREMENTS

DETAILED CONTENTS

- 1. Introduction to Electrical Measuring Instruments: (05 Periods)**
 - 1.1 Concept of measurement and instruments
 - 1.2 Concept of measurement of electrical quantities and instruments for their measurements, sources of error.
 - 1.3 Types of electrical measuring instruments – indicating, integrating and recording type instruments
 - 1.4 Essentials of indicating instruments – deflecting, controlling and damping torque
- 2. Ammeters and Voltmeters (Moving coil and moving iron type) (06 Periods)**
 - 2.1 Concept of ammeter and voltmeters and difference between them
 - 2.2 Construction and working principles of moving Iron and moving coil instruments
 - 2.3 Merits and demerits, sources of error and application of these instruments
- 3. Wattmeter (Dynamometer Type) (06 Periods)**

Construction, working principle, merits and demerits of dynamometer type wattmeter, Digital wattmeters.
- 4. Energy meter (10 Periods)**
 - 4.1 Induction Type: Construction, working principle, merits and demerits of single-phase and three-phase energy meters
 - 4.2 Errors and their compensation
 - 4.3 Simple numerical problems
 - 4.4 Construction and working principle of maximum demand indicators
 - 4.5 Digital energy meter (diagram, construction and application)
- 5. Miscellaneous Measuring Instruments: (18 Periods)**

- 5.1 Construction, working principle and application of Meggar, Earth tester (Analog and digital) Multimeter, Frequency meter (dynamometer type) singlephase power factor meter (Electrodynamometer type). Working principle of synchroscope and phase sequence indicator, tong tester (Clamp-on meter)
- 5.2 Instrument Transformers: Construction, working and applications
 - a) CT
 - b) PT

6. Electronic Instruments: (06 Periods)

- 6.1 Cathode Ray Oscilloscope: Block diagram, working principle of CRO and its various controls. Applications of CRO.
- 6.2 Digital multi-meter (only block diagram) and Applications

7. LCR meters. (04 Periods)

Study of LCR meters and their applications

8. Power Measurements in 3-phase circuits by (04 Periods)

- 8.1 Two wattmeter method in balanced and unbalanced circuits and simple problems
- 8.2 Three wattmeter method

9. Transducers (10 Periods)

Introduction, Types of Transducers (1 phase, 3 phase)

Basic concept of pressure measurement, flow measurement, level measurement, displacement measurement using transducers

10. Measurement of Temperature (09 Periods)

Different types of thermometers, thermocouple, resistance temperature detector and their construction, principle and working. Thermal Imager Camera (Concept)

11. Smart Metering System (06 Periods)

AMI (Advance Metering Infrastructure), Functions of AMI, cyber Security, Advantages

Smart Meter Technology: AMR (Automatic Metering Reading), inverse/reverse metering system in solar power plant, MRI (Meter Reading Instrument)

Department of Electrical Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)
2nd Year /3rd Semester

DELEMEE304:
ELEMENTARY MECHANICAL & CIVIL ENGINEERING

SECTION A - MECHANICAL ENGINEERING

DETAILED CONTENTS

1. Thermal Engineering (14 periods)

1.1 Sources of Energy

Definition, Concept of thermodynamic system and surroundings, Closed system, Open system, Isolated system, Thermodynamics definition of work. Zeroth law of thermodynamics
Basic ideas, conventional and nonconventional forms- Thermal, Hydel, Tidal, wind, Solar, Biomass and Nuclear and their uses.

1.2 Fuels & Combustion:

Combustion of fuels- their higher and lower calorific values. Combustion equations for carbon, sulphur, hydrogen and their simple compounds. Calculation of minimum amount of air required for complete combustion.

Combustion analysis on mass basis and on volume basis. Concept of excess Air in a boiler furnace combustion. Heat carried away by flue gases.

Analysis of flue gases by Orsat apparatus. Simple numerical problems

Idea of specific properties of liquid fuels such as detonation, knock resistance (cetane and octane numbers), viscosity, solidification point, flash point and flame point.

3. Machine Components (20 periods)

Brief idea of loading on machine components.

(i) Pins, Cotter and Knuckle Joints.

(ii) Keys, Key ways and splines on the shaft. (iii) Shafts, Collars, Cranks, Eccentrics.

(iv) Couplings and Clutches.

Bearings-Plane, Bushed, Split-step, ball, Roller bearing, Journal bearing, Foot step bearing, thrust bearing, collar bearing and Special type bearings and their applications.

(vi) Gears

Different types of gears, gear trains and their use for transmission of motion. Determination of velocity ratio for spur gear trains; spur gear, single and double helical gears, Bevel gears, Mitre wheel, worms, Rack and Pinion. Simple and compound and epicyclic gear trains and their use. Definition of pitch and pitch circle & module.

(vii) Springs

Compression, Tension, Helical springs, Torsion springs, Leaf and Laminated springs. Their use and material.

3. Lubrication (08 periods)

Different lubrication system for lubricating the components of machines. Principle of working of wet sump and dry sump system of lubrication. (Explain with simple line diagram). Selection of lubricant based on different application (Requirement with the help of manufacturer catalogue).

SECTION B: CIVIL ENGINEERING

4. Construction Materials (06 periods)

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.

5. Foundations (08 periods)

5.1 Bearing capacity of soil and its importance

5.2 Types of various foundations and their salient features, suitability of various foundations for heavy, light and vibrating machines.

6. Concrete (08 periods)

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..

7. RCC (06 periods)

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

Note: While imparting instructions, teachers are expected to lay more emphasis on concepts and principles. It will be better if the classes for general engineering are conducted by organized demonstrations for explaining various concepts and principles.

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DELEMEE305: ELECTRICAL MACHINE-I

DETAILED CONTENTS

1. Introduction to Electrical Machines (20 Periods)

- 1.1 Definition of motor and generator
- 1.2 Torque development due to alignment of two fields and the concept of torque angle
- 1.3 Electro-magnetically induced emf
- 1.4 Elementary concept of an electrical machine
- 1.5 Comparison of generator and motor
- 1.6 Generalized theory of electrical machines

2. DC Machines (25 Periods)

- 2.1 Main constructional features, Types of armature winding
- 2.2 Function of the commutator for motoring and generation action
- 2.3 Factors determining induced emf
- 2.4 Factors determining the electromagnetic torque
- 2.5 Various types of DC generators
- 2.6 Significance of back e.m.f., the relation between back emf and Terminal voltage
- 2.7 Armature Reaction
- 2.8 Methods to improve commutation
- 2.9 Performance and characteristics of different types of DC motors
- 2.10 Speed control of dc shunt/series motors
- 2.11 Need of starter, three point dc shunt motor starter and 4 point starter
- 2.12 Electric Braking
- 2.13 Applications of DC motors
- 2.14 Faults in dc machines and their retrospective
- 2.15 Losses in a DC machine
- 2.16 Determination of losses by Swinburne's test
- 2.17 Rating and Specifications of DC machines

3. Single Phase Transformer (25 Periods)

- 3.1 Introduction
- 3.2 Constructional features of a transformer and parts of transformer
- 3.3 Working principle of a transformer
- 3.4 EMF equation
- 3.5 Transformer on no-load and its phasor diagram
- 3.6 Transformer – neglecting voltage drop in the windings – Ampere turn balance –its phasor diagram

- 3.7 Mutual and leakage fluxes, leakage reactance
- 3.8 Transformer on load, voltage drops and its phasor diagram
- 3.9 Equivalent circuit diagram
- 3.10 Relation between induced emf and terminal voltage, voltage regulation of a transformer- mathematical relation
- 3.11 Losses in a transformer
- 3.12 Open circuit and short circuit test. Calculation of efficiency, condition for maximum efficiency-maintenance of Transformer, scheduled Maintenance
- 3.13 Auto transformer construction, working and applications
- 3.14 Different types of transformers including dry type transformer.
- 3.15 Rating and Specifications of single phase transformer

4. Three Phase Transformer (14 Periods)

- 4.1 Construction of three phase transformers and accessories of transformers such as Conservator, breather, Buchholtz Relay, Tap Changer (off load and on load) (Brief idea)
- 4.2 Types of three phase transformer i.e. delta-delta, delta-star, star-delta and star- star
- 4.3 Star delta connections (relationship between phase and line voltage, phase and line current)
- 4.4 Conditions for parallel operation (only conditions are to be studied)
- 4.5 On load tap changer
- 4.6 Difference between power and distribution transformer
- 4.7 Cooling of transformer
- 4.8 Rating and Specifications of three phase transformers

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DELECEE306: ELECTRICAL INSTRUMENTS AND MEASUREMENTSLAB

LIST OF PRACTICALS

1. Use of analog and digital multimeter for measurement of voltage, current (A.C/D.C)and resistance
2. Measurement of pressure by using LVDT
3. To measure the value of earth resistance using earth tester.
4. To measure power, power factor in a single-phase circuit, using wattmeter and power factor meter and to verify results with calculations.
5. Measurement of power and power factor of a three-phase balanced load by two wattmeter method.
6. Measurement of voltage and frequency of a sinusoidal signal using CRO and draw wave shape of signal.
7. Measurement of power in a 3 phase circuit using CT, PT and 3-phase wattmeter.
8. Use of LCR meter for measuring inductance, capacitance and resistance.
9. To record all electrical quantities from the meters installed in the institution premises.
10. To measure Energy at different Loads using Single Phase Digital Energy meter
11. Measurement of temperature by using thermistor/Thermal Imager
12. Calibration of single phase and three-phase energy meter and digital energy meter

