

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



Syllabus and Evaluation Scheme
DIPLOMA
Electrical & Electronics Engineering

(Effective from Session: 2019-20)

Evaluation Scheme

Diploma EEE- Ist Year

| I – SEMESTER | | THEORY | | PRACTICAL | | TOTAL |
|--------------|---|-----------|----------|-----------|----------|-------|
| SUBJECT CODE | SUBJECT NAME | SESS.(30) | EXT.(70) | SESS.(25) | EXT.(25) | |
| DEN-101 | Foundation Communication | 30 | 70 | 25 | 25 | 150 |
| DEN-102 | Applied Mathematics-1(A) | 30 | 70 | NA | NA | 100 |
| DEN-103 | Applied Physics | 30 | 70 | 25 | 25 | 150 |
| DEN-104 | Applied Chemistry | 30 | 70 | 25 | 25 | 150 |
| DEN-105 | Electrical & Electronics Engg. Material | 30 | 70 | NA | NA | 100 |

Diploma EEE- Ist Year

| II – SEMESTER | | THEORY | | PRACTICAL | | TOTAL |
|---------------|---------------------------------|-----------|----------|-----------|----------|-------|
| SUBJECT CODE | SUBJECT NAME | SESS.(30) | EXT.(70) | SESS.(25) | EXT.(25) | |
| DEN-201 | Applied Mathematics-1(B) | 30 | 70 | NA | NA | 100 |
| DEN-202 | Applied Physics-II | 30 | 70 | 25 | 25 | 150 |
| DEN-203 | Basic Electrical Engg& Circuit. | 30 | 70 | 25 | 25 | 150 |
| DEN-204 | Introduction To Computer | 30 | 70 | 25 | 25 | 150 |
| DEN-205 | Engineering Drawing | 30 | 70 | NA | NA | 100 |

Diploma EEE- IInd Year

| III – SEMESTER | | THEORY | | PRACTICAL | | TOTAL |
|----------------|--|-----------|----------|-----------|----------|-------|
| SUBJECT CODE | SUBJECT NAME | SESS.(30) | EXT.(70) | SESS.(25) | EXT.(25) | |
| DEN-301 | FunctionalCommunication | 30 | 70 | 25 | 25 | 150 |
| DEN-302 | AppliedMathematics-II | 30 | 70 | NA | NA | 100 |
| DEN-303 | Principles of Digital Electronics | 30 | 70 | 25 | 25 | 150 |
| DEN-304 | Electrical Machine | 30 | 70 | 25 | 25 | 150 |
| DEN-305 | Electrical & Electronics Measurements. | 30 | 70 | 25 | 25 | 150 |

Diploma EEE- IInd Year

| IV – SEMESTER | | THEORY | | PRACTICAL | | TOTAL |
|---------------|--|-----------|----------|-----------|----------|-------|
| SUBJECT CODE | SUBJECT NAME | SESS.(30) | EXT.(70) | SESS.(25) | EXT.(25) | |
| DEN-401 | Networking & Programming in C | 30 | 70 | 25 | 25 | 150 |
| DEN-402 | Generation, Transmission & Distribution of Elect power | 30 | 70 | NA | NA | 100 |
| DEN-403 | Communication Engineering | 30 | 70 | 25 | 25 | 150 |
| DEN-404 | Power Electronics | 30 | 70 | 25 | 25 | 150 |
| DEN-405 | Energy Conservation | 30 | 70 | NA | NA | 100 |
| DEN-405 | Electrical & Electronics Minor Project | NA | NA | 25 | 25 | 50 |

Diploma EEE- IIIrd Year

| V – SEMESTER | | THEORY | | PRACTICAL | | TOTAL |
|--------------|--|-----------|----------|-----------|----------|-------|
| SUBJECT CODE | SUBJECT NAME | SESS.(30) | EXT.(70) | SESS.(25) | EXT.(25) | |
| DEN-501 | Industrial Management and Entrepreneurship Development | 30 | 70 | NA | NA | 100 |
| DEN-502 | Switch Gear & Protection | 30 | 70 | NA | NA | 100 |
| DEN-503 | Microprocessor And Application | 30 | 70 | 25 | 25 | 150 |
| DEN-504 | Control System | 30 | 70 | NA | NA | 100 |
| DEN-505 | Electrical Drafting In AUTOCAD | 30 | 70 | NA | NA | 100 |
| DEN-506 | Integrative comm. (PRACTICAL) | NA | NA | 25 | 25 | 50 |

Diploma EEE- IIIrd Year

| VI – SEMESTER | | THEORY | | PRACTICAL | | TOTAL |
|---------------|---|-----------|----------|-----------|----------|-------|
| SUBJECT CODE | SUBJECT NAME | SESS.(30) | EXT.(70) | SESS.(25) | EXT.(25) | |
| DEN-601 | Environmental Education & Disaster Management | 30 | 70 | NA | NA | 100 |
| DEN-602 | Industrial Drives & Control | 30 | 70 | 25 | 25 | 150 |
| DEN-603 | Trouble Shooting And Servicing | 30 | 70 | NA | NA | 100 |
| DEN-604 | Electric Traction | 30 | 70 | NA | NA | 100 |
| DEN-605 | Project | NA | NA | 25 | 25 | 50 |

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I Year I Semester

DEN-101: FOUNDATIONAL COMMUNICATION

SECTION "A" (ENGLISH)

1. PARTS OF SPEECH:

- a. Noun
- b. The pronoun: Kinds and Usage
- c. The adjective: Kinds and Degree
- d. Determiner: Articles
- e. The verb: Kinds
- f. The Adverb: Kinds, Degree and Usage
- g. Prepositions
- h. Conjunctions
- i. The Interjections
- j. Subject: Verb Agreement (Concord)

2. VOCABULARY BUILDING:

- a. Antonyms and Synonyms
- b. Homophones
- c. One word substitutions
- d. Idioms and Phrases
- e. Abbreviations

3. Grammar

- a. Sentence & its types
- a. Tenses
- b. Punctuations
- c. Active and Passive voice
- d. Transformation of Sentences
- e. Synthesis of Sentences
- f. Direct and Indirect Narrations

4. DEVELOPMENT OF EXPRESSION (Composition):

- a. Paragraph Writing
- b. Essay Writing
- c. Proposal Writing
- d. Letter Writing (Formal, Informal, Business, official etc.)
- f. Report Writing
- g. Note Making
- h. News Making
- i. Application Writing
- j. Minute Writing
- k. Invitation Letter Writing

SECTION “B” (Hindi)

5. $\sin^{-1}(\sin x)$, $\cos^{-1}(\cos x)$, $\tan^{-1}(\tan x)$, $\cot^{-1}(\cot x)$, $\sec^{-1}(\sec x)$, $\csc^{-1}(\csc x)$, $\sin^{-1}(\sin x)$, $\cos^{-1}(\cos x)$, $\tan^{-1}(\tan x)$, $\cot^{-1}(\cot x)$, $\sec^{-1}(\sec x)$, $\csc^{-1}(\csc x)$
1
6. $\sin^{-1}(\sin x)$, $\cos^{-1}(\cos x)$, $\tan^{-1}(\tan x)$, $\cot^{-1}(\cot x)$, $\sec^{-1}(\sec x)$, $\csc^{-1}(\csc x)$, $\sin^{-1}(\sin x)$, $\cos^{-1}(\cos x)$, $\tan^{-1}(\tan x)$, $\cot^{-1}(\cot x)$, $\sec^{-1}(\sec x)$, $\csc^{-1}(\csc x)$
1
7. $\sin^{-1}(\sin x)$, $\cos^{-1}(\cos x)$, $\tan^{-1}(\tan x)$, $\cot^{-1}(\cot x)$, $\sec^{-1}(\sec x)$, $\csc^{-1}(\csc x)$, $\sin^{-1}(\sin x)$, $\cos^{-1}(\cos x)$, $\tan^{-1}(\tan x)$, $\cot^{-1}(\cot x)$, $\sec^{-1}(\sec x)$, $\csc^{-1}(\csc x)$
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I Year I Semester

DEN-102: APPLIED MATHEMATICS I(A)

1. 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, Scalar and vector triple product.
- 2.2 Complex number : Complex numbers, Representation, Modulus and amplitude
De Moivre 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 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.
Application - Finding Tangents, Normal, Points of Maxima/Minima, Increasing/Decreasing functions, Rate, Measure, velocity, Acceleration, Errors and approximation

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I Year I Semester
DEN-103: APPLIED PHYSICS-I

1. UNITS AND DIMENSIONS (4MARKS)

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 dimension analysis.

2. ERRORS AND MEASUREMENT (4Marks)

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 of instruments,

3. CIRCULAR MOTION (5MARKS)

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 :(5Marks)

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

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

Rigid body, Rotational motion, Moment of inertia, Theorems (Perpendicular and Parallel axis) of moment of inertia (Statement). Expression of M.I. of regular bodies (Lamina, Sphere, Disc, Cylindrical), 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 :(4MARKS)

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 (6MARKS)

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: (6MARKS)

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 (5MARKS)

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.

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I Year I Semester
DEN-104: APPLIED CHEMISTRY

1. ATOMIC STRUCTURE:

Basic concept of atomic structure, Matter wave concept, Quantum number, Haiseinberg's Uncertainty Principle, Shaples 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, electron negativity, Electron affinity.

4. ELECTROCHEMISTRY-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 numerical. Buffer solutions, Indicators, Solubility product, Common ion effect with their application,

5. ELECTROCHEMISTRY-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 methods.

6. CHEMICAL KINETICS:

Law of mass action, order and molecularity of reaction. Activation energy, rate constants, I 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.

1. 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.

2. **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

3. **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, priming and foaming in boilers.

Disinfecting of Water By Chloramine-T, Ozone and Chlorine. Advantage and disadvantage of chlorination, Industrial waste and sewage, Municipality waste water treatment, Definition of BOD and COD. Numerical Problems based on topics.

4. **COLLOIDAL STATE OF MATTER:**

Concept of colloidal and its types, Different system of colloids, Dispersed phase and dispersion medium. Methods of preparation of colloidal solutions, Dialysis and electro dialysis. Properties of colloidal solution with special reference to absorption, Brownian movement, Tyndal effect, Electrophoresis and coagulation. Relative stability of hydrophilic and hydrophobic colloids. Protection and protective colloids. Emulsion, Types, preparation, properties and uses. Application of colloids chemistry in different industries.

