

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



**Syllabus and
Evaluation Scheme**

DIPLOMA
Electrical & Electronics Engineering

2ND SEMESTER

(Effective from Session: 2025-26)

**STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME
IN EEE**

YEAR-1st/SEMESTER -2nd

SUBJECT CODE	SUBJECTS NAME	STUDY SCHEM E Periods/Wee k			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal & External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	
DAPPLEX201	Applied Mathematics -II	3	1	0	4	30	-	30	70	-	70	100
DAPPLEX202	Applied Physics -II	2	1	0	3	30	-	30	70	-	70	100
DBASIEX203	Basic