RECOMMENDED BOOKS

1. Electrical Measurements and Measuring Instruments by Golding and Widdis; Wheeler Publishing House, New Delhi
2. Electrical Measurements and Measuring Instruments by SK Sahdev, Uneek International Publications, Jalandhar
3. A Course in Electrical Measurement and Measuring Instruments by AK Sawhney and PL Bhatia; Dhanpat Rai and Sons, New Delhi
4. Electric Instruments by D. Cooper
5. Experiments in Basic Electrical Engineering by SK Bhattacharya and KM Rastogi, New Age International (P) Ltd., Publishers, New Delhi
6. Electronics Instrumentation by Umesh Sinha, Satya Publication, New Delhi
7. Basic Electrical Measurements by Melville B. Staut.
8. Electrical Measurement and Measuring Instruments by JB Gupta, SK Kataria and Sons, New Delhi
9. Electrical Measurement and Measuring Instruments by ML Anand, SK Kataria and Sons, New Delhi

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DFUNCEE307: FUNCTIONAL COMMUNICATION LAB

List of Practical's

1. Debate
2. Telephonic Conversation: general etiquette for making and receiving calls
3. Offering- Responding to offers.
4. Requesting – Responding to requests
5. Congratulating
6. Exploring sympathy and condolences
7. Asking Questions- Polite Responses
8. Apologizing, forgiving
9. Complaining
10. Warning
11. Asking and giving information
12. Getting and giving permission
13. Asking for and giving opinions

RECOMMENDED BOOKS

1. Communicating Effectively in English, Book-I by RevathiSrinivas; Abhishek Publications, Chandigarh.
2. Communication Techniques and Skills by R. K. Chadha; DhanpatRai Publications, New Delhi.
3. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
4. Excellent General English-R.B.Varshnay, R.K. Bansal, Mittal Book Depot, Malhotra
5. The Functional aspects of Communication Skills – Dr. P. Prasad, S.K. Katria & Sons, New Delhi
6. Q. Skills for success – Level & Margaret Books, Oxford University Press.
7. E-books/e-tools/relevant software to be used as recommended byAICTE/UPBTE/NITTTR.

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DELEMEE308: ELEMENTARY MECHANICAL & CIVIL ENGINEERING LAB

LIST OF PRACTICALS

1. Study and Sketch of Pins and Cottor
2. Study and Sketch of Keys and Key ways
3. Study and sketch of Couplings andClutches
4. Study and Sketch of Bearings
5. Study and Sketch of Springs
6. Study of green energy
7. Testing of bricks
 - a) Shape and size
 - b) Soundness test
 - c) Water absorption
 - d) Crushing strength
8. Testing of concrete
 - a) Slump test
 - b) Compressive Strength of concrete cube
9. The students should be taken to different construction sites to show them various construction materials, concreting process and construction of RCC structural elements, foundations and other civil works.

RECOMMENDED BOOKS

1. Textbook of Concrete Technology 2nd Edition, by Kulkarni, PD Ghosh TK and Phull, YR; New Age International(P) Ltd, Publishers, New Delhi
2. Materials of Construction by Ghosh; Tata McGraw Hill Publishing Co. Ltd., New Delhi
3. Civil Engineering Materials by TTTI, Chandigarh; Tata McGraw Hill Publishing Co. Ltd., New Delhi
4. Concrete Technology by J.Jha and Sinha; Khanna Publishers, Delhi
5. Building Construction by Jha and Sinha; Khanna Publishers, Delhi
6. Building Construction by Vairani and Chandola; Khanna Publishers, Delhi
7. Civil Engineering Materials by SV Deodhar and Singhai; Khanna Publishers, New Delhi
8. Soil Mechanics and Foundation Engineering by SK Garg; Khanna Publishers, New Delhi

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DELEC309: ELECTRICAL MACHINE-I LAB

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LIST OF PRACTICALS

1. To measure the angular displacement of rotor of the three phase synchronous machine with respect to the stator on application of DC to the field winding and simultaneously to each phase-winding in sequence

OR

Measurement of the angular displacement of the rotor of a slip-ring induction motor on application of DC to stator of motor winding in sequence and simultaneously to each phase of rotor winding
2. Speed control of DC shunt motor (i) Armature control method (ii) Field control method
3. Study of DC series motor with starter (to operate the motor on no load for a moment)
4. Determine efficiency of DC motor by Swinburne's Test at (i) rated capacity (ii) half full load
5. To perform open circuit and short circuit test for determining: (i) equivalent circuit (ii) the regulation and (iii) efficiency of a transformer from the data obtained from open circuit and short circuit test at full load
6. To find the efficiency and regulation of single phase transformer by actually loading it.
7. Checking the polarity of the windings of a three phase transformer and connecting the windings in various configurations
8. Finding the voltage and current relationships of primary and secondary of a three phase transformer under balanced load in various configurations conditions such as
 - (a) Star-star
 - (b) Star-delta
 - (c) Delta-star
 - (d) Delta - Delta configuring conditions

RECOMMENDED BOOKS

1. Electrical Machines by SK Bhattacharya, Tata Mc Graw Hill, Education Pvt Ltd. NewDelhi
2. Electrical Machine by B.L. Thareja, S. Chand Publication, New Delhi.
3. Electrical Machines by SK Sahdev, Uneek Publications, Jalandhar
4. Electrical Machines by Nagrath and Kothari, Tata Mc Graw Hill, New Delhi
5. Electrical Machines by JB Gupta, SK Kataria and Sons, New Delhi
6. Electrical Machines by Smarajit Ghosh-Pearson Publishers, Delhi.

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DCOMP EE310: COMPUTER APPLICATION LAB

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List of Practicals

1. Practice on utility commands in DOS.
2. Composing, Correcting, Formatting and Article (Letter/Essay/Report) on Word Processing tool Word and taking its print out.
3. Creating, editing, and modifying tables in Database tool.
4. Creating labels, report, and generation of simple forms in Database tool.
5. Creating simple spread sheet, using in built functions in Worksheet tool.
6. Creating simple presentation.
7. Creating mail ID, Checking mail box, sending/replying e-mails.
8. Surfing web sites, using search engines.

Note : In the final year, related students have to use the concept of MS Word/MS Excel/MS Access/MS Power Point in their respective branch's project work such as creating project report through MS Word/Creation of statistical data in MS Excel/Creation of database in MS Excel/ Demonstration of project through Power Point Presentation.

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DELECEE401: ELECTRONICS – II

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DETAILED CONTENTS

1. Digital Electronics: (12 Periods)

- (i) Introduction - Basic difference between analog and digital signal; Advantages of digital system and its field of applications.
- (ii) Number system - Binary, Decimal, Octal and Hexadecimal and their need.
- A. Logic Gates** - Symbol and truth tables of AND, OR NOT, NAND, NOR and EX-OR gates. Boolean theorems and postulates (without proof) Realization of small Boolean functions and reduction using Karnaugh's Map up to 3 variables using logic gates and vice-versa.

B. Logic Families- TTL, CMOS, MOS, ECL, DTL, HTL, IIL. (6 Periods)

- (iv) Half Adder and full adder circuits and their operations, Display Devices.
- (v) Encoder, Decoder, Multiplexer and Demultiplexer.
- (vi) Need of Flip-Flops, Detail idea of counters and (Synchronous and Asynchronous) and register with purpose. Idea of astable, monostable, Bistable multivibrators.
- (vii) A/D and D/A conversion.

2. Operational Amplifiers (6 Periods)

Specifications of ideal operational amplifier and its block diagram as an Inverter, scale changer, adder, subtract or, differential amplifier, buffer Amplifier, differentiator, integrator, Schmitt trigger and log and antilog Amplifiers.

3. Microprocessors (10 Periods)

- (i) Microprocessors and its need in modern technology.
- (ii) Functional block diagram of microprocessors and function of its various Blocks with reference to 8085 microprocessors. Concepts of and Assembly Language programming with 8085.

4. Communication Engineering

- (i) Basic block diagram of a modern communication system and its working.
- (ii) Concept of modulation/demodulation its need and types.
- (iii) Concept of demodulation its need and types.
- (iv) Introduction to digital and data communication.
- (v) Introduction to modern ways of communication- Brief idea and concept of optical Fiber communication, Microwave communication, Satellite communication and Mobile communication.

5. INTEGRATED CIRCUITS (10 Periods)

- (i) Introduction to IC and its importance in modern electronics, types of IC's.
- (ii) Difference between SSI, MSI, LSI, VLSI.

NOTE: Only brief idea of above topics should be given.

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DELECEE402: ELECTRICAL DESIGN, DRAWING & ESTIMATING-I

DETAILED CONTENTS (To make 16 Sheets)

1. Symbols and Signs Conventions (2 Sheets)

Various Electrical Symbols used in Domestic and Industrial Installation and Power System (Generation, Transmission and Distribution including Sub-stations) as per BIS Code.

2. Wiring Diagram

2.1. Wiring diagram of light, fan, bell and alarm circuits. (6 Sheets)

2.2. Staircase and godown wiring

2.3 Traffic light signal control circuit at crossroads

3. Panels/Distribution Boards (6 Sheets)

Design and Drawing of panels/Distribution board using MCB, ELCB main switches and change over switches for domestic installation, industrial and commercial installation.

4. Orthographic projections of Simple Electrical Parts (8 Sheets)

- ☐ Bus bar post/ Kit Kat
- ☐ Pin type and shackle type insulator (Pin Type 11kV/66kV)
- ☐ Bobbins of a small transformer / choke
- ☐ Stay insulators/Suspension type insulators
- ☐ Rotor of a squirrel cage induction motor
- ☐ Motor body (induction motor) as per IS Specifications (using outside dimensions)
- ☐ Slip rings of 3-phase induction Motor.
- ☐ Stator of 3 phase Induction motor (Sectional View)

5. Prepare at least 2 wiring diagram and block diagrams for circuits/systems using anyEngineering Graphic package (preferably CAD) (4 Sheets)

6. Introduction to Estimating & Costing (04 periods)

Purpose of estimating and costing, proforma for making estimates, preparation of materials schedule, costing, price list, preparation of tender document (with 2-3 exercises), net rice list, market survey, overhead

charges, labor charges, electrical point method and fixed percentage method, contingency, profit, purchase system, enquiries,

Comparative statements, orders for supply, payment of bills.