5. **LUBRICANTS :**

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

6. **HYDROCARBONS:**

- A. Classification and IUPAC nomenclature of organic compounds homologous series (Functional Group)
- B. Preparation, properties and uses of Ethane, Ethene, Ethyne (Acetylene), Benzene and Toluene.

7. **ORGANIC REACTIONS & MECHANISM:**

- 1. Fundamental aspects-
 - A. Electrophiles and nucleophiles, Reaction Intermediates, Free radical, Carbocation, Carbanion
 - B. Inductive effect, Mesomeric effect, Electromeric effect.

2. A. Mechanism of addition reaction (Markonikov's Rule, Cyanohydrin and Peroxide effect),
B. Mechanism of Substitution reactions; (Nucleophilic) hydrolysis of alkyl halide, electrophilic substitution halogenation, Sulphonation, Nitration 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 polymerization, Average molecular weight, Free radical polymerization (Mechanisms)
2. Thermosetting and Thermoplastic resins -
 - 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. **SYNTHETIC MATERIALS:**

- A. Introduction - Fats and Oils
- B. Saponification of fats and oils, manufacturing of soap.
- C. Synthetic detergents, types of detergents and its manufacturing.
3. EXPLOSIVES: TNT, RDX, Dynamite.
4. Paint and Varnish

LIST OF PRACTICALS

1. To analyse inorganic mixture for two acid and basic radicals from following radicals
- A. Basic Radicals:
- NH_4^+ , Pb^{++} , Cu^{++} , Bi^{+++} , Cd^{++} , As^{+++} , Sb^{+++} , Sn^{++} , Al^{+++} , Fe^{+++} , Cr^{+++} , Mn^{++} , Zn^{++} ,
 Co^{++} , Ni^{++} , Ba^{++} , Sr^{++} , Ca^{++} , Mg^{++}
- B. Acid Radicals: CO_3^{--} , S^{--} , SO_3^{--} , CH_3COO^- , NO_2^- , NO_3^- , Cl^- , Br^- , I^- , SO_4^{--}
2. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.
 3. To determine the total hardness of water sample in terms of CaCO_3 by EDTA titration method using Eriochrome 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

DEN-105 ELECTRICAL AND ELECTRONICS ENGG.MATERIALS

[Only For Electrical Engineering]

1. Classification

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

2. Conducting Materials

- (i) Resistivity and factors affecting resistivity, such as temperature, alloying and Electrical stressing.
- (ii) Super conductivity and super conducting material.
- (iii) Low resistivity materials e.g. Copper, aluminum and steel, their general Properties as conductor e.g. resistivity, temperature co-efficient, mechanical Properties, corrosion, solar ability, contact resistance and practical Application Uses of mercury as conducting material.
- (iv) Comparison of copper, aluminums and steel for various applications as. Electrical conductor.
- (v) Low resistivity copper alloys: brass, bronze (cadmium and beryllium), their Practical application.
- (vi) High resistivity materials: managene, constantan nichrome, carbon, tungsten, their practical applications.
- (vii) Electric lamp materials.
- (viii) Brush contact materials.
- (ix) Soldering materials.
- (x) Thermocouple materials, Fuse materials.

3. Insulating Materials

- (i) Introduction.
- (ii) Properties of insulating material.
 - **Electrical properties:** Volume resistivity, Surface resistivity, Dielectric Loss, Dielectric Constant, Dielectric strength.
 - **Mechanical properties:-** Mechanical strength
 - **Physical properties:-** Hygroscopicity tensile and compressive strength, Abrasive resistance, brittleness.
 - **Thermal properties** - Heat resistance, Classification according to high permissible temperature rise, Effect of over loading on the life of an electrical appliances, Increase in rating with the use of insulating materials having higher thermal stability, Thermal conductivity.
 - **Chemical properties** - Solubility, Chemical resistance, Weather ability
- (iii) Insulating materials and their application-
 - Definition and classification
 - Thermo setting materials e.g. Phenol Formaldehyde, Resins (i.e Bakelite), Amino resins (Urea Formaldehyde and Melamine formaldehyde), Epoxy resins their properties, Applications and Commercial names.

- Thermo Plastic materials e.g. Polyvinyl Chloride (P.V.C.), Poly Ethelene Silicons their properties application and commerical names. Brief description of extrusion and moulding process of using plastic materials in electrical engineering.
- Natural Insulating Materials- Mica and Mica products, Asbestos and Asbestos products, Ceramic materials (Porcelain and Stealite), Glass and glass products, Cotton, Silk, Jute, Paper (Dry and impregnated), Rubber Butuman, Mineral and insulating oil for transformer, switch gear, capacitors, high voltage cables, insulating varnishes for coating and impregnation, Enamels for winding wires, Glass fibre sleeves
- Gasous Materials e.g. Air, Hydrogen, Nitrogen and SF6

4. Magnetic Materials:

- (i) Classification of magnetic materials into soft and hard magnetic materials.
- (ii) Soft magnetic materials - high silicon alloy steel for transformers and low silicon alloy steel, for electric rotating machine cold rolled grain oreinted and non-oriented steel, Nickel iron alloy, soft ferrites, their properties and uses.
- (iii) Hard magnetic materials - tungsten steel, chrome steel, cobalt steel, alnico, hard ferrites, their properties and applications.

5. Semiconductor Materials:

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

6. Special Purpose Materials:

Materials used in transistor and IC manufacturing, PC BS, computer memory devices (name of such materials to beaded) Ferrous and non ferrous materials. Thermistor, Sensistor, V aristor and their practical Application.

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I Year II Semester

DEN-201 APPLIED MATHEMATICS I(B)

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 of definite integrals. Integration of special function.
- 2.1 Application : Finding areas bounded by simple curves, Length of simple curves, Volume of solids of revolution, centre of mean of plane areas.
- 2.2 Simpsons 1/3rd and Simposns3/8th rule and Trapezoidal Rule: Their application in simple cases.

3 CO-ORDINATE GEOMETRY (2DIMENSION):

- 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 (3DIMENSION):

- 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).

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I Year II Semester
DEN-202 APPLIED PHYSICS-II

1. Optic:

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.

1. 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, Kirchhoff's Law and their simple application, Principle of Wheatstone 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 superconductivity, 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 semiconductors, Electrons and holes as charge carriers in semiconductors, P-type and N-type semiconductors.

8. Junction Diode and Transistor:

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

9. Introduction To Digital Electronics:

Concept of binary numbers, 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 windmill.
- (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.

APPLIED PHYSICS-II

PHYSICS LAB

Note: Any 4 experiments are to be performed.

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.

NOTE :

Students should be asked to plot a graph in experiments (where possible) and graph should be used for calculation of results. Results should be given in significant figures only.

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I Year II Semester

DEN- 203 BASIC ELECTRICAL ENGINEERING& CIRCUIT

1. Basic Terminology and their concepts

- 1.1 Current, EMF, potential difference (Voltage), resistance, resistivity their units conductors & insulators, Insulation resistance of cable.
- 1.2 Effect of temperature on the resistance of conductors, semiconductors (C, Si, Ge) and insulators physical explanation, temperature coefficient of resistance.
- 1.3 Electrical power, energy and their units (SI), Heating effect of electric current and its practical examples.
- 1.4 Relationship between electrical, mechanical and thermal SI units of work, power and energy, Electrical Safety and precautions.

2. D.C. Circuits

- 2.1 Kirchhoff's laws.
- 2.2 Simple numerical problems based on Kirchhoff's laws.
- 2.3 Introduction to Thevenin and Superposition theorem, Norton's theorem

3. Batteries

- 3.1 Construction, chemical changes during charging and discharging of lead acid cells.
- 3.1 (a) Indications of a fully charged battery.
- 3.2 Capacity and efficiency of lead acid cell /battery.
- 3.3 Charging of 6 V., 12 V. commercial batteries.
- 3.3 (a) Grouping of cells.
- 3.4 Care and maintenance of commercial batteries.
- 3.5 Problems/defects in lead acid batteries.
- 3.6 Concept of Nickel-Iron and Nickel Cadmium Batteries.
- 3.7 Concept of solid sealed maintenance free batteries (SMF batteries), Oxygen recombination principle.

4. Capacitors

- 4.1 Concept of capacitor, types of capacity of parallel plate capacitor, Composite capacitor and effect of physical parameters.
- 4.2 Energy stored in a capacitor, dielectric and its influence on capacitance of a capacitor, dielectric constant dielectric breakdown and dielectric strength Dielectric loss.

- 4.3 Series and parallel combination of capacitors.
- 4.3 (a) Capacitance of multi-plate capacitors.
- 4.4 Variable capacitors.
- 4.5 Charging and discharging of capacitors.
- 4.6 Simple Problems on capacitors.

5. Electromagnetism

- 5.1 Concept of magnetic flux, flux density, magnetic field intensity, permeability and their units.
- 5.2 Magnetic circuits, concept of reluctance and m.m.f. and simple problems.
- 5.3 Analogy between electric and magnetic circuits.
- 5.4 B-H curve and magnetic hysteresis (No mathematical derivation).
- 5.5 Elementary ideas about hysteresis loss.
- 5.5 (a) Lifting powers of a magnet.

6. Electromagnetic Induction

- 6.1 Faraday's laws of electromagnetic induction. Lenz's Law, simple problem. Dynamically induced emf.
- 6.2 Self-induced emf, inductance, its role in electrical circuits. Simple problems.
- 6.3 Mutually induced emf, mutual inductance, its role in electrical circuits. Simple problems.
- 6.4 Energy stored in magnetic circuit.
- 6.5 Rise and decay of current in inductors.
- 6.6 Force on a current carrying conductor placed in a magnetic field and its applications.
- 6.7 Elementary idea about eddy current loss.

7. A.C.Circuits

- 7.1 Recapitulation of terminology, instantaneous value, maximum (peak) value, cycle, frequency, alternate current and voltage. Difference between AC and DC.
- 7.2 Equation of an alternating voltage and current and wave shape varying sinusoidal.
- 7.3 Average and RMS value of alternating voltage and current. Importance of RMS value. Simple problems.
- 7.4 Concept of phase, phase difference and phasor representation of alternating voltage and current.
- 7.5 A.C. through pure resistance, inductance, capacitance, phasor diagram and power absorbed.
- 7.6 R-L series circuit, idea of impedance and calculations.
- 7.7 Apparent power, reactive power and active power, power factor, its importance and simple problems.
- 7.8 R-C series circuit, simple problems.
- 7.9 R-L-C series circuit, simple problems.
- 7.10 Solution of simple parallel A-C circuits by
 - (a) Phasor diagram method,
 - (b) Admittance method.
- 7.11 Solution of AC circuits series/ parallel by j method. (simple problems).
- 7.12 Resonance (Series and parallel) and practical application, simple problems.