7. Types of Wiring (04 Periods)

Cleat, batten, casing capping and conduit wiring, comparison of different wiring systems, selection and design of wiring schemes for particular situation (domestic and Industrial). Selection of wires and cables, wiring accessories and use of protective devices i.e. MCB, ELCB etc. Use of wire-gauge and tables (to be prepared/arranged)

8. Estimating and Costing (18 Periods)

8.1 Domestic installations; standard practice as per IS and IE rules. Planning of circuits, sub-circuits and position of different accessories, electrical layout, preparing estimates including cost as per schedule rate pattern and actual market rate (single storey and multi-storey buildings having similar electrical load)

8.2 Industrial installations; relevant IE rules and IS standard practices, planning, designing and estimation of installation for single phase motors of different ratings, electrical circuit diagram, starters, preparation of list of materials, estimating and costing exercises on workshop with single-phase, 3-phase motor load and the light load (3-phase supply system)

8.3 Service line connections estimate for domestic and industrial loads (over-head and underground connections) from pole to energy meter.

9. Estimating Materials Required (12 Periods)

9.1 Transmission and distribution lines (overhead and underground) planning and designing of lines with different fixtures, earthing etc. based on unit cost calculations

9.2 Substation: Types of substations, substation schemes and components, estimate of 11/0.4 kV pole mounted substation up to 200 kVA rating, earthing of substations, single Diagram of 66 kV/11 kV, 132KV/11KV, 220KV/33KV Substation

9.3 Single line diagram, layout sketching of outdoor, indoor 11kV sub-station or 33kV sub-station

10. Preparation of Tender Documents (04Periods)

Tender – constituents, finalization, specimen tender. Procedure to take financial loans from banks for taking contracts.

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DPOWEEE403: POWER PLANT ENGINEERING

DETAILED CONTENTS

1. Power Generation (06 Periods)

- 1.1 Main resources of energy, conventional and non-conventional
- 1.2 Different types of power stations-thermal, hydro, gas, diesel and nuclear power stations, comparison of generating stations.

2. Thermal Station (10 Periods)

Main parts and working of stations-thermodynamic cycles, fuel handling, combustion and combustion equipment, problem of ash disposal, circulating water schemes and supply of make-up water, choice of pressure of steam generation and steam temperature, selection of appropriate vacuum; economizer, air pre-heater feed water heaters and dust collection. Characteristics of turbo alternators, steam power plant heat balance and efficiency.

3. Hydro-Electric Plant (8 Periods)

Hydrology, stream flow, hydrograph, flow duration curves. Types of hydroelectric plants and their fields of use, capacity calculations for hydropower, Dams, head water control, penstocks, water turbines, specific speeds, turbine governors. Hydro plant auxiliaries, plant layout, automatic and remote control of hydro plants, pumped storage projects, cost of hydro-electric projects. Cooling of alternators.

4. Nuclear Power Plant (9 Periods)

Elements of nuclear power plant, nuclear reactor, fuels, moderators, coolants, control. Classification of nuclear power stations. Cost of nuclear power.

5. Diesel Power Plant (6 Periods)

Diesel engine performance and operation, Plant layout, Log sheets, applications, selection of engine size.

6. Gas Turbine Plant (9 Periods)

Plant layout, methods of improving output and performance. Fuels and fuel systems. Methods of testing. Open and closed cycle plants. Operating characteristics.

Applications. Free piston engine plants, limitation and applications. Non-conventional energy sources.

7. Combined Working of Power Plant (10 Periods)

Advantages of combined working of different types of power plants. Need for co-ordination of various types of power plants in power systems, base load stations and peak load stations.

8. Economics of Generation (12 Periods)

8.1 Fixed and running cost, load estimation, load curves, demand factor, load factor, diversity factor, power factor and their effect on cost of generation, simple problems.

8.2 Base load and peak load power stations, concept of regional and national grid, reason of grid failure and its remedies.

9. Non-Conventional Source of Energy (5 Periods)

Introduction, Concept of Solar Energy, Bio Mass Energy, Wind Energy, Tidal Energy, Geothermal Energy, Micro hydel Energy, Biodiesel Energy.

RECOMMENDED BOOKS

1. Electrical Power System and Analysis by CL Wadhwa, 3rd edition, New Age International Publishers, New Delhi
2. Substation Design and Equipment by Satnam and PV Gupta, Dhanpat Rai & Sons, New Delhi
3. Electrical Power –I by SK Sahdev, Uneek Publications, Jalandhar
4. Electrical Power System by VK Mehta, S Chand and Co., New Delhi
5. Electrical Power System by JB Gupta, SK Kataria and Sons, New Delhi
6. Sub-Station Design by Satnam, Dhanpat Rai and Co., New Delhi
7. Electrical Power Distribution System by AS Pabla, Tata McGraw Hill, New Delhi
8. Electrical Power System by S Channi Singh, Tata McGraw Publishing Co. New Delhi
9. Electrical Power by Soni Gupta and Bhatnagar; Dhanpat Rai & Sons, New Delhi
10. E-books/e-tools/relevant software to be used as recommends.

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DELECEE405: ELECTRONICS - II LAB

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10 Experiments are to be performed at least 4 from each group

A - Digital Electronics

1. Familiarizations with bread-board. Familiarizations with TTL and MOS ICs.
2. Identification of IC-No's, pin no's, IC types.
3. To observe that logic low and logic high do not have same voltage value in INPUT and OUTPUT of a logic gate.
4. To observe the propagation delay of TTL logic gate.
5. Observation of differences between MOS and TTL gate under the Following heads:
(a) Logic levels (b) Operating voltages.
6. Use of Op-Amp. (For IC 741) as inverting and non-inverting amplifier, adder, Comparator, buffer, scale changer.
7. Use of IC 755 as timer. Display Devices and Associated Circuits
8. Familiarizations and use of different types of LEDs common anode and Common cathode seven segment display Logic Gates
9. Verification of truth tables for 2 Input NOT, AND, OR NAND, NOR, XOR GATES.
10. To construct half adder and half subtractor using XOR and NAND gates Verification of their truth tables.
11. To construct a full adder circuit with XOR and NAND gates.
(a) Study of 3 bit adder circuit implemented with OR and NAND gates.
(b) To construct 4 bit adder and full subtractor using full adder chip 7480 and NAND GATES.
12. (a) To verify the truth table of 4 bit adder IC chip 7483.
(b) To construct the 4-bit adder/2 complement subtract using 7483 and AND Gates.

12. Flip Flops

To verify the truth table for selected positive edge triggered and negative Edge triggered F/F of J-K and D type.

13. Counters

To construct and verify truth table for asynchronous bin and decade counter Using J-K flip flops.

- (a) To construct divide by 60 counter using ripples counter IC Chips.
- (b) To use counter IC chip 7493 in the divided by eight mode and divide by Sixteen modes.
- (c) To construct a divide by 100 counter using CMOS
To construct a divide by 60 counter using synchronous counter IC chips.

14. Registers

To construct a 4 bit buffer register using 4 bit register IC chips.

To construct a 4 bit universal shift register using flip flops.

To use a 4035 B universal shift registers.

B-Microprocessor;

1. Familiarization with 8085 and 8088 Trainer.
2. Add two 8 bit numbers.
3. a) Obtain 2's complement of 8-bit numbers.
b) Subtraction of two numbers using 2's complement.
4. Extract fifth bit of a number in A and store it in another register.
5. Count No. of bits in high state in accumulator.
6. Check even parity and odd parity.
7. a) Add two 16-bit numbers by repetitive addition.
b) Divide two 8-bit numbers by repetitive sub-traction.
8. a) Smallest number of three digits. b) Largest number of three digits.
9. Arrange numbers in ascending order.
10. Write a program to find out sum of first n-multiplier of a number.
11. Arrange number in descending order.
15. Use of Op-Amp. (For IC-741) as Inverting and non-inverting amplifier, Adder, comparator, buffer, scale changer.

NOTE: Every Student should fabricate a Mini Project based on Solid State Device.

RECOMMENDED BOOKS

1. Basic Electronics and Linear Circuit by NN Bhargava, Kulshreshta and SC Gupta, Tata McGraw Hill Education Pvt Ltd, New Delhi.
2. Principles of Electrical and Electronics Engineering by VK Mehta; S Chand and Co., New Delhi
3. Electronics Devices and Circuits by Millman and Halkias; McGraw Hill.
4. Electronic Devices and Circuits by Dharma Raj Cheruku and Battula Tirumala Krishna: Pearson Education (Singapore) Pvt Ltd., Indian Branch, 482 F.I.E Patparganj, Delhi- 92
5. Basic Electronics by JB Gupta, SK Kataria and Sons, New Delhi
6. Electronics Devices and circuit by Boylested, Tata McGraw Hill, New Delhi

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2nd Year/ 4th Semester

DELECEE406: ELECTRICAL DESIGN, DRAWING & ESTIMATING-I LAB

LIST OF PRACTICALS

1. Framing of Tender and reply to tender to get job/project
2. Identification of wiring for different applications
3. Prepare an estimate for a Two room residential building as per given plan
4. Prepare an estimate for service connection for residential building having load Connected