8. Transients and Harmonics

Introduction, Types of transients, Important differential equations, First and second order equations, Transients in R-L series circuits (D.C.), Short circuit current, Time constant, Transients in R-L series circuits (A.C.), Transients in R-C series circuits (D.C.), Transients in R-C- series circuits (A.C.), Double energy transients, Fundamental wave and harmonics, Different complex waveforms, General equation of complex wave, R.M.S. value of a complex wave, Power supplied by complex wave, Harmonics in single phase A.C. circuits, Selective resonance due to harmonics, Effect of harmonics on measurement of inductance and capacitance.

9. Polyphase System

- 8.1 Introduction to polyphase system. Advantage of three phase system over single phase system.
- 8.2 Star and Delta connections. Relationship between phase and line value of currents and voltage. Power in polyphase circuits. Simple problems of balanced circuits only.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

I Year II Semester

BASIC ELECTRICAL ENGINEERING LAB

- i) To show the variation of resistance of a lamp with temperature by plotting a V-I curve for 60W and 100W filament lamps.
- ii) To verify the Kirchoff's laws.
- iii) To observe the B-H curve for a ferro-magnetic core on CRO.
- iv) To find the relationship between voltage and current for R-L series circuit for variable resistances & variable inductance.
- v) To determine the variation in the values of inductance of a coil for different positions of the movable iron core.
- vi) To measure the power factor in a single phase AC circuit by using voltammeter, ammeter & wattmeter.
- vii) To test a battery for charged and discharged Condition and to charge a battery.
- viii) Verification of voltage and current relations in Star and delta connected systems.
- ix) To charge and discharge a capacitor and to show the graph on C.R.O.
- x) Verification of laws of capacitors in series and parallel.

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

I Year II Semester

DEN-204: INTRODUCTION TO COMPUTER

1. INTRODUCTION TO COMPUTER:

- Block Diagram of Computer.
- Types of Computer
- Types of Input and Output devices
- Memories Devices (Its Types and Basic)

2. INTRODUCTION TO OPERATING SYSTEMS(MS-DOS/MS-WINDOWS :

3. What is operating system, its significance, Commands of DOS, Features/Application of window?

4. WORD PROCESSING:

File: Open, Close, Save, Save as, Search, Send to, Print Preview, Print and Page

Setup Edit: Cut, Copy, Paste, Office Clipboard, Select All, Find, replace, Go to, etc.

View: Normal/Web Layout/Print Layout; Tool Bars; Header/Footer; Zoom, etc.

Insert: Break, Page Number, Date & Time, Symbol, Comment, Reference, etc.

Format: Font, Paragraph, Bullets & Numbering, Borders& Shading, Column, Change case, Back ground, etc.

Tools: Spelling & Grammar, Language, Word Count, Letters & Mailing, Options, Customize, etc.

Table: Draw Insert, Delete, Select, Auto Format, AutoFit, Convert, Sort, Formula, etc.
Mail Merge.

5. WORKSHEET: Introduction, Use of Tools/Icons for preparing simple Mini Project.

6. PRESENTATION:

Introduction, Use of Tools/Icons for preparing simple presentation on Power Point.

7. DATABASE OPERATION:

Create database using MS Access, Create Table and Creating Reports.

8. Introduction to Internet:

What is Network, How to send & receive messages, Use of Search Engines, Surfing different web sites. Creating Mail ID, Use of Briefcase, Sending/replying emails.

9. INTRODUCTION TO ADVANCE TOOLS:

I . Steps requires to solving problems.

A . Flow Chart

B . Algorithm

C . Programming

II . Use of advance Tools such as Skype, Team viewer, Installation of Modem, use of WiFi, Etc.

Department of Electrical & Electronics Engineering
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P.K. University, Shivpuri (MP)

I Year II Semester

DEN-204: INTRODUCTION TO COMPUTER LAB

List of Practical

- 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 mailbox, sending/replying e- mails.
- 8 . Surfing web sites, using search engines.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

I Year II Semester
DEN- 205 ENGINEERING DRAWING

NOTE: Latest Indian Standards Code of Practice to be followed.

1. **Drawing, instruments and their uses.** 1 Sheet
 - 1.1 Introduction to various drawing, instruments.
 - 1.2 Correct use and care of Instruments.
 - 1.3 Sizes of drawing sheets and their layouts.
2. (a) **Lettering Techniques** 2 Sheet
Printing of vertical and inclined, normal single stroke capital letters. Printing of vertical and inclined normal single stroke numbers, Stencils and their use.
(b) **Introduction to Scales** 2 Sheet
Necessity and use, R F Types of scales used in general engineering drawing. Plane, diagonal and chord scales.
3. **Conventional Presentation:** 1 Sheet
Thread (Internal and External), Welded joint, Types of lines, Conventional representation of materials, Conventional representation of machine parts.
4. (a) **Principles of Projection** 1 Sheet
Orthographic, Pictorial and perspective. Concept of horizontal and vertical planes. Difference between I and III angle projections. Dimensioning techniques.
(b) **Projections of points, lines and planes.** 1 Sheet
- 5 (a) **Orthographic Projections of Simple Geometrical Solids** 2 Sheet
Edge and axis making given angles with the reference planes.
Face making given angles with reference planes. Face and
6. **of machine parts:** 2 Sheet
Nut and Bolt, Locking device, Wall bracket
7. **Practice On Autocad:** 2 Sheet
Concept of AutoCAD, Tool bars in AutoCAD, Coordinate System, Snap, Grid and Ortho mode. Drawing Command - Point, Line, Arc, Circle, Ellipse. Editing Commands - Scale, Erase, Copy, Stretch, Lengthen and Explode. Dimensioning and Placing text in drawing area. Sectioning and hatching. Inquiry for different parameters of drawing

NOTE :

- A. The drawing should include dimension with tolerance wherever necessary, material list according to I.S. code. 25% of the drawing sheet should be drawn in first angle projection and rest 75% drawing sheet should be in third angle figure
- B. Practice on AutoCAD latest software is to be done in AutoCAD lab of Mechanical Engineering Department of the Institute.

Department of Electrical & Electronics Engineering
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P.K. University, Shivpuri (MP)

II Year III Semester
DEN-301 Functional Communication

Section “A” (English)

Text Lessons

| | |
|-----------|---|
| Unit.I. | On Communication |
| 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

- 1& Lojkstxkj
- 2& Hkkjrh; oSKkfudksa ,oarduhfd;ksadkHkkjr ds
fodklesa ;ksxnku
- 3& xzkE; fodkl
- 4& ifjokjfu;kstu
- 5& lkekftdlaLFkk;sa
- 6& fu;kstuvkSjtudY;k.k
- 7& HkkjresaizkS|Skfxdh ds
fodklldkbfrgkl
- 8& gfjrdzkafUr
- 9& i;kZoj.k ,oaekuoiznw”k.k
- 10& JfeddY;k.k
- 11& HkkjresaJfedvkUnksyu

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year III Semester
DEN-302 APPLIED MATHEMATICS II

1. MATRICES:

- 1.1 Algebra of Matrices, Inverse: Addition, Multiplication of matrices, Null matrix and a unit matrix, Square matrix, Symmetric, Skew symmetric, Hermitical, Skew hermit ion, 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 a 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:

- 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, Eulers 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:

- 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:

- 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:

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

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year III Semester

DEN-303: PRINCIPLES OF DIGITAL ELECTRONICS

1. INTRODUCTION TO DIGITALELECTRONICS:

- 1.1 Basic difference between analog and digital signal.
- 1.2 Application and advantages of digital signal processing.

2. NUMBERSYSTEM:

- 2.1 Binary, Octal and Hexadecimal number system; conversion from decimal octal and hexadecimal to binary and vice-versa.
- 2.2 Binary addition, subtraction, multiplication and division including binary points.

3. 1's and 2's complements method of subtraction.

4. CODES, CODE CONVERSION AND PARITY:

- 4.1 The 8421 and excess-3 codes; mention of other popular BCD codes.
- 4.2 Addition of 8421, BCD coded numbers its limitations and excess-3 coded numbers.
- 4.3 Gray code, Gray to binary conversion and vice-versa.
- 4.4 Basic concept of parity, single and double parity and error detection.

1. LOGICGATES:

- 1.1 Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates.
- 1.2 Concept of negative and positive logic.

2. LOGIC SIMPLIFICATIONS

- 2.1 Boolean algebra, Karnaugh-mapping (up to 4 variables) and simple application in developing combinational logic circuits.
- 2.2 Implementation of logic equations with gates.
- 2.3 Use of NAND and NOR gates as universal gates.

3. LOGIC FAMILIES AND DIGITALICS:

- 3.1 Logic family classification:
 - (a) Definition of SSI, MSI, LSI, VLSI.
 - (b) Bipolar Logic, Diode Logic, Transistor Logic Inverter, TTL logic, MOS, CMOS logic, logic ECL
 - (c) Sub-classification of TTL and MOS logic families.
 - (d) Characteristics of TTL and MOS Digital gates delay,
- 4. Speed of noise margin, logic levels, power dissipation, FAN-IN, FAN-OUT, power supply requirements and comparison between TTL and MOS ICs.

4.1 Logic Circuits:

- (a) Open collector and to tempole output circuit operation for a standard TTL, NAND gate.
- 4.2 MOS circuit operation for a standard gate (NOR). Tristate Switch: Normally open and normally closed switch.
- 4.3 Familiarization with commercial digital IC gates, their number identification and Pincon figuration.

5. ARITHMETIC OPERATIONS:

- 5.1 Design of Exclusive or, Half adder and Half subtractor.
- 5.2 Design of Full adder circuits and its operation.
- 5.3 Design of Full subtractor circuits and its operation.
- 5.4 Some examples (circuits) of code converters.