RECOMMENDED BOOKS

1. Electrical Engineering Design and Drawings by SK Bhattacharya, SK Kataria and Sons, New Delhi
2. Electrical Engineering Design and Drawings by Ubhi& Marwaha, IPH, New Delhi
3. Electrical Design and Drawing by SK Sahdev, Uneek Publications, Jalandhar
4. Electrical Engineering Drawing by Surjit Singh, SK Kataria and Sons, New Delhi
5. Electrical Installation, Estimating and Costing by JB Gupta, SK Kataria and Sons, New Delhi
6. Estimating and Costing by SK Bhattacharya, Tata McGraw Hill, New Delhi
7. Estimating and Costing by Surjeet Singh, Dhanpat Rai & Co., New Delhi
8. Estimating and Costing by Praveen Kumar; North Publication, Jalandhar
9. Estimating and Costing by SL Uppal, Khanna Publishers, New Delhi
10. Electrical Estimating and Costing by N Alagappan and B Ekambaram, TMH,

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DTRANEE404 : TRANSMISSION & DISTRIBUTION OF ELECTRICAL POWER

DETAILED CONTENTS

1. Transmission Systems (28 Periods)

- 1.1 Layout of transmission system, selection of voltage for H.T and L.T lines, advantages of high voltage for Transmission both AC and DC
- 1.2 Comparison of different system: AC versus DC for power transmission, conductor material and sizes from standard tables
- 1.3 Constructional features of transmission lines: Types of supports, types of insulators, Types of conductors, Selection of insulators, conductors, earth wire and their accessories, Transposition of conductors and string efficiency of suspension type insulators, Bundle Conductors.
- 1.4 Mechanical features of line: Importance of sag, calculation of sag, effects of wind and ice related problems; Indian electricity rules pertaining to clearance
- 1.5 Electrical features of line: Calculation of resistance, inductance and capacitance without derivation in a.c. transmission line, voltage regulation, and concept of corona. Effects of corona and remedial measures
- 1.6 Transmission Losses
- 1.7 Economic Principle of Transmission Kelvin's law, limitation of Kelvin's law modification in Kelvin's law

2. Distribution System (21 Periods)

- 2.1 Lay out of HT and LT distribution system, constructional feature of distribution lines and their erection. LT feeders and service mains; Simple problems on AC radial distribution system, determination of size of conductor
- 2.2 Preparation of estimates of HT and LT lines (OH and Cables).
- 2.3 Constructional features of LT (400 V), HT (11 kV) underground cables, advantages and disadvantages of underground system

- with respect to overhead system.
- 2.4 Losses in distribution system
- 2.5 Faults in underground cables-determine fault location by Blavier Test, Murray Loop Test, Varley Loop Test
- 3. Substations: (21 Periods)**
 - 3.1 Brief idea about substations; outdoor grid sub-station 220/132 KV, 66/33 KV outdoor substations, pole mounted substations And indoor substation
 - 3.2 Layout of 33/11 KV & 220/33KV distribution substation and various auxiliaries and equipment associated with it.
- 4. Power Factor: (14 Periods)**
 - 4.1 Concept of power factor
 - 4.2 Reasons and disadvantages of low power factor
 - 4.3 Methods for improvement of power factor using capacitor Banks, Static VAR Compensator (SVC)
- 5. Revenue and Energy loss (14 Periods)**

Technical losses and Commercial losses, Input energy calculation, Sales calculation, Billing efficiency, Collection efficiency, Total energy billed (KWH), Percent aggregated technical and commercial losses.

RECOMMENDED BOOKS

1. Electrical Power System and Analysis by CL Wadhwa, 3rd edition New Age International Publishers, New Delhi.
2. Substation Design and Equipment by Satnam and PV Gupta, Dhanpat Rai & Sons, New Delhi.
3. Electrical Power –I by SK Sahdev, Uneek Publications, Jalandhar
4. Electrical Power System by VK Mehta, S Chand and Co., New Delhi
5. Electrical Power System by JB Gupta, SK Kataria and Sons, New Delhi
6. Sub-Station Design by Satnam, Dhanpat Rai and Co., New Delhi
7. Electrical Power Distribution System by AS Pabla, Tata McGraw Hill, New Delhi.
8. Electrical Power System by S Channi Singh, Tata McGraw Publishing Co. New Delhi

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EVALUATION SCHEME & SYLLABUS
FOR
DIPLOMA IN ELECTRICAL ENGINEERING
ON
CHOICE BASED CREDIT SYSTEM (CBCS)

[Effective from the Session: 2022-23]

DIPLOMA ELECTRICAL ENGINEERING

Study And Evaluation Scheme For Diploma Electrical Engineering

Year- 3rd /Semester -5th

Subject Code	Subjects Name	Study Scheme Periods/Week			Credits	Marks in Evaluation Scheme						Total Marks of Internal & External
						Internal Assessment			External Assessment			
		L	T	P		Th	Pr	Total Internal	Th	Pr	Total External	Grand Total
DINDUEE501	Industrial Management and Entrepreneurship Development	4	0	0	4	30	-	30	70	-	70	100
DSWITEE502	Switch Gear and Protection	4	0	0	4	30	-	30	70	-	70	100
DINDUEE503	Industrial Electronics and Control	4	0	0	4	30	-	30	70	-	70	100
DELECEE504	Electrical Machine-II	4	1	0	5	30	-	30	70	-	70	100
DELECEE505	Electrical Traction	4	0	0	4	30	-	30	70	-	70	100
DINDUEE506	Industrial Electronics and Control Lab	0	0	2	1	-	25	25	-	25	25	50
DINTEEE507	Integrative communication Lab	0	0	2	1	-	25	25	-	25	25	50
DELECEE508	Electrical Machine-II Lab	0	0	2	1	-	25	25	-	25	25	50
Total		20	1	6	24	150	75	225	350	75	425	650
For pass the candidate is required to obtain		40% marks in each paper and 50% marks in aggregate.									325	

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DINDUEE501:
INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT

SECTION – A

ENTREPRENEURSHIP

1. Introduction

- 1.1 Concept /Meaning and its need
- 2 1.2 Qualities and functions of entrepreneur and barriers in entrepreneurship
- 1.3 Sole proprietorship and partnership forms and other forms of business organizations
- 1.4 Schemes of assistance by entrepreneurial support agencies at National, State, District –level, organization: NSIC, NRDC, DC, MSME, SIDBI, NABARD, NIESBUD, HARDICON Ltd., Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubators (TBI) and Science and Technology Entrepreneur Parks

2. Market Survey and Opportunity Identification/Ideation (04 Periods)

- 2.1 Scanning of the business environment
- 2.2 Salient features of National and Haryana State industrial policies and resultant business opportunities
- 2.3 Types and conduct of market survey
- 2.4 Assessment of demand and supply in potential areas of growth
- 2.5 Identifying business opportunity
- 2.6 Considerations in product selection
- 2.7 Converting an idea into a business opportunity

3

3. Project report Preparation (06 Periods)

- 3.1 Preliminary project report
- 3.2 Detailed project report including technical, economic and market feasibility
- 3.3 Common errors in project report preparations
- 3.4 Exercises on preparation of project report
- 3.5 Sample project report

SECTION –B

MANAGEMENT

4. Introduction to Management (06 Periods)

- 4.1 Definitions and importance of management
- 4.2 Functions of management: Importance and process of planning, organizing, staffing, directing and controlling
- 4.3 Principles of management (Henri Fayol, F.W. Taylor)
- 4.4 Concept and structure of an organization
- 4.5 Types of industrial organizations and their advantages
- 4.6 Line organization, staff organization
- 4.7 Line and staff organization
- 4.8 Functional Organization

5. Leadership and Motivation (08 Periods)

- 5.1 Leadership: Definition and Need, Qualities and functions of a leader, Manager Vs. leader, Types of leadership, Case studies of great leaders
- 5.2 Motivation: Definition and characteristics, Importance of self-motivation, Factors affecting motivation, Theories of motivation (Maslow, Herzberg, Douglas, McGregor)

6. Management Scope in Different Areas (14 Periods)

- 6.1 Human Resource Management: Introduction and objective, Introduction to Man power planning, recruitment and selection, Introduction to performance appraisal methods
- 6.2 Material and Store Management: Introduction functions, and objectives, ABC Analysis and EOQ
- 6.3 Marketing and sales: Introduction, importance, and its functions, Physical distribution, Introduction to promotion mix, Sales promotion
- 6.4 Financial Management: Introductions, importance and its functions, knowledge of income tax, sales tax, excise duty, custom duty, VAT, GST

7. Work Culture (08 Periods)

- 7.1 Introduction and importance of Healthy Work Culture in organization
- 7.2 Components of Culture
- 7.3 Importance of attitude, values and behavior
- 7.4 Behavioral Science – Individual and group behavior.
- 7.5 Professional ethics – Concept and need of Professional Ethics and human values.

8. Basic of Accounting and Finance (10 Periods)

- 8.1 Basic of Accounting: Meaning and definition of accounting, Double entry system of book keeping, Trading account, PLA account and balance sheet of a company
- 8.2 Objectives of Financial Management: Profit Maximization v/s Wealth Maximization

9. Miscellaneous Topics (10 Periods)

- 9.1 Total Quality Management (TQM): Statistical process control, Total employees Involvement, Just in time (JIT)
- 9.2 Intellectual Property Right (IPR) : Introduction, definition and its importance, Infringement related to patents, copy right, trade mark

RECOMMENDED BOOKS

- 1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; AapgaPublications, Panchkula (Haryana)
- 2. Entrepreneurship Development and Management by J.S.Narang; Dhanpat Rai & Sons, Delhi.
- 3. Entrepreneurship Development by CB Gupta and P Srinivasan, Sultan Chand and Sons, New Delhi
- 4. Handbook of Small Scale Industry by PM Bhandari
- 5. Entrepreneurship Development and Management by MK Garg
- 6. E-books/e-tools/relevant software to be used as recommended by AICTE/ NITTTR, Chandigarh.

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DSWITEE502: SWITCH GEAR AND PROTECTION

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DETAILED CONTENTS

- 1. Faults (15 Periods)**
Types of faults, three phase symmetrical faults, effects of faults on system reliability and stability, abnormalities, short circuits and their effects, representation of fault conditions through single line diagrams
- 2. Switch gear (24 Periods)**
 - 2.1 Purpose of protective gear, characteristics of a protection system.
 - 2.2 Classification of fuses H.V. Fuses, application and working, grading and co-ordination L.V. fuses, selection of fuses, characteristics
 - 2.3 Isolators and switches, outdoor isolators, functions, air break switches, braking capacity of switches.
 - 2.4 Circuit breakers :- requirements of circuit breakers, definition of terms associated with circuit-breakers, reasons for arc formation, principles of arc extinction, types of circuit breakers, comparison with oil circuit breaker, classification, rating of circuit breakers, working of different types of air and oil circuit breakers, specification of circuit breakers, maintenance schedule, SF- 6 and Vacuum circuit breakers.
 - 2.5 Relays: Requirement of relays, operation principles, induction type over current, directional over current, differential, percentage differential relays working, applications and characteristics, basic principles of static relays. Introduction too distance relay.
- 3. Protective Schemes (15 Periods)**
 - 3.1 Protection of alternators, stator faults, and rotor faults, mechanical conditions, external faults - their reasons, effect and protections used.
 - 3.2 Protection of power transformer: types of faults, its effects, types of protective schemes over current, earth fault, differential protection, Buckholz devices, winding temp. Protection.
 - 3.3 Motor protection: types of faults and protection in motors, thermal relays, protection of small motors, under voltage protection.
 - 3.4 Protection of feeders: radial, parallel and ring feeders' protection, directional time and current graded schemes, differential protection.
- 4. Protection Against Over Voltages (15 Periods)**
Causes of over voltages, travelling wave's earth wire, protective zone, lightening arrestors, space-gap and electrolytic arrestors, surge

absorber, location and rating of lightening arrestors. Thyrite lightening arrestor.

5. Different Type of Sub-stations (15 Periods)

- 5.1 Layout, single line diagram, bus bar arrangement, equipment, their functions, accessories, study of protective schemes, batteries and their maintenance, operation of small sub-stations.
- 5.2 Reactors: types of reactors, bus bar reactor, tuning reactor, arc- suppression reactor, connection of reactors in power stations, uses of reactors.
- 5.3 Neutral grounding:- types of grounding solid grounding, reactance grounding, arc suppression, coil grounding, choice of method of neutral earthing, grounding of sub-stations, grounding of line structure and substation equipment.
- 5.4 Concept of G.I.S. (Gas Insulated Substation)

RECOMMENDED BOOKS

1. Switchgear and Protection by NagrathKathan; TMH
2. Switchgear and Protection by Soni Gupta &Bhatnagar; Dhanpat Rai & Sons
3. Switchgear and Protection by Sunil S. Rao; Dhanpat Rai & Sons
4. Switchgear and Protection by HarnoonAsfaqHussain; Khanna Publications
5. Switchgear and Protection by J.B. Gupta; Kataria& Sons
6. Switchgear and Protection by U.A Bakshi; Technical Publications, Pune

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DINDUEE503: INDUSTRIAL ELECTRONICS AND CONTROL

DETAILED CONTENTS

1. Introduction to SCR (18 Periods)

- 1.1 Power diode characteristics, application of general purpose diode, fast recovery diode and Schottkey diode, use in R, RLseries circuit.
- 1.2 Construction and working principles of an SCR, two transistor analogy and characteristics of SCR

- 1.3 SCR specifications and rating
- 1.4 Construction, working principles and V-I characteristics of DIAC, TRIAC and Quadriac
- 1.5 Basic idea about the selection of heat sinks for SCR and TRIACS
- 1.6 Methods of triggering a Thyristor. Study of triggering circuits
- 1.7 UJT, its Construction, working principles and V-I characteristics, UJT relaxation oscillator
- 1.8 Commutation of Thyristors
- 1.9 Series and parallel operation of Thyristors
- 1.10 Applications of SCR, TRIACS and Quadriac such as light intensity control, speed control of DC and universal motor, fan regulator, battery charger etc.
- 1.11 dv/dt and di/dt protection of SCR.

2. Controlled Rectifier

(12 Periods)

- 1.1 Single phase half wave controlled rectifier with resistive load and inductive load, concept of freewheeling diode.
- 1.2 Single phase half controlled full wave rectifier
- 1.3 Single phase fully controlled full wave rectifier
- 1.4 Single phase full wave centre tapped rectifier
- 1.5 Three phase full wave half controlled bridge rectifier
- 1.6 Three phase full wave fully controlled bridge rectifier

3. Inverters, Choppers, Dual Converters and Cyclo Convertors (12 Periods)

- 3.1 Inverter-introduction, working principles, voltage and current driven series and parallel inverters and applications
- 3.2 Choppers-introduction, types of choppers and their working principles and applications
- 3.3 Dual converters-introduction, working principles and applications
- 3.4 Cyclo-converters- introduction, types, working principles and applications

4. Thyristor Control of Electric Drives

(18 Periods)

- 4.1 DC drives control (Basic Concept)
- 4.2 Half wave drives
- 4.3 Full wave drives
- 4.4 Chopper drives
- 4.5 AC drives control
- 4.6 Phase control
- 4.7 Variable frequency a.c. drives
- 4.8 Constant V/F application
- 4.9 Voltage controlled inverter drives
- 4.10 Constant current inverter drives
- 4.11 Cyclo convertors controlled AC drives
- 4.12 Slip control AC drives

5 Uninterrupted power supplies

(12 Periods)

- 5.1 UPS online, off line
- 5.2 Storage devices (batteries)
- 5.3 SMPS, CVT

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3rd Year /5th Semester

DELECEE504 ELECTRICAL MACHINE- II

DETAILED CONTENTS

1. 3 Phase Induction Motors

(25 Periods)

- 1.1 Productions of rotating magnetic field in 3 phase winding.
- 1.2 Salient constructional features of squirrel cage and slip ring 3-phase induction motors
- 1.3 Principle of operation, slip and its significance
- 1.4 Locking of rotor and stator fields
- 1.5 Rotor resistance, inductance, emf and current
- 1.6 Relationship between rotor copper losses, slip and rotor input power.
- 1.7 Power flow diagram of an induction motor
- 1.8 Factors determining the torque
- 1.9 Torque-slip curve, stable and unstable zones
- 1.10 Effect of rotor resistance upon the torque slip curve
- 1.11 Double cage rotor motor and its applications
- 1.12 Starting of 3-phase induction motors, DOL, star-delta, auto transformer starter.
- 1.13 Causes of low power factor of induction motors
- 1.14 Testing of 3-phase motor on no load and blocked rotor test and to find efficiency
- 1.15 Method of Speed control of induction motor
- 1.16 Harmonics and its effects, cogging and crawling in Induction Motors.
- 1.17 Specifications and ratings of induction motors.

2. Single Phase Motors

(18 Periods)

- 2.1 Single phase induction motors; Construction characteristics, specifications and applications.
- 2.2 Nature of field produced in single phase induction motor-double revolving field theory.
- 2.3 Split phase induction motor
 - 2.3.1 Capacitor start, capacitor run, capacitor start and run motor
 - 2.3.2 Shaded pole motor
- 2.4 Alternating current series motor and universal motors, construction, working principle and operation, application.
- 2.5 Single phase synchronous motor
 - 2.5.1 Reluctance motor
 - 2.5.2 Hysteresis motor

3. Synchronous Machines (25 periods)

- 3.1 Main constructional features of synchronous machine including commutator and brushless excitation system
- 3.2 Generation of three phase emf
- 3.3 Concept of distribution factor and coil span factor and emf equation Armature reaction at unity, lag and lead power factor
- 3.4 Equivalent circuit diagram of synchronous machine
- 3.5 Concept of voltage regulation. Determination of voltage regulation by synchronous impedance method.
- 3.6 Operation of single synchronous machine independently supplying a load.
- 3.7 Concept of infinite bus bar. Need and necessary conditions of parallel operation of alternators, synchronizing an alternator (Synchroscope method) with the bus bars
- 3.8 Operation of synchronous machine as a motor –its starting methods
- 3.9 Effect of change in excitation of a synchronous motor, V curve, Concept of synchronous condenser.
- 3.10 Concept and cause of hunting and its prevention
- 3.11 Specification, rating and cooling of synchronous machines
- 3.12 Applications of synchronous machines

4. Special Purpose Machines

(16 periods)

Construction, working principle and application of linear induction motor, stepper motor, AC Servomotor, Submersible Motor,

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3rd Year/5th Semester
DELECEE505: ELECTRIC TRACTION

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- 1. Introduction (05 periods)**

Electric traction system and its advantages over other systems, types of electric traction systems. Traction systems for India.
- 2. Electric Traction drive (9 periods)**

Suitability of electric traction drives- D.C. series motor, A.C. series motor, 3 phase induction motor, characteristics of electric traction drives, special design requirements, methods of starting and speed control, different methods of braking, plugging, rheostatic, regenerative.
- 3. Power Supply of Electric Traction (10 periods)**

Different systems of power supplies, their chronological evaluation, power supply arrangement i.e. traction substation major equipment, transformer, circuit breaker, interrupter, protection system, remote control system. Design consideration.
- 4. Mechanics of traction: (10 periods)**

System of units, speed time curves, their construction, simplification and interpretation for main line, suburban routes, tractive effort, specific energy consumption and factors effecting it. Weight transfer due to torque coefficient of adhesion.
- 5. Rectification equipment: (7 periods)**

Equipment required for rectification, their brief
- 6. Overhead equipment (7 periods)**

Design aspects of overhead equipment catenary and its types, practical aspects of working, maintenance of overhead equipment, current collection system, and their requirements.
- 7. Track Circuits (12 periods)**

D.C. and A.C. track circuits, signals for traffic control.
- 8. Supervisory Remote Control (12 periods)**

System of remote control, its advantages, mimic diagram, remote control system and network remote control centre (R.C.C.)
- 9. Rail and Return Path (12 periods)**

Earth return protection of underground equipment, Negative booster, voltage distribution on rails.