6. ENCODER, DECODERS & DISPLAY DEVICES ASSOCIATED CIRCUITS:

- 6.1 LED, LCD, seven segment display, basic operation of various commonly used types.
- 6.2 Four Decoder circuits for 7 segment display.
- 6.3 Basic decimal to BCD encoder circuits.
- 6.4 Use of decoders/driver ICs with reference to commercial ICs.
- 6.5 Basic Multiplexer and Demultiplexer

7. FLIPFLOPS:

- 7.1 Operation using waveforms and truth tables of following flip flops.
RS, T, RST, D, JK, Master/Slave JK Flip Flops Mention of commonly used ICs
Flip flops.

8. COUNTERS:

- 8.1 Counters classification.
- 8.2 Binary and decade counters.
- 8.3 Divide by N counters.
- 8.4 Programmable asynchronous counters.
- 8.5 Down counters up/down counter operations.
- 8.6 Presentable asynchronous counters.
- 8.7 Difference between asynchronous and synchronous counters.
- 8.8 Ring counters with timing diagram.
- 8.9 Familiarization with commercial TTL/CMOS counter ICs.

9. SHIFTREGISTERS:

- 9.1 Introduction and Basic concepts including shift left and shift right.
- 9.2 Serial in serial out. Serial in parallel out. Parallel in serial out. Parallel in parallel out.
- 9.3 Universal shift register.
- 9.4 Familiarization with common TTL/CMOS ICs.
- 9.5 Buffer register, Tristate Buffer Register.

10. MEMORIES:

- 10.1 Classification according to the following heads.
 - (a) Volatile and non-volatile memories.
 - (b) Random access memories and sequential access.
 - (c) Semiconductor and non-semiconductor memories.
 - (d) Destructive and non-destructive memories.
- 10.2 Semi-conductor ROMs, PROMs, EPROM, SRAM, DRAM, Basic structure and working of CCD, R/W memory.

11. A/D AND D/A CONVERTERS:

- 11.1 Use of A/D and D/A converters.
- 11.2 Binary resistor network R-2R network.
- 11.3 D/A converter using R-2R.
- 11.4 UP, UP/Down counter type A/D converter.
- 11.5 Successive approximation.
- 11.6 Basic concepts of parallel A/D converter.
- 11.7 Two bit A/D converter.

12. ARITHMETIC CIRCUITS: Ideas About

- 12.1 Basic Arithmetic logic unit's applications.
- 12.2 Block diagram explanation of binary multiplier circuit.

List of Books

- 1. Malvino & Leach-Digital Principles & Application- McGraw Hill- 5th Edition.
- 2. Mano, M. Morris- Digital Logic and Computer Design- Prentice Hall (India)

Department of Electrical & Electronics Engineering
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II Year III Semester

DEN-303: PRINCIPLES OF DIGITAL ELECTRONICS LAB

List of Experiments

- 1 . Do at least 20 experiments familiarization with bread-board. Familiarization with TTL and MOS ICs.
- 2 . Identification of Ic-nos, Pin-nos, Ic types.
- 3 . To observe that logic low and logic high do not have same voltage value in input and output of logic gate.
- 4 . To observe the propagation delay of TTL logic gate.
- 5 . Observation of the difference between MOS and TTL gates under the following heads
 - (a) Logic levels.
 - (b) Operating voltages.
 - (c) Propagation delay.

Display Devices And Associated Circuits.

- 6 . Familiarization and use different types of LEDs common anode and common cathode seven segment display.
- 7 . Use of 7447 BCD to 7-segmentdecoder. Logic Gates.
- 8 . Verification of truth table for 2 Input NOT, AND,OR, NAND, NOR, XOR Gates. Design and Implementation of Simple Logic Circuits.
- 9 . To construct a 4-bit even/odd parity generator/checker using XOR gates and to verify their truth tables.
- 10 . To construct half adder and half subtract or using XOR and NAND gates verification of their truth tables.
- 11 . To construct a full adder circuit with XOR and NAND gates.

12. (a) Study of 3 bit adder circuit implemented with or and NAND gates.
- (b) To construct 4 bit adder and full subtract or using full adder chip 7480 and NAND gates.
13. (a) To verify the truth table of 4 bit adder IC chip 7483.
- (b) To construct the 4 bit adder/2's complement subtract or using 7483 and NAND gates.

Flip Flops.

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

Counters

15. To construct and verify truth table for a synchronous binary and decade using J-K flip flops.
16. (a) To construct device by 60 counter using ripple.
- (b) To use counter IC chip 7493 in the divide by eight mode and divide by sixteen mode.
- (c) To construct a divide by 100 counter using CMOS.
17. To construct a divide by 60 counters using synchronous counter IC chips.

Registers.

18. To construct a 4 bit buffer register using 4 bit register IC chip.
19. To construct a 4 bit universal shift register using flip flops.
20. To use a 4035 B universal shift register.

Multiplexers and DE multiplexers.

21. To decode a 3 line to 8 line encode from 8 line to 3 line and to observe inputs and outputs.
22. Single plus to 16 line decoder and observation output after a 16 to 4 line encoder.
23. To use ALU chip for selected arithmetic and logic operations.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year III Semester
DEN-304: ELECTRICAL MACHINE

1. Generalized Theory of Electrical Machine

- 1.1 Definitions of motor and generator.
- 1.2 The principle of Electro Mechanical Energy Conversion.
- 1.3 Elementary concept of generator and motor

2. D.C. Machines

- 2.1 Construction of d.c. machines.
- 2.2 E.M.F. equation
- 2.3 Electromagnetic torque (torque equation)
- 2.4 Principle of generating and motoring action.
- 2.5 Speed and torque equation
- 2.6 Armature reaction and commutation in d.c.m/cs.
- 2.7 Factors controlling speed of d.c.motor.
- 2.8 Speed control methods and starters for d.c.m/cs.
- 2.9 Characteristics and application of D.C. generators and motors.

3. Transformer

- 3.1 Classification, construction, principle and working of 1 ph. and 3 ph. transformer.
- 3.2 E.M.F. equation.
- 3.3 Phasor diagram on no load and load.
- 3.4 Transformer connections.
- 3.5 Losses and efficiency.
- 3.6 Voltage drops and regulation.
- 3.7 Connections for parallel operation.
- 3.8 Cooling
- 3.9 Testing of transformer as per IS specification (Type test and routine test, etc.)
- 3.10 Special transformer- Auto transformer, rectifier transformer, dry type transformer, furnace transformer earthing transformer, traction transformer and its use.
- 3.11 Welding transformer: constructional detail, comparison between power and welding transformer.

4. A. C. Generator(Alternator)

Working principle, construction, Full pitch and short pitch winding, pitch factor or coil span factor, distribution or winding factor, E.M.F. equation, rating of alternators, armature reaction, voltage drops in alternator, vector diagram of loaded alternator, voltage regulation and its determination, Efficiency of alternator, conditions for parallel operation, Methods of parallel operation, operation of alternators when connected to infinite bus bar.

5. Synchronous Motor

Construction, working principle, effect of load on synchronous motor, effect of change in excitation on the performance of synchronous motor, V curves, torque & mechanical power developed condition for max. Mechanical power, synchronous condenser, hunting and its elimination, comparison between ind. motor and synch. Motor, starting methods and uses of synch. motor.

6. Induction Motor

Rotating magnetic field for 3 ph. concept of motors and its reversing.

- 1 Construction and working of 3 ph. induction motor (squirrel cage and wound rotor motor). Double squirrel cage induction motor.
- 2 Rotor frequency, rotor e.m.f., rotor current and rotor power factor.
- 3 Torque equation
- 4 Torque slips characteristics.
- 5 Principle and methods of speed control
- 6 Methods of starting of induction motor. On line, auto transformer, star delta manual/automatic starters for induction motor. Starter for slip ring induction motor.
- 7 Application of induction motor.
- 8 Testing of motor as per I.S. Performance of 3 phase induction motor with the help of circle diagram.
10. Losses and efficiency (simple problems only)
11. Phasor diagram of induction motor.

7. Single Phase Induction Motors

1. Classification of F.H.P. motors
2. Production of rotating Magnetic field in 1 ph. motors.
3. Double revolving field theory.
4. Construction working and application of
 - (i) Capacitor motor (all types)
 - (ii) Shaded pole motor
 - (iii) 1 ph. synchronous motor
 - (iv) 1 ph. series and universal motor
 - (v) Servomotor

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year III Semester
DEN-304: ELECTRICAL MACHINE LAB

1. Measurement of induced emf and magnetizing current under open circuit condition in D.C. generators.
2. Determination of the relationship between terminal voltage and load current keeping speed constant for
 - (a) Separately excited generator keeping excitation constant
 - (b) D.C. shunt generator.
3. To measure the variation in no load speed of a separately excited d.c. motor for the variation in
 - (a) Armature circuit resistance
 - (b) Field circuit resistance.
4. Measurement of the speed of a d.c. series motor as a function of the load torque.
- 5
 - (a) No-load and short circuit test on a single phase transformer.
 - (b) Determination of Efficiency and Regulation of transformer.
6. To determine performance characteristics of a poly phase induction motor. (load v/s efficiency, load v/s power factor, load v/s slip)
7. To start a 3 phase induction motor and to determine its slip at various loads.
8. To determine V curves of a synchronous motor.
9. To perform open circuit and block rotor test on a 3ph. induction motor and to determine its efficiency.
10. To perform open circuit and short circuit test on a 3ph. synchronous machine and to determine synchronous impedance and regulation at lagging/leading power factor.
11. Achieving high starting torque in case of 3 phase slip ring motor by increasing external resistance in rotor circuits and determine speed regulation at different loads

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year III Semester

DEN-305: ELECTRICAL AND ELECTRONIC MEASUREMENTS

- 1 Introduction to electrical measuring instruments:
 - 1.1 Concept of measurement and instruments.
 - 1.2 Electrical quantities and instruments for their measurements.
- 2.1 Measurement and Errors. Accuracy, precision, types of errors, probability of errors and Gaussian Errors curve, sensitivity, resolution and stability. Classification of errors.
- 2.2 Types of electrical measuring instruments, indicating, integrating and recording instruments.
- 2.3 Essentials of indicating instruments deflecting, controlling and damping torques.
6. Miscellaneous Measuring Instruments:

The construction, working principle and application of: ohm- meter, meggar, earth tester, multi meter, frequency meter (reed-type) single phase power factor meter (Electrodynamometer type), 3-phase power factor meter, phase sequence indicator, synchro scope.
4. Elements of Process Instrumentation
 - 4.1 Block diagram of process instrumentation system and purpose of each block.
 - 4.2 Basic principles of various sensors/transducers for measurement of temperature, pressure, strain and liquid level.
5. **ELECTRONIC MULTIMETER:**
 - 5.1 Advantage over conventional multimeter for voltage measurement with respect to input impedance and sensitivity, principles of voltage, current and resistance measurements.
 - 5.2 Specification of electronic multimeter and their significance.
6. **CATHODE RAY OSCILLOSCOPE:**
 - 6.1 Construction of CRT, Electron gun, Electrostatic focusing and acceleration (Explanation only-no mathematical treatment) Deflection sensitivity, Brief mention of screen phosphor for CRT. Internal Block Diagram of CRO.
 - 6.2 Explanation of time base operation and need for blanking during fly back, synchronization.
 - 6.3 Block diagram and explanation of a basic CRO and a triggered sweep oscilloscope, front panel controls.
 - 6.4 Specifications of CRO and their significance.
 - 6.5 Use of CRO for the measurement of voltage (D.C. & A.C.) frequency using Lissajous figure, time period, phase.
 - 6.6 Special features of dual trace, delayed sweep and storage CROs (Brief mention only).
 - 6.7 Brief idea of Digital Storage Oscilloscope.