RECOMMENDED BOOKS

1. Electric Traction by J. Upadhyaya; Allied Publisher Limited, New Delhi
2. Modern Electric Traction by H. Pratap; Dhanpat Rai & Sons, New Delhi
3. Electric Traction by A.T. Dover; Mcmillan Dhanpat Rai & Sons, New Delhi
4. Electric Traction Handbook by R.B. Brooks; Sir Isaac Pitman and Sons Ltd., London

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3rd Year/5th Semester

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DINDUEE506: INDUSTRIAL ELECTRONICS & CONTROLLAB

LIST OF PRACTICALS

1. To draw V-I characteristics of an SCR
2. To draw V-I characteristics of a TRIAC
3. To draw V-I characteristics of a DIAC
4. To draw uni-junction transistor characteristics
5. Observe the output wave of an UJT relaxation oscillator
6. Observe the wave shape across SCR and load of an illumination control circuit
7. Fan speed regulator using TRIAC Quadriac (fabrication of this circuit)
8. Speed-control of a DC shunt motor or universal motor
9. To observe the output wave shape on CRO of
 - (a) Single phase half controlled full wave rectifier
 - (b) Single phase controlled rectifier

BOOKS RECOMMENDED

1. Industrial Control Electronics. John Webb, Kevin Greshock, Maxwell, Macmillan International editions.
2. Fundamentals of Power Electronics by S Rama Reddi, Narosa Publishing House Pvt. Ltd, New Delhi
3. Power Electronics, Circuits Devices and Applications by Mohammad H. Rashid
4. Power Electronics by PC Sen

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DINTEEE507: INTEGRATIVE COMMUNICATION LAB

DETAILED CONTENTS

PERSONALITY DEVELOPMENT

1. Introduction to Personality Development

AIM, Skills, Types of Skills, LIFE SKILLS VS OTHER SKILLS, Concept of Life Skills. Ten core Life Skills identified by WHOM

2. Factors Influencing / Shaping Personality:

Introduction, Physical and Social Factors Influencing / Shaping Personality (Hereditary, Self-Development, Environment, Education, Life-situations) psychological & Philosophical Factors Influencing / Shaping Personality past Experiences, Dreams and Ambitions, Self-Image, Values)

3. Self-Awareness – 1

DIMENSIONS OF SELF AWARENESS (Self Realization, Self-Knowledge or Self Exploration, Self Confidence, Self-Talk, Self-Motivation, Self Esteem, Self-Image, Self-Control, Self-Purpose, Individuality and Uniqueness, Personality, Values, Attitude, Character), self-realization & self-exploration through swot analysis and johari window,

4. Self-Awareness – 2

SYMPATHY VS EMPATHY AND ALTRUISM, Importance of Empathizing with Others,

5. Self-Awareness – 3

Self-Awareness through Activity, Body Image (What is Body Image, What Decides our Body Image, What is Poor Body Image, what are the Harmful Effects of Poor Body Image), Tackling Poor Body Image (Enhance Self-Esteem, Build up Critical Thinking, Build up Positive Qualities, Understand Cultural Variation, Dispel Myths, Utilize Life Skills)

6. Change Your Mind Set

What is Mindset, HOW TO CHANGE YOUR MINDSET (Get the Best? Information Only, Make the best people your role Model, Examine Your Current Beliefs, Shape Your Mindset with vision and Goals, Find Your Voice, Protect Your Mindset, Let Go of Comparisons, put an end to Perfectionism, Look at the Evidence, Redefine What Failure Means, Stop Worrying about What —People Think

INTERPERSONAL SKILLS

7. Interpersonal Relationship and Communication

Interpersonal relationship, forms of interpersonal relationship must have in an interpersonal relationship, interpersonal relationship between a man and a woman (passion, intimacy, commitment), relationship between friends,

Role of Communication in Interpersonal relationship (Take Care of Your Tone and Pitch, Choice of Words is Important in Relationships, Interact Regularly, Be Polite, Try To Understand The Other Person's Point Of View As Well as, Individuals can also communicate Through Emails,

8. Non-Verbal Communication Skills

Non-Verbal Communication, We Communicate with Our Eyes, Communication with Facial Expression, a Good Gesture, Appearance, Posture and Gait, Proximity & Touch), IMPORTANCE OF LISTENING, Characteristics of Good and Effective Listener (Is Attentive, Do Not Assume, Listen for Feelings and Facts, Concentrate on the Other Speakers Kindly and Generously, Opportunities)

9. Communication Skills Activities

in Making Collages, Making Advertisements, PPT Preparation & Presentation, Speaking -Seminars, Group Discussions, Debates, Extempore Speeches, Listening to an audio clip and telling its gist, Answering a Telephone call, making enquiries, General tips Pronunciation, Tone, Pitch, Pace, Volume, relevance, brief, simple Reading Newspaper, Magazines (Current Affairs, Economic magazines, Technical magazines), How to read a Report, article, Writing- Resume Writing, Writing joining report, Notice Writing, Report making, Proposal writing, Advertisement, Notice for tender, Minutes writing, E-Mail writing, Listening News, Listening to audio clips.(Lecture, poetry, speech, songs),

10. Body Language Skills

Introduction, what is Body Language, Body Language Parts, Personal Space Distances (Intimate Distance, Personal Distance, Social Distance, Public Distance), IMPORTANT BODYLANGUAGE SIGNS AND THEIR MEANING

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DELECEE508: ELECTRICAL MACHINE -II LAB

LIST OF PRACTICALS

1. Determination of efficiency by (a) no load test and blocked rotor test on an induction motor (b) direct loading of an induction motor (refer BIS code)
2. Determination of effect of rotor resistance on torque speed curve of an induction motor Observe the performance of a ceiling fan (I- ϕ induction motor) without capacitor
3. Determine the effect of change in capacitor on the performance of 1-phase induction motor and reverse the direction of motor.
4. To plot relationship between no load terminal voltage and excitation current in asynchronous generator at constant speed
5. Determination of the relationship between the voltage and load current of an alternator, keeping excitation and speed constant
6. Determination of the regulation and efficiency of alternator from the open circuit and short circuit test
7. Determination of the effect of variation of excitation on performance of a synchronous motor

RECOMMENDED BOOKS

1. Electrical Machines by SK Bhattacharya; Tata McGraw Hill, New Delhi
2. Electrical Machine by B.L.Thareja; S.ChandPublicaion, New Delhi
3. Electrical Machines by SK Sahdev; Uneek Publications, Jalandhar
4. Electrical Machines by Nagrah and Kothari; Tata McGraw Hill, New Delhi
5. Electrical Engineering by JB Gupta; SK Kataria and sons, New Delhi
6. Electrical Machines by Samarjit Ghosh; Pearson Education (Singapore) Pvt, Ltd.Delhi
7. E-books/e-tools/relevant software to be used as recommended by AICTE/UBTE/NITTTR, Chandigarh.

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3rd Year/6th Semester

DENVIEE601: ENVIRONMENTAL EDUCATION & DISASTER MANAGEMENT

1. INTRODUCTION:

(4 periods)

- Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system, different development i.e. irrigation, urbanization, road development and other engineering activities and their effects on Ecology and eco system, Mining and deforestation and their effects.
- Lowering of water level, Urbanization.
- Biodegradation and Biodegradability, composting, bio remediation, Microbes. Use of bio pesticides and bio fungicides.
- Global warning concerns, Ozone layer depletion, Greenhouse Effect, Acid Rain, etc.

2. POLLUTION: (4 periods)

Sources of pollution, natural and manmade, their effects on living environments and related legislation.

(06 Periods)

2.1 WATER POLLUTION:

(06 periods)

- Factors contributing water pollution and their effect.
- Domestic waste water and industrial waste water. Heavy metals, microbes and Leaching metal.
- Physical, Chemical and Biological Characteristics of waste water.
- Indian Standards for quality of drinking water.
- Indian Standards for quality of treated waste water.
- Treatment methods of effluent (domestic waste water and industrial/ Mining waste water), its reuse/safe disposal.

2.2 AIR POLLUTION:

Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, CO, CO₂, NH₃, F, CL, causes and its effects on the environment.

- Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.
 - A. Settling chambers
 - B. Cyclones
 - C. Scrubbers (Dry and Wet)
 - D. Multi Clones
 - E. Electro Static Precipitations
 - F. Bog Fillers.

- Ambient air quality measurement and their standards.
- Process and domestic emission control
- Vehicular Pollution and Its control with special emphasis of Euro-I, Euro-II, Euro-III and Euro IV.

(08 periods)

2.3 NOISE POLLUTION:

Sources of noise pollution, its effect and control.

2.4 RADISACTIVE POLLUTION:

Sources and its effect on human, animal, plant and material, means to control and preventive measures.

2.5 SOLID WASTE MANAGEMENT:

Municipal solid waste, biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

3. LEGISLATION:

(08 periods)

Preliminary knowledge of the following Acts and rules made there under-

- The Water (Prevention and Control of Pollution) Act - 1974.
- The Air (Prevention and Control of Pollution) Act - 1981.
- The Environmental Protection (Prevention and Control of Pollution) Act - 1986. Rules notified under EPAct - 1986 Viz.
 - # The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000
 - # The Hazardous Wastes (Management and Handling) Amendment Rules, 2003
 - # Bio-Medical Waste (Management and Handling) (Amendment) Rules, 2003.
 - # the Noise Pollution (Regulation and Control) (Amendment) Rules, 2002.
 - # Municipal Solid Wastes (Management and Handling) Rules, 2000.
 - # The Recycled Plastics Manufacture and Usage (Amendment) rules, 2003.

4. ENVIRONMENTAL IMPACT ASSESSMENT (EIA):

(10 periods)

- Basic concepts, objective and methodology of EIA.
- Objectives and requirement of Environmental Management System (ISO-14000) (An Introduction).

5. DISASTER MANAGEMENT:

Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, Case study of tsunami Disaster, National policy- Its objective and main features, National environment Policy, Need for central intervention, State Disaster Authority-Duties and powers, Case studies of various Disaster in the country, Meaning and Benefit of vulnerability reduction, Factor promoting vulnerability reduction and Mitigation, Emergency support function plan. Main feature and function of National Disaster Management Frame Work, Disaster mitigation and prevention, Legal Policy Frame Work, Early warning system, Human Resource Development and Function, Information dissemination and communication.

RECOMMENDED BOOKS

1. Aggarwal, J.C. (2007): Education for values, environment and human rights, Shipra publications, Delhi.
2. Dani, H.M. (1996): Environmental Education. Publication Bureau, Punjab University, Chandigarh.
3. Kohli, V.K. and Kohli, V. (2000): Environmental Pollution and Management. Vivek Publishers, Ambala.
4. Nanda, V.K. (1997): Environmental Education, Anmol Publications, New Delhi.
5. Nanda, V.K. (1997): Environmental Education, Anmol Publications, New Delhi.
6. Sharma, R.C. Environmental Education, Metropolitan Book Pvt. Ltd.
7. Sungosh, S.M. (2006): An introduction to Environmental Education, Akashi Book Depot, Shillong .
8. Trivedi, R.N. (1990): Dimensions of safe environment, Anmol Publications, New Delhi.

Department of Electrical Engineering

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P.K. University, Shivpuri (MP)

3rd Year/ 6th Semester

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DINSTE602: INSTALATION, MAINTENANCE AND REPAIR

OF ELECTRICAL EQUIPMENTS

DETAILED CONTENTS

1. Tools and Accessories (14 Periods)

Tools, accessories and instruments required for installation, maintenance and repair work. Knowledge of Indian Electricity rules, safety codes, causes and prevention of accidents, artificial respiration of an electrocuted person, workmen's safety devices

2. Installation (40 Periods)

2.1 Installation of transmission and Distribution Lines

Erection of steel structures, connecting jumpers, tee-off points, joints and dead ends; crossing of roads, streets, power/telecommunication lines and railway line crossings, clearances; earthing of transmission lines and guarding, spacing and Configuration of conductors: Arrangement for suspension and strain insulators, bird guards, anti-climbing devices and danger plates; sizes of conductor, earth wire and guy wires. Laying of service lines, earthing, provision of service fuses, installation of energy meters

2.2 Laying of Underground Cables

Inspection, storage, transportation and handling of cables, cable handling equipment, cable laying depths and clearances from other services such as: water, sewerage, gas, heating and other mains, and also a series of power and telecommunication cables and coordination with these services, excavation of trenches, direct cable laying, including laying of cable from the drum, laying cable in the trench, taking all measurements and making drawings, back filling of trenches with earth or sand, laying protective layer of bricks etc.,) laying of cables into pipes and conduits and within buildings.

2.3 Elementary idea regarding, inspection and handling of transformers; pole mounted substations, plinth mounted substations, grid substation, bus bars, isolators, voltage and current transformers, lightning arrestors, control and relay panels, HT/LT circuit breakers, LT switches, installation of power/distribution transformers, dehydration. Earthing system, fencing of yard, equipment foundations and trenches etc.

2.4 Testing of various electrical equipment such as electrical motor, transformers, cables, and generators, motor control centres, medium voltage distribution panels, power control centres, motor control centres, lighting arrangement, storage, pre-installation checks, connecting and starting, pre-commissioning checks, drying out

2.5 Testing of Transformers: Type test, oil testing of transformers

3. Maintenance (30 Periods)

3.1 Types of maintenance, maintenance schedules, procedures

3.2 Maintenance of Transmission and Distribution System Authorized persons, danger notice, caution notice, permit to work, arranging of shutdowns personally, temporary earthing, and cancellation of permit and restoration of supply. Patrolling and visual inspection of lines - points to be noted during patrolling from ground; special inspections and night inspections;

Location of faults using Meggar, effect of open or loose neutral connections, provision of proper fuses on service lines and their effect on system, causes of dim and flickering lights.

3.3 Maintenance of Distribution Transformers

Transformer maintenance and points to be attended to in respect of various items of equipment

Checking of insulation resistance, transformer oil level and BDV test of oil, measurement of earth resistance

3.4 Maintenance of Grid Substations

Checking and maintenance of bus bars, isolating switches, HT/LT circuit breakers, LT switches. Power transformers.

3.5 Maintenance of Motors over hauling of motors, preventive maintenance, Trouble shooting of electric motors.

3.6 Domestic Installation

Introduction, testing of electrical installation of a building, testing of insulation resistance to earth, testing of insulation and resistance between conductors, continuity or open circuit test

RECOMMENDED BOOKS

1. Testing, Commissioning , Operation and Maintenance of Electrical Equipment by SRao,Khanna Technical Publication, New Delhi
2. Preventive Maintenance of Electrical Apparatus by SK Sharotri, Katson PublishingHouse, Ludhiana
3. Installation and Maintenance of Electrical Equipment by Praveen Kumar, NorthPublication, Jalandhar

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3rd Year/6th Semester

DELECEE603: ELECTRICAL DESIGN, DRAWING AND ESTIMATING – II

DETAILED CONTENTS

1 Contractor Control Circuits (10 periods)

Design of circuit drawing of schematic diagram and power wiring
diagram of following circuits, specification of contactors

- 1.1 DOL starting of 3-phase induction motor
- 1.2 3-phase induction motor getting supply from selected feeder
- 1.3 Forwarding/reversing of a 3-phase induction motor
- 1.4 Two speed control of 3-phase induction motor
- 1.5 Limit switch control of a 3-phase induction motor
- 1.6 Sequential operating of two motors using time delay relay
- 1.7 Manually generated star delta starter for 3-phase induction motor
- 1.8 Automatic star delta starter for 3-phase Induction Motor
- 1.9 Control circuit for cross road signal

2. Earthing (08 periods)

- 2.1 Concept and purpose of earthing Different types of earthing, drawings of plate and pipe earthing
- 2.2 Procedure of earthing, test of materials required and costing and estimating
- 2.3 Method of reducing earth resistance
- 2.4 Relevant IS specifications of earth electrode for earthing a transformer, a high building
- 2.5 Earthing layout of distribution transformer
- 2.6 Substation earthing layout and earthing materials
- 2.7 Line diagram of 11kV, 33kV, 66kV, 132 kV sub-stations

- 3. Schematic Diagram of lighting system of conference room/Theatre/sports stadium (indoor and outdoor) and Circuits using timers using CAD and, Drawing sheets.

4. Estimation of Internal Wiring Installation (12 periods)

Estimation of wiring installation for commercial and industrial buildings such as multi- storied hotels, hospitals, schools, colleges, cinema, community centers, public library, high rise residential buildings etc. including design of layout, load estimation, Demand factor and diversity factor, power distribution scheme, list of material with specifications estimation of cost preparing relevant electrical schedule or rate (CPWD or PWD) using latest practices, materials and Accessories.

5. **Estimation of Power Wiring** (08 periods)

I.S. specifications and I.E. rules, calculation of current for single and three phase motors. Determination of sizes of cables, conductors distribution board, main switches and starters for power circuits. Cost of equipment and accessories and schedule of material. Estimation and cost of material and work for motors up to 20 H.P., pump sets and small workshops.

6. **Estimation of Overhead and Underground Distribution Lines** (08 periods)

Main components of overhead lines-line supports, cross-arm, clamps, conductors and stay sets, lightening arrestors, danger plates, anti-climbing devices, bird guards, jumpers etc., concerting of poles, earthing of transmission line, formation of lines, specification of materials for O.H. lines, I.S, specification and I.E. rules. Cost of material and work for overhead and underground lines up to 11 KV only

7. **Estimation of Service Connections** (08 periods)

Service connection, types of service connections-overhead and underground for single story and double story buildings, estimate of materials required for giving service connection to domestic consumers, commercial consumers and industrial consumers at L.T. and H.T. costing of material and work in above cases.

8. **Estimation of Small Sub-Station** (08 periods)

Main equipment and auxiliaries installed on the substation. Estimation of materials required for a small distribution substation (indoor and outdoor type-platform and pole mounted). Costing of material and work of above substations.

Note: Draw various schematic and wiring diagrams using graphic package (preferably CAD)

RECOMMENDED BOOKS

1. Electrical Design and Drawings by Raina & Bhattacharya
2. Electrical Design & Drawings by Sarabjeet Singh
3. IEEE Guide 80 for Earthing, IEEE Publication, New York
4. Electrical Design and Drawing by Surjit Singh, North Publication, Jalandhar
5. BIS for Electrical Earthing
6. e-books/e-tools/relevant software to be used as recommended by

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3rd Year/6th Semester

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DUTILEE604: UTILIZATION OF ELECTRICAL ENERGY	4	0	0

DETAILED CONTENTS

1. Illumination (14 Periods)

- 1.1 Nature of light, visibility spectrum curve of relative sensitivity of Human eye and wave length of light.
- 1.2 Definition: Luminous flux, solid angle, intensity, luminous efficiency. Space to height ratio, reflection factor, lux, shadow.
- 1.3 Different types of lamps, construction and working of incandescent and discharge lamps. Fitting required for filament lamp, mercury vapor, sodium lamp, halogen lamp, CFL, LED lamp.
- 1.4 Calculation of number of light points for interior illumination calculation of indoor and outdoor illumination levels at different points.
- 1.5 Time switches, street lighting, flood lighting and its characteristics.