7. AUDIO POWERMETER:

- 7.1 Block diagram of an audio power meter.
- 7.2 Principles of working its application and high frequency limitations.
- 7.3 Scale conversion from power to db.

8. IMPEDANCE BRIDGES QMETERS:

- 8.1 D.C. and A.C. Bridges:

D.C. bridges- Wheat stone bridge, Kelvin bridges, Sensitivity- Null indicators.

A. C. Bridges - Inductance bridges (Maxwell bridge), Capacitance bridges, Hays bridge, Anderson bridge, Schering bridge, Wein bridge, Twin network, Storage factor, Dissipation factor and their measurements.

- 8.2 Block diagram explanation and working principle of laboratory types (balancing type) RLC Bridge. Specifications of a RLC bridge, Principle of digital RLC bridge.
- 8.2 Block diagram and working principles of a Q meter.

9. DIGITALINSTRUMENTS:

- 9.1 Comparison of Analog and Digital instruments, characteristics of digital meter.
- 9.2 Working principle of Ramp, Dual slope and integrating type of digital voltmeter.
- 9.3 Block diagram and working of a digital multimeter.
- 9.4 Working principle of time interval frequency and period measurement using universal counter, frequency counter, time base stability and accuracy and resolution.

List of Books:

- 1. A. K. Sawhney- A course in Electrical &Electronic Measurement & Instrumentation – Dhanpat Rai & Sons
- 2. Helfric & Cooper –Modern Electronic Instrumentation and Measurement Techniques-PHI

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year III Semester

DEN-305: ELECTRICAL AND ELECTRONICS MEASUREMENT LAB

- 1 . To extend the range of an ammeter/voltmeter.
- 2 . To convert an ammeter into voltmeter.
- 3 . To measure power, power factor in a l-phase circuit using wattmeter and power factor meter and verify results with calculations.
- 4 . Measurement of voltage, frequency of a sinusoidal signal with C.R.O.
- 5 . Measurement of resistance, voltage, current with electronic multimeters (Analog & Digital) and compare threading.
- 6 . To calibrate three phase energy meter with the help of standard 3 phase energy meter.
- 1 . Measurement of Q of a coil and its dependence on frequency using a Q meter.
- 2 . To test a power supply for ripple, line and load regulation, Tracing of wave form, To find out operating range of power supply.
- 3 . Measurement of distortion of a LF signal generator using distortion factor meter.
- 4 . Measurement of R.L. and C using a LRC bridge/universal bridge.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year IV Semester

DEN-401: NETWORKING & PROGRAMMING IN C

1 CONCEPT OF PROGRAMMING:

Concept of Flow charring, algorithm, programming, Structured Programming Various Techniques of programming, Use of programming.

2 . PROGRAMMING IN C:

Data Types, Operators and Expressions; Input & Output print f, scanf, clibrary Control Statement: IF- ELSE, While, For, Do- While, Switch; Functions and modular programming; Scope of variables, parameter passing, recursion, block structure; preprocessor statements; pointers and arrays; structures and unions; File handling.

3 . NETWORKING:

What is network, need of network, terminology of network, network topologies, types of network, transmission media, network devices, network security?

4 . OPEN SOURCE CONCEPT:

Open source based software, free software, types of standard, common open standard format.

5 . IT APPLICATION:

Front and interface, backend database, front end and backend database connectivity, impact of ICT on society.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year IV Semester

DEN-401: NETWORK AND PROGRAMMING IN C

List of Experiments

1. Exercises involving output and input format controls in Pascal.
2. Exercises involving control transfer statements in C
3. Exercises with arrays & Pointers in C.
4. Exercises with functions in C.
5. Exercises with files in C.
6. Making of straight and cross wire UTP cable
7. Study of modem, switch, hub.
8. Creation of LAN.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year IV Semester

DEN-402: GENERATION, TRANSMISSION & DISTRIBUTION OF ELECTRICAL POWER

1. POWER PLANTS:

(A) Thermal Power Plant:

Plant layout and working of various elements, fuel handling combustion, combustion equipment, Steam generation and its temperature and pressure, environmental pollution due to dust and ash, methods of dust collection, cooling of turbo-alternators.

(B) Hydro-Electric Power Plant:

Plant layout and working of various elements, Hydrology and hydrograph, flow duration curves, Types of hydrograph plants and their use, Water turbines, Automatic and remote control of power plants,----- Head water control and Penstocks, Pumped storage plant.

(C) Nuclear Power Plant:

Plant layout and working of various elements. Fuels, Classification of nuclear power stations. Types of nuclear reactor, Coolants.

(D) Other Plants:

Plant layout and working of various elements of gas turbine plant, Open and closed cycle plants, Fuel and Fuel systems.

2. UNCONVENTIONAL POWER GENERATION:

Types of non-conventional energy resources, Solar cell and Solar power generation, Wind power generation, Role of unconventional power generation on rural socio-economic growth.

3. POWER PLANT ECONOMICS:

Load estimation, Load curves, Load and diversity factors, Demand factor, Plant capacity and utilization factors. Cost of generation and influence of load and diversity factors, Tariff and various methods of calculation, Bill preparation. Causes and effect of low power factor methods for improving power factor.

4. CONSTRUCTION FEATURES OF TRANSMISSION AND DISTRIBUTION LINES:

Constructional features of transmission and distribution lines. Types of supports, Types of conductors, Types of insulators. Erection of transmission towers and distribution poles. Fixing of insulators a on conductors, testing, operation and maintenance of distribution lines. Testing of insulators, Voltage distribution of string insulators, Vibration dampers. Basic idea of Sag calculation.

5. TRANSMISSION SYSTEM:

Short, medium and long transmission lines. Parameters of lines. Performance of short lines (Regulation, Efficiency, Vector diagram). Corona formation and its effects on performance of lines. Advantage of EHV transmission. Concept of HVDC transmission and its salient feature. Kelvin's law its limitations and utility.

Concepts of Grid and advantages.

6. DISTRIBUTION SYSTEM:

Feeders, distributors and service mains, radial and ring main distributors, A. C. distributors fed from one end and both ends (Simple problems on feeders and distributors).

7. UNDERGROUND CABLES:

H. T. and L. T. power cables construction, Cable joining, Laying of cables, Fault location, Murray loop test, Testing of cables, Comparison of underground cable with overhead line.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year IV Semester
DEN-403: COMMUNICATION ENGINEERING

1. INTRODUCTION

- 1.1 Brief idea of various types of communication system.
- 1.2 Need of modulation and demodulation in communication system.
- 1.3 Types of modulation-Brief description and typical application of AM, FM, phase modulation and pulse modulation (PAM, PPM and PCM).

2. AMPLITUDEMODULATION

- 2.1 Derivation of expression for an amplitude modulated wave. Carrier and side bands, modulation index and depth of modulation.
- 2.2 Relative power distribution in carrier and sidebands.
- 2.3 Elementary idea of DSB, DSB-SC, SSB, SSB-SC modulation and their comparison.

3. FREQUENCYMODULATION

- 3.1 Derivation of an expression for frequency modulated wave and its frequency spectrum (without analysis of Bessel= function) Modulation index, Maximum frequency deviation and deviation ratio.
- 3.2 Advantages and disadvantages of FM over AM in communication systems based on consideration of band width requirement and noise.

4. PHASEMODULATION

Expression of phase modulated wave and its comparison with frequency modulation. (Brief introduction only)

5. PRINCIPLE OF AMMODULATORS

- 5.1 Working principles and typical application of
 - Collector Modulator.
 - Base Modulator.
 - Balanced Modulator.
- 5.2 Single-Side-Band (SSB) generation and its typical applications.

6. PRINCIPLE OF FM MODULATORS

- 6.1 Working principle and applications of reactance tube modulator, varactor diode modulator and Armstrong phase modulator.
- 6.2 Limiter, pre-emphasis and de-emphasis in FM communication system.

7. DEMODULATION OF AMWAVES

- 7.1 Principle of demodulation of AM wave using diode detector circuit; concept of diagonal clipping and formula for RC time constant for minimum distortion (No derivation).
- 7.2 Comparison of typical diode detector circuits in a Radio and TV receiver.

8. DEMODULATION OF FMWAVES

- 8.1 Basic principles of detection of FM waves.
- 8.2 Foster-seely discriminator and its working principles.
- 8.3 Working of Ratio-detector circuit and its advantage over Foster-seely discriminator circuits.
- 8.4 Basic principle of Quartered election.

9. TRANSMITTERS

- 9.1 Block diagram of an AM transmitters and working of each stage. Low level and High level modulation.
- 9.2 Block diagram and working principle of reactance tube and Armstrong FM transmitters.