2. Electric Heating and Welding (18 Periods)

- 2.1 Advantages of electrical heating
- 2.2 Heating methods
 - 2.2.1 Resistance heating – direct and indirect resistance heating, electric ovens, their temperature range, properties of resistance heating elements, domestic water heaters and other heating appliances, thermostat control circuit
 - 2.2.2 Induction heating; principle of core type and coreless induction furnace, their construction and applications
 - 2.2.3 Electric arc heating; direct and indirect arc heating, construction, working and applications of arc furnace
 - 2.2.4 Dielectric heating, applications in various industrial fields
 - 2.2.5 Infra-red heating and its applications (construction and working of two appliances)
 - 2.2.6. Microwave heating and its applications (construction and working of two appliances)
 - 2.2.7 Solar Heating
- 2.3 Calculation of resistance heating elements (simple problems)
- 2.4 Electric Welding
 - 2.4.1 Advantages of electric welding
 - 2.4.2 Welding methods
 - 2.4.3 Principles of resistance welding, types – spot, projection, seam and butt welding, welding equipment

- 2.4.4 Principle of arc production, electric arc welding, characteristics of arc; carbon arc, metal arc, hydrogen arc welding method and their applications.
Power supply requirement. Advantages of using coated electrodes, comparison between AC and DC arc welding, welding control circuits, welding of aluminum and copper

3. Electrolytic Processes (08 Periods)

- 3.1 Need of electro-deposition
- 3.2 Laws of electrolysis, process of electro-deposition - clearing, operation, deposition of metals, polishing and buffing
- 3.3 Equipment and accessories for electroplating
- 3.4 Factors affecting electro-deposition
- 3.5 Principle of galvanizing and its applications
- 3.6 Principles of anodizing and its applications
- 3.7 Electroplating of non-conducting materials
- 3.8 Manufacture of chemicals by electrolytic process

4. Electrical Circuits used in Refrigeration, Air Conditioning and Water Coolers (08 Periods)

- 4.1 Principle of air conditioning
- 4.2 Description of Electrical circuit used in
 - a) Refrigerator,
 - b) Air-conditioner, and
 - c) Water cooler

5. Electric Drives (10 Periods)

- 5.1 Advantages of electric drives
- 5.2. Characteristics of different mechanical loads
- 5.3. Types of motors used as electric drive
- 5.4. General idea about the methods of power transfer by direct coupling by using devices like belt drive, gears, chain drives etc.
- 5.5. Examples of selection of motors for different types of domestic loads
- 5.5 Selection of drive for applications such as general workshop, textile mill, paper mill, steel mill, printing press, and crane and lift etc. Application of flywheel.
- 5.6 Selection of motors for Domestic Appliances

6. Electric Traction (12 Periods)

- 6.1 Advantages of electric traction
- 6.2 Different systems of electric traction, DC and AC systems, diesel electric system, types of services – urban, sub-urban, and main line and their speed- time curves
- 6.3 Different accessories for track electrification; such as overhead catenary wire, conductor rail system, current collector-

- pantograph
- 6.4 Factors affecting scheduled speed
- 6.5. Electrical block diagram of an electric locomotive with description of various equipment and accessories used.
- 6.6 Types of motors used for electric traction
- 6.7 Power supply arrangements
- 6.8 Starting and braking of electric locomotives
- 6.9 Introduction to EMU and metro railways
- 6.10 Train Lighting Scheme

Note: Students should be taken for visits to nearest electrified railway track and railway station to study the electric traction system. Also visit should be made to show electric Illumination in building.

RECOMMENDED BOOKS

1. Art and Science of Utilization of Electrical Energy by H Partap, Dhanpat Rai & Sons, Delhi
2. Utilization of Electrical Energy by JB Gupta, Kataria Publications, Ludhiana
3. Utilization of Electrical Energy by Sahdev, Uneek Publication, Jalandhar
4. A Text Book. of Electrical Power by Dr. SL Uppal, Khanna Publications, Delhi
5. Modern Electric Traction by H Partap, Dhanpat Rai & Sons, Delhi
6. Utilization of Electrical Energy by D.R. Arora, North Publication, Jalandhar
7. Generation, Distribution and Utilization if Electrical Power by CL Wadhwa, Wiley Eastern Ltd., New Delhi
8. E-books/e-tools/relevant software to be used as recommended by AICTE/UBTE/NITTTR

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**DELECEE605: ELECTRICAL DESIGN, DRAWING AND
ESTIMATING – II LAB**

Department of Electrical Engineering

(Faculty of Engineering & Technology)

P.K. University, Shivpuri (MP)

3rd Year/6th Semester

DPROJEE606: PROJECT

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RATIONALE

Major Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place students for project oriented practical training in actual work situation for the stipulated period.

LEARNING OUTCOMES

After undergoing the project work, students will be able to:

Apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place the learner for project oriented practical training in actual work situation for the stipulated period with a view to:

- ☐ Develop understanding regarding the size and scale of operations and nature of field- work in which students are going to play their role after completing the courses of study
- ☐ Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.
- ☐ Develop firsthand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems related to the world of work.
- ☐ Develop abilities like interpersonal skills, communication skills, positive attitudes and values etc.

General Guidelines

The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (say at the end of second year). Students should be allotted a problem of interest to him/her as a major project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The project work identified in collaboration with industry should be preferred.

This practical training cum project work **should not be considered** as merely conventional industrial training in which students are sent at work places with either minimal or no supervision. This experience is required to be planned in advance and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnics may establish close linkage with 8-10 relevant organization for providing such an experience to students. It is necessary that each organization is visited well in advance and activities to be performed by students are well defined. The chosen activities should be such that it matches with the curricular interest to students and of professional value to industrial/ field organizations. Each teacher is expected to supervise and guide 5-6 students.

Some of the project activities are given below:

- Projects related to designing small electrical equipment / instruments.
- Projects related to increasing productivity in electrical manufacturing areas.
- Projects related to quality assurance.
- Projects connected with repair and maintenance of plant and equipment.
- Projects related to design of PCBs.
- Projects related to design of small oscillators and amplifier circuits.

- Projects related to design, fabrication, testing and application of simple digital circuits and components.

- Projects related to microprocessor/microcontroller based circuits/ instruments.

A suggestive list of project is given below:-

1. Design and fabrication of control panel for various applications in the field of electrical engineering.
2. Rewinding of a single phase/three phase induction motor
3. Fabrication of working model of a solar thermal power plant.
4. Design and fabrication of automated car parking system.
5. Design and fabrication of automated gate control of railway crossing.
6. Design and fabrication of electrical resistive/inductive/capacitive loads.

7. Design and fabrication of remote control of various domestic electrical appliances.
8. Design and fabrication of microcontroller based DC drive system.
9. Design and fabrication of automatic water level control system.
10. Design and fabrication of automatic solar battery charger.
11. Fabrication of automatic star-delta starter.
12. Fabrication of working model of hydroelectric power plant.
13. Fabrication of sine wave inverter up to 500VA.
14. Fabrication of water level indicator.
15. Fabrication of rain/fire/ smoke/burglar detector.
16. Fabrication of automatic solar panel based street lights.
17. Fabrication of automatic solar panel based traffic lights
18. Fabrication of automatic voltage stabilizer up to 1 KVA.
19. Fabrication of working model of wind power plant.
20. Fabrication of heat convector blower with humidifier.
21. Fabrication of oil based radiation type room heater.
22. Fabrication of small 1- phase transformer up to 1KVA.

23. Fabrication of UPS up to 500VA.
24. Fabrication of a distribution board as per requirement.
25. Fabrication of Direct-On-Line (DOL) starter.
26. Fabrication of solar tracking system.
27. Fabrication of automatic power factor corrector.
28. Fabrication of desert cooler/ room cooler.

29. Fabrication of electric/solar water heater.
30. Erection, installation & commissioning of electrical equipment.
31. Fault detection & repair of electrical/ electronic instruments.

32. Drawing, estimating and costing of electrical installation of the institution from supplier's pole to the institution distribution board.
33. Drawing, estimating and costing of electrical installation of a workshop having a given number of electrically operated appliances/machines.
34. To study the laying out of underground distribution cable for a small colony starting from main distribution pole.
35. To study the erection of a 5 pole span overhead line for a small distance for distribution of electrical energy and to prepare list of material required.
36. Energy audit for the workshop of your institution & to suggest remedies to reduce electricity bills.
37. Estimate the material required to provide a service connection to a consumer's premises for domestic purposes.
38. To survey the load of a given area in a village, small colony, calculate the effective load and find out the sizes of cables/conductors for the proposed distribution system.
39. Designing of light and fan scheme for an institutional or commercial building.
40. To study and estimate the material required during augmentation of a nearby pole mounted sub-station.
41. To study and estimate the material required during augmentation of a nearby in door sub-station.
42. To study and estimate the material required for a solar power station up to 100KW after visiting the actual site
43. To prepare a proposal for substation of your institution , calculating the total load (estimating and costing)
44. Installation of home security system
45. Detection of electricity theft control system with wireless indication system
46. Fabrication of cyclo-converter (frequency changer)
47. Design and fabrication of panel for automatic switching of DG set with supply system
48. Design and fabrication of wireless AC Power transmission.
49. Design and fabrication of solar energy based projects like solar cooker, solar dryer, solar street light, solar inverter, solar pump,

solar emergency light etc.

NOTE: The project should be preferably undertaken by a group of students depending upon cost and time involved.

There is no binding to take up the above projects as it is only a suggestive list of projects.