10. RADIORECEIVER

- 10.1 Brief description of crystal and TRF radio receivers; Need for and principles of super heterodyne radio receiver.
- 10.2 Block diagram of super-heterodyne AM receiver, function of each block and typical waveforms at the input and output of each block.
- 10.3 Block diagram of an FM receiver, function of each block and wave/forms at input and output at different blocks

11. ANTENNA AND PROPAGATION

- 11.1 Physical concept of radiation of electromagnetic energy from an antenna, relationship between the direction of electric and magnetic fields with direction of propagation; concept of polarization of EM waves.
- 11.2 Electromagnetic spectrum and its various range VLF,LF,HF, VHF, UHF, Micro wave, Optical waves etc.
- 11.3 Definition and physical concepts of the terms used with antennas like point source, gain, power gain, directivity aperture, effective area, radiation pattern,(field strength, power and phase) beam angle, beam width and radiation resistance.
- 11.4 Types of antennas-Brief description, characteristics and typical applications of medium wave antenna, shortwave antenna, HF antenna, VHF, UHF and Microwave antennae's., half wave dipole, ground plane, yagi and ferrit rod antenna in transistor receiver. Brief idea about Rhombic antenna, dish antenna, Horn, Parabolic reflector and Lens antenna.
- 11.5 Antenna arrays-Brief description of broad side and end fire arrays, their radiation pattern and application (without analysis);
- 11.6 Basic idea about different modes of radio wave propagation- ground wave propagation, space wave propagation and sky wave propagation, their characteristics and typical areas of application. (e.g. medium wave, shortwave, TV communication.)
- 11.7 Explanation of the terms-critical frequency, maximum usable frequency (MUF) and skipdistance.

List of Books

- 1. Simon Haykin- Communication System- John Wiley & Sons.
- 2. Kennedy & Davis-Electronic Communication System-Tata Mcgraw Hill.
- 3. Sombir Singh - Principle of Communication Engineering- Jai Prakesh Publication, Meerut

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year IV Semester

COMMUNICATION ENGINEERING LAB

List of Experiments

- 1 . To observe an AM wave on CRO and calculate the modulation index.
- 2 . To observe the output of reactance tube modulator.
- 3 . To observe the output of balanced modulator.
- 4 . Identification of different block and tracing of wave shapes at different block of a super heterodyne radio receiver.
- 5 . Tracing of circuit and fault finding in different stages of AM radio receiver.
- 6 . Tracing of circuit and output of a AM detector circuit.
- 7 . To plot the selectivity characteristics of a radio receiver.
- 8 . To plot the sensitivity characteristics of a radio receiver
- 9 . Tuning and alignment of radio receiver.
- 10 . To study the different types of antennas.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year IV Semester
DEN-404: POWER ELECTRONICS

1 . INTRODUCTION:

- (I) Role of power electronics in the field of electric power control.
- (II) Salient features of power semiconductor devices and relative comparison from application point of view.
- (III) Characteristics and symbols of power semiconductor devices.
- (IV) Types of power electronic circuits.

2 . POWER SEMI CONDUCTOR DIODES:

- (I) Characteristics and applications of general purpose diode, fast recovery diode and schottky diode.
- (II) Series and Parallel operation of power diodes.
- (III) (III)Performance parameters.

3 . THYRISTORS:

- (I) Construction, characteristics and application of SCR, Gate, Turn off thyristor (GTO thyristor), and Light activated SCR and reverse conducting SCR, Performance parameters.
- (II) Methods of triggering a SCR, Gate characteristics. General layout of gate triggering circuits, R-C firing circuit, characteristics of UJT and its application in the triggering of SCR, Triggering of GTO thyristor.
- (III) Commutation of SCR, methods of commuting a SCR, converter grade and Inverter grade SCRs.
- (IV) Series and Parallel operation of SCR.
- (V) Protection of SCR and GTO thyristor.
- (VI) Construction, Characteristics and applications of Diac and Triac.

4 . POWER TRANSISTORS:

- (I) Characteristics and application of Bipolar Junction, Transistor, Power MOSFET, Performance Parameter.
- (II) Base drive requirements, typical base drive circuits.
- (III) Service and parallel operation of power transistor.
- (IV) Protection of power transistor.

5 . CONTROLLED RECTIFIERS:

- (I) Phase controlled rectifier operation on resistive and resistive inductive loads. Use of freewheeling diode.
- (II) Single phase and three phases controlled and fully controlled bridge rectifiers, Dual converters, Effect of load and source inductance. Performance comparison. Capacitor aided commutation.
- (III) Single phase and three phase line commutated bridge invertors.
- (IV) Simple numerical problems on controlled rectifiers.

6 . A. C. VOLTAGE CONTROLLERS:

- (I) Principle of integral cycle control and phase control.
- (II) Single phase and Three phase A. C. voltage controllers. Various configurations.
- (III) Single Phase transformer Tap Changer.
- (IV) Single phase and Three phase Cyclo-Converter.

7 . CHOPPERS:

- (I) Principle of operation and control techniques of chopper, current and voltage waveforms for resistive inductive static and motor loads, effects of chopper frequency and load inductance.
- (II) Voltage commutated and current cumulated thyrist or chopper circuits. Power transistor chopper circuits, Use of input and output D. C.filters.
- (III) Step up chopper and its applications.

8 . INVERTERS:

- (I) Single phase series and parallel inverters. Output voltage and current waveforms.
- (II) Principle of operation of bridge inverter concept of voltage source. Current source and Pulse width modulated bridge inverter. Performance parameters.
- (III) Single phase and Three phase voltage source (auxiliary and complementary commutated only) and current source bridge inverters, methods of voltage control, various techniques of pulse width modulation, comparison of voltage source and current source inverters application.
- (IV) High frequency inverters and their application.

9 . POWER SUPPLIES:

- (I) D. C. and A. C. power supplies, Switched mode power supplies, Resonant power supply and Bi-directional power supply.
- (II) Switching mode regulators, Principle of switching mode regulator; Bulk, Boost, Bulk-Boost regulators.

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

DEN-404: POWER ELECTRONICS

LIST OF PRACTICALS

- 1 . V-I characteristics of SCR.
- 2 . Study of R-C firing circuit of SCR.
- 3 . Study of UJT firing circuit of SCR.
- 4 . Study of Power Transistor as as witch.
- 5 . Study of SCR as witch.
- 6 . Power control using Diac andTriac.
- 7 . Fabrication and testing of Half Controlled Bridge Rectifier circuit.
- 8 . Fabrication and testing of SCR Chopper Circuit.
- 9 . Fabrication and Testing of Single Phase Series inverter circuit.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year IV Semester

DEN-405: ENERGY CONSERVATION

1. Basics of Energy

- 1.1 Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy, Capacity factor of solar and wind power generators.
- 1.2 Global fuel reserve
- 1.3 Energy scenario in India and state of U.P. Sector-wise energy consumption (domestic, industrial, agricultural and other sectors)

2. Impact of energy usage on climate

- 2.1 Introduction to energy management, energy conservation, energy efficiency and its need
- 2.2 Salient features of Energy Conservation Act 2001 & The Energy Conservation (Amendment) Act, 2010 and its importance. Prominent organizations at centre and state level responsible for its implementation.
- 2.3 Standards and Labeling
 - 2.3.1 Concept of star rating and its importance
 - 2.3.2 Types of product available for star rating

3. Electrical Supply System and Motors

- 3.1 Types of electrical supply system
- 3.2 Single line diagram
- 3.3 Losses in electrical power distribution system
- 3.4 Understanding Electricity Bill
 - 3.4.1 Transformers Tariff structure
 - 3.4.2 Components of power (kW, kVA and kVAR) and power factor, improvement of power factor
 - 3.4.3 Concept of sanctioned load, maximum demand, contract demand and monthly minimum charges(MMC)

3.5 Transformers

- 3.5.1 Introduction
- 3.5.2 Losses in transformer
- 3.5.3 Transformer Loading
- 3.5.4 Tips for energy savings in transformers

3.6 Electric Motors

- 3.6.1 Types of motors
- 3.6.2 Losses in induction motors
- 3.6.3 Features and characteristics of energy efficient motors
- 3.6.4 Estimation of motor loading
- 3.6.5 Variation in efficiency and power factor with loading
- 3.6.6 Tips for energy savings in motors

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

II Year IV Semester
DEN-405: ELECTRICAL & ELECTRONICS MINOR PROJECT

GENERAL OBJECTIVES

After the completion this course the learner will be able to

1. Become familiar with identification and testing of common tools and components used in electrical and electronics.
2. Become familiar with domestic and semi-domestic practical models.
3. Become familiar with preparation of project report consisting of 4 to 5 pages.

Fabrication and testing of the following mini projects -

1. Single Stage Amplifier
 2. Full wave rectifier using Pi Filter
 3. Two Stage R-C coupled Amplifier
 4. Clipping and clamper circuit.
 5. Porch light using LER & SCR.
 6. Clap Switch
 7. Water Level Indicator.
 8. Temperature indicator.
 9. Lamp Dimmer.
 10. Seven segment display
 11. Fabricate distribution board consisting of 2 or 3 electrical points.
 12. Stair case wiring
-
1. 20/40 watt tube light connection diagram.

Note:

Student should fabricate and test at least 4 projects and to prepare a small project report for every project consisting of circuit diagram, brief detail of used component and total cost of the project (The report should not exceed from 4 to 5 pages).

Some other mini project can be prepared with the consultation of faculty member according to the local needs/ availabilities.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year V Semester

**DEN-501 INDUSTRIAL MANAGEMENT AND ENTREPRENEURSHIP
DEVELOPMENT**

1. Principles of Management

- 1.1 Management, Different Functions: Planning, Organizing, Leading, Controlling.
- 1.2 Organizational Structure, Types, Functions of different departments.
- 1.3 Motivation: Factors, characteristics, methods of improving motivation, incentives, pay, promotion, rewards, job satisfaction, job enrichment.
- 1.4 Need for leadership, Functions of a leader, Factors for accomplishing effective leadership, Manager as a leader, promoting teamwork.

2. Human Resource Development

- 2.1 Introduction, objectives and functions of human resource development (HRD) department.
- 2.2 Recruitment, methods of selection, training strategies and career development.
- 2.3 Responsibilities of human resource management – policies and functions, selection – Mode of selection –Procedure – training of workers, Job evaluation and Merit rating.

3. Wages and Incentives

- 3.1 Definition and factors affecting wages, methods of wage payment.
- 3.2 Wage incentive – type of incentive, difference in wage, incentive and bonus; incentives of supervisor.
- 3.3 Job evaluation and merit rating.

4. Human and Industrial Relations

- 4.1 Industrial relations and disputes.
- 4.2 Relations with subordinates, peers and superiors.
- 4.3 Characteristics of group behavior and trade unionism.
- 4.4 Mob psychology.
- 4.5 Grievance, handling of grievances.
- 4.6 Agitations, strikes, Lockouts, Picketing and Gherao.
- 4.7 Labour welfare schemes.
- 4.8 Workers' participation in management.

5. Professional Ethics

- 5.1 Concept of professional ethics
- 5.2 Need for code of professional ethics.
- 5.3 Professional bodies and their role.

6. Sales and Marketing management

- 6.1 Functions and duties of sales department.
- 6.2 Sales forecasting, sales promotion, advertisement and after sale Services.
- 6.3 Concept of marketing.
- 6.4 Problems of marketing.
- 6.5 Pricing policy, break even analysis.
- 6.6 Distribution channels and methods of marketing.

7. Labour Legislation Act (as amended on date)

- 7.1 Factory Act 1948.
- 7.2 Workmen's Compensation Act 1923.
- 7.3 Apprentices Act 1961.
- 7.4 PF Act, ESI Act.
- 7.5 Industrial Dispute Act 1947.
- 7.6 Employers State Insurance Act 1948.
- 7.7 Payment of Wages Act, 1936.
- 7.8 Intellectual Property Rights Act

8. Material Management

- 8.1 Inventory control models.
- 8.2 ABC Analysis, Safety stock, Economic ordering quantity.
- 8.3 Stores equipment, Stores records, purchasing procedures, Bin card, Cardex.
- 8.4 Material handling techniques.

9. Financial Management

- 9.1 Importance of ledger and cashbook.
- 9.2 Profit and loss Account, Balance sheet.
- 9.3 Interpretation of Statements, Project financing, Project appraisal, return on investments.

10. Entrepreneurship Development

- 10.1 Concept of entrepreneur and need of entrepreneurship in the context of prevailing employment conditions.
- 10.2 Distinction between an entrepreneur and a manager.
- 10.3 Project identification and selection.
- 10.4 Project formulation.
- 10.5 Project appraisal.
- 10.6 Facilities and incentives to an entrepreneur.

11. Fundamental of Economics

- 11.1 Microeconomics.
- 11.2 Macroeconomics.

12. Accidents and Safety

- 12.1 Classification of accidents based on nature of injuries, event and place.
- 12.2 Causes and effects of accidents.
- 12.3 Accident-prone workers.
- 12.4 Action to be taken in case of accidents with machines, electric shock, fires and erection and construction accidents.
- 12.5 Safety consciousness and publicity.
- 12.6 Safety procedures.
- 12.7 Safety measures – Do's and Don'ts and good housekeeping

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year V Semester

DEN-502 SWITCH GEAR AND PROTECTION

1. Faults:

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:

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 circuits-breakers, comparison with oil circuit Breaker classification, rating of circuit breakers, working of different

Types of air and oil circuit breaker, specification of circuit breakers, Maintenance schedule. SF-6 and 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 of distance relay.

3. Protective Schemes:

3.1 Protection of alternators, stator faults, 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, Buckholtz 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:

4.1 Causes of over voltages, travelling wave's earth wire, protective zone, Lightning arrestors, space-gap and electrolytic arrestors, surge Absorber, location and rating of lightening arrestors Thyrite lightening Arrestor.

5. Different Type of Sub-Stations:-

Layout, single line diagram bus bar arrangement, equipment's their functions, Accessories, study of protective schemes, etc. batteries and their Maintenance, operation of small sub-station.

Reactors: types of reactors, bus bar reactor, tuning reactor, arc-suppression Reactor connection of reactors in power stations. Uses o reactors.

Neutral grounding: - types of grounding solid grounding, reactance Grounding, arc suppression coil grounding, choice of method of neutral Earthing. Grounding of sub-station, grounding of line structure And substation equipment.

Concept of G.I.S. (Gas Insulated Substation).

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year V Semester
DEN-503: MICROPROCESSOR AND APPLICATION

1. OVERVIEW OF MICROCOMPUTERS SYSTEM:

1.1 Functional block.

- (a) CPU.
- (b) Memory.
- (c) Input/Out devices (Keyboard, Floppy drive, Hard disk drive, Tape drive, VDU, Printer, Plotter).

1.2 Concept of programme and data memory.

- (a) Registers (general purpose).
- (b) External memory for storing data and results.

1.3 Data transfer between registers.

1.4 Concept of tristatebus.

1.5 Control on registers.

2. INTRODUCTION OF 8085MICROPROCESSOR:

Evolution of Microprocessor, Register Structure, ALU, BUS Organization, Timing and Control. Internal Architecture of 8085 microprocessor, Pin diagram and input output(in detail)

3. INTRODUCTION OF 8086MICROPROCESSOR:

Internal organization of 8086, Bus Interface Unit, Execution Unit, Unit, register, Organization, Sequential Memory Organization, Bus Cycle.

4. ASSEMBLY LANGUAGE PROGRAMMING:

Addressing Modes, Data Transfer, Instructions, Arithmetic and Logic Instruction, Program Control Instructions (Jumps, Conditional Jumps, Subroutine Call) Loop and String Instructions, Assembler Directives.

5. BASIC I/O INTERFACING:

Programmed I/O, Interrupt Driven I/O, DMA, Parallel I/O (8255-PPI, Centronics Parallel Port), Serial I/O(8251/8250, RS-232 Standard), 8259-Programmable Interrupt Controller, 8237-DMA Controller, 8253/8254-Programmable Timer/Counter, A/D and D/A conversion.

6. MEMORY INTERFACING:

Types of Memory, RAM and ROM Interfacing with Timing Considerations, DRAM Interfacing. Memory organization, Extension of memory in word length and depth, Memory mapping, Bus contention and How to avoid it.

7. ADVANCE MICROPROCESSOR AND MICRO CONTROLLERS:

Brief idea of Microcontroller 8051, Pentium and Power PC

NOTE: Study of Popular ICs Read/WriteChips-8155/8156,2114,2148,2164. ROM Chips- 8355,2716,2732,8755.Othersupport chips - 8279,8257,8275,8205.

LIST OF BOOKS

- 1. Singh, B. P. - Advanced Microprocessor and Microcontrollers- New Age International.
- 2. Singh, B. P. - Microprocessor Interfacing and Application -New Age International.
- 3. Brey, Barry B.-INTELMicroprocess-Prentic Hall (India)-4thEdition.
- 4. Liu and Gibson G.A. - Microcomputer System-The 8086/8088 Familly- Prentice Hall (India) 2ndEdition.
- 5. Sombir Singh- Microprocessor and Its Application-Jai Prakesh Publication, Meerut

Department of Electrical & Electronics Engineering
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P.K. University, Shivpuri (MP)

III Year V Semester
MICROPROCESSORS AND APPLICATIONS LAB

List of Practical's

- 1 . Assembly language programming: -Programming of simple problems. Assembly Language Programming using addition, subtraction, multiplication, division, larger, largest, smaller, smallest, positive and negative, etc. 8bit and 16 bit based programming.
- 2 . Simple programming problems using 8085 and 8086 Trainer kit to gain competence in the use of
 - (a) 8085 and 8086 Instruction set.
 - (b) Support chips of 8085 and 8086.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year V Semester

DEN-504: CONTROL SYSTEM

1. Introduction:

Need of automatic control, Concept of open loop and closed loop control, Block diagram of feedback control system and its basic elements, definition and explanation of following control system.

- (i) Linear and Non-Linear Systems.
- (ii) Continuous and discrete Systems.
- (iii) Static and Dynamic Systems.
- (iv) Single Input Single Output (SISO) System and Multi input Multi output (MIMO) System.

Process and Process characteristics, Analogy with electrical system, Concept of process time delay.

2. Components & Devices Used In Control System:

Brief description and working of potentiometer, self-balancing potentiometer, differential transformer, synchros, servomotors, tacho generators, DC Servo motors and DC Techo Generator, Eddy current clutch.

3. Input Output Relationship of System & Control system Components:

- (i) Concept of transfer function and its use in control system.
- (ii) Derivation of transfer functions of following systems and components.
 - (a) Simple RC low pass network.
 - (b) First order thermal system and fluid level system.
 - (c) General Feedback Control System.

4. Performance of Control System:

- (i) Step, Ramp, Pulse and sinusoidal type inputs and their Laplace Transforms.
- (ii) Time domain response of First order and second order system with step input.
- (iii) Definitions of Rise time, Peak overshoot, Settling time, Natural frequency and Damping Ratio pertaining to second order system.
- (iv) Initial value and final value theorems and their use in control systems.
- (v) Types of feedback systems and error constants.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year V Semester
DEN-505: ELECTRICAL DRAFTING IN AUTOCAD

- 1. INTRODUCTION TO AUTOCAD ELECTRICAL:**
What are AutoCAD electrical, drawing files, electrical files, electrical components and wires, design methodologies.
- 2. PROJECT FILES:**
Project files, Project manager interface, Accessing project files, Opening a drawing, Create a drawing to a project file, Managing drawings in projects, Project manager drawing list.
- 3. SCHEMATICS - I SINGLE WIRES/COMPONENTS:**
Referemcomg, Ladders, Insert wores, Edit wires, Addrungs wire setup, Wire numbers, Source and destination signal arrows, Insert component, Parret/Child component.
- 4. SCHEMATICS - II MULTIWIRE AND CIRCUITS:**
Dashed link lines, 3 phase ladders, Multiple wire bus, 3 Phase wire numbering, cable markers, fan in. out, insert saved circuits, save circuits to icon menu, block circuits, move circuit, copy circuit, circuit builder.
- 5. EDITING COMMANDS:**
Edit component, Project Task list, Move components, Copy components, Align, Delete component, Surfer command, Copy catalog assignment, Copy installation/location code values, Attribute editing commands.
- 6. PANEL DRAWINGS:**
Insert Foot Print (Icon Menu), Insert Foot Print (Schematic List), Insert Component (Panel List), Edit Foot Print, Assign Item Numbers, Add Balloons.
- 7. TERMINALS:**
Insert terminal symbols, multiple level terminals, multiple insert component command, Insert jumpers, Terminal strip editor, Din rail command.
- 8. PLCSYMBOLS:**
Insert PLC (Parametric), Insert PLC (Full Units), Insert individual PLC I/o points, PLC based taffing, Spread sheetto PLC I/o Utility.
- 9. POINT TO POINT WIRING DRAWINGS:**
Insert connectors, editing connectors, Insert spliess, Insert multiple wires, Bend wires.
- 10. SYMBOL CREATIONS:**
Schematic symbol, Naming convention, Icon menu wizard, AutoCad electrical databases, Projects database, Catalogue Database, Foot Print Lookup Database, PLC data base, Pin list data as, Terminal properties database.
- 11. TITLE BLOCKS:**
Update Title Blocks, Title Block Setup.
- 12. REPORTING TOOLS:**
Create Reports, Save to External Files, Put on Drawing, Configure Reports Templates, running Automatic Reports, Electrical Audit.
- 13. SETTING AND TEMPLATES:**
Project Properties, Drawing properties, Panel Drawing configuration, Templates Files, Sharing Symbol Libraries and Database
- 14. DRAWING UPDATE TOOLS:**
Project-wide update/Retag, Project-wide utilities, Plot project, Export to spreadsheet, Copy project, Swap/Update block, Mark drawing, Verify drawing.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year V Semester
DEN-506 INTEGRATIVE COMMUNICATION LAB

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 You 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–

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 Body language Signs And Their Meaning

UNDERSTANDING OTHERS

11. Leadership Traits & Skills:

Introduction, Important Leadership Traits (Alertness, Bearing, Courage, Decisiveness, Dependability, Endurance, Enthusiasm, Initiative, Integrity, Judgment, Justice, Knowledge, Loyalty, Sense of Humor), Other Useful Traits (Truthfulness, Esprit-de-corps, Unselfishness, Humility and sympathy, Tact without loss of moral courage, Patience and a sense of urgency as Appropriate, Self-confidence, Maturity, Mental including emotional stability)

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year VI Semester

DEN-601: ENVIRONMENTAL EDUCATION & DISASTERMANAGEMENT

1. **INTRODUCTION:-** 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 biopesticides and bio fungicides. Global warning concerns, Ozone layer depletion, Greenhouse effect, Acid rain, etc.
2. **POLLUTION:**
Sources of pollution, natural and man-made, their effects on living environments and related legislation.
- 2.1 **WATER POLLUTION:**
 - 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 wastewater.
 - 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.

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:

Preliminary knowledge of the following Act 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 EP Act -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):

- 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.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year VI Semester

DEN-602: INDUSTRIAL DRIVES AND CONTROL

1. ELECTRICAL DRIVES:

- 1.1 An introduction to Electrical Drives
- 1.2 Advantages of Electrical Drives.
- 1.3 Parts of electrical drives- Electrical Motors, Power modulators, Sources, Control Unit.
- 1.4 Choice of Electrical Drives.
- 1.5 Status of DC and AC Drives.

2. DYNAMICS AND CONTROL OF ELECTRICAL DRIVES:

- 2.1 Fundamental Torque Equations.
- 2.2 Speed Torque conventions and multi quadrant operation.
- 2.3 Equivalent values of drive parameters.
 - 2.3.1 Load with rotational motion.
 - 2.3.2 Load with translation motion.
 - 2.3.3 Measurement of moment of inertia.
- 2.4 Components of load torques.
- 2.5 Nature and classification of load torques.
- 2.6 Calculation of time and energy loss in transient operation.
- 2.7 Steady state stability.
- 2.8 Load Equalization.
- 2.9 Speed control and drive classifications.
- 2.10 Closed-Loop Control of Drives.
 - 2.10.1 Current limit control
 - 2.10.2 Closed-loop torque control
 - 2.10.3 Speed sensing
 - 2.10.4 Phase locked loop (PLL) Control
 - 2.10.5 Closed loop position control.

3. SELECTION OF MOTOR POWER RATING:

- 3.1 Continuous Duty.
- 3.2 Equivalent current. Torque and power methods for fluctuating and intermittent loads.
- 3.3 Shot time duty.
- 3.4 Frequency of operation of motors. Subjected to intermittent load.

4. DC DRIVES:

- 4.1 Introduction
- 4.2 Basic Characteristics of DC Motors
- 4.3 Operating Modes.
- 4.4 Single phase drives.

- 4.4.1 Single Phase half wave converter Derives
- 4.4.2 Single Phase Semi converter Derives
- 4.4.3 Single Phase Full converter Derives
- 4.4.4 Single Phase Dual converter Derives
- 4.5 Three Phase drives-
 - 4.5.1 Three Phase Half Wave Converter Drives
 - 4.5.2 Three Phase Semi Converter Drives
 - 4.5.3 Three Phase Full Converter Drives
 - 4.5.4 Three Phase Dual Converter Drives
- 4.6 DC-DC Converter Drives-
 - 4.6.1 Principle of Regenerative Break Control
 - 4.6.2 Principle of Rheostatic Break Control
 - 4.6.3 Principle of combined Regenerative & Rheostatic Break Control
 - 4.6.4 Two & Four Quadrant DC-DC Converter Drives
- 4.7 **Closed Loop Control of DC Drives-**
 - 4.7.1 Phase Locked Loop Control
 - 4.7.2 Open Loop and Closed Loop Transfer Function.
- 5. AC DRIVES:**
 - 5.1 Introduction
 - 5.2 Performance Characteristics
 - 5.3 Rotor Voltage Control
 - 5.4 Frequency Control
 - 5.5 Voltage and Frequency Control
 - 5.6 Current Control
 - 5.7 Voltage, Current and Frequency Control
 - 5.8 Closed Loop Control of Induction Motors.
 - 5.9 Synchronous Motor Drives
 - 5.9.1 Cylindrical Rotor Motor
 - 5.9.2 Salient Pole Motor
 - 5.9.3 Reluctance Motor
 - 5.9.4 Permanent Magnet Motors.
 - 5.9.5 Switched Reluctance Motors.
- 6. TRACTION DRIVES:**
 - 6.1 Electric Traction services.
 - 6.2 Nature of Traction Load
 - 6.3 Braking
 - 6.4 Important Features of Traction Drives.
 - 6.5 Traction Motor-
 - 6.5.1 Motor Employed in Traction
 - 6.5.2 Traction Motor Control
 - 6.6 **Traction Drives-**
 - 6.6.1 A D.C. Traction drives employing resistance control.
 - 6.6.2 25 KV, 50Hz, A.C. traction using on load transformers tapchanger.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year VI Semester
INDUSTRIAL DRIVES AND CONTROL LAB

1. Fabrication and testing of electronic fan speed regulator.
2. Study of serving motor and synchros.
3. To study speed control of separately excited DC motor by varying armature voltage using single phase fully controlled bridge converter.
4. To study speed control of separately excited DC motor by varying armature voltage using single phase half controlled bridge converter.
5. To study speed control of separately excited DC motor using single dual converter.
6. To study speed control of separately excited DC motor using MOSFET/IGBT chopper.
7. To study speed control of single phase induction motor using single phase AC voltage controller.
8. To study speed control of Three Phase induction motor using Three Phase AC Voltage controller.
9. Thristered speed control of 3 Phase induction motor.
10. To study speed control of Three Phase Slip Ring Induction Motor using Static Rotor Resistance Control using Rectifier and Chopper.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year VI Semester
DEN-603: TROUBLE SHOOTING ANDSERVICING

GENERAL OBJECTIVES

After the completion this course the learner will be able to

1. Become familiar with identification and testing of common tools and components used in electrical and electronics.
2. Become familiar with fault finding/servicing of common domestic equipment.
3. Become familiar with procedure adopted for the trouble shooting/servicing such as symptoms analysis, circuit tracing, major measurement and signal injection and tracing etc. consisting of 4 to 5pages.

Students have to perform at least 10 types of trouble shooting/ servicing. Some of them are given-

1. Trouble shooting and servicing of common lab equipment such as multimeter, power supply, energy meter, CRO etc.
2. Trouble shooting and servicing of the following
 - Room Heater
 - Fans
 - Tube Light
 - Stabilizers
 - Invertor
 - House Wiring
 - Radio Receiver
 - Refrigerator
 - Single/Three Phase Wiring
 - DVD Player
 - Electric Press
 - DC Motors/Induction Motors (3 Phase and 1Phase)
 - Single Phase and Three Phase Transformer

Other home/industrial appliance can also be included with consultation of the Faculty member.

In each exercise the circuit diagram, operating voltages at major point and the component replaced must be shown very clearly.

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year VI Semester
DEN-604: ELECTRIC TRACTION

1. Introduction:

Electric traction system and its advantages over other system, types of electric traction systems. Traction systems for India.

2. Electric traction drives:

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:

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

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

Equipment required for rectification their brief theory and working.

6. Overhead Equipment

Design aspects of overhead equipment catenary and its types, practical aspects of working, maintenance of overhead equipment, current collection system, their requirements.

7. Track Circuits

D.C. and A.C. track circuits, signals for traffic control,

8. Supervisory Remote Control

System of remote control, its advantages, mimic diagram, remote control system and network remote control center (R.C.C.)

9. Rail and Return Path

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

Department of Electrical & Electronics Engineering
(Faculty of Engineering & Technology)
P.K. University, Shivpuri (MP)

III Year VI Semester
DEN-605: PROJECT

GENERAL OBJECTIVE:

Purpose of the project work is:

(i) To develop abilities of diagnosing problems.

(ii) To develop the abilities to:

- (a) Make literature survey.
- (b) Design/develop/fabricate/test simple circuits.
- (c) Prepare documents for electronic work.
- (d) Work as a team.

LIST OF PROJECTS (TO BE ASSESSED INTERNALLY):

The list of projects shown below is indicative of general nature and the complexity of work to be entrusted to students. (Teachers can modify this list to suit local needs and constraints keeping the level of complexity as suggested here).

1. To assemble and test a regulated power supply (15 V/1Amp).
2. To assemble and test a two stage R/c coupled amplifier and to calculate overall gain, loading effect and frequency response curve.
3. To assemble and test a invertors (500W).
4. To assemble and test the speed control of motor.
5. To assemble and test a battery charger with necessary control.
6. To assemble and test an automatic street light controller.
7. To assemble and test an automatic door opener/closer of a college/factory.
8. To assemble and test an audio amplifier (50W).
9. To assemble a AM/FM Radio receiver.

NOTE:-

1. Depending upon the complexity of the work, the teacher may assign any number of project works to a group. The group size will also be similarly decided by the teacher, normally between 2 to 4 students per group.

2. A project report (of about 100 typed computer pages) should submit covering the following points.
3. Basic design procedure for the project circuit.
4. Full block diagram and/or circuits diagram showing the component values.
5. Component layout diagram, including component and copper side details of the PCB used.
6. List of components used showing type's voltage/current ratings, tolerance values and other specifications.
7. Details of heat sink used IC and Transistor pin connections and types of packages.
8. Test and measurement procedure.
9. Discussion on the deviation of the results from the given specifications.
10. Estimating and costing with discussion about selection of components from cost point of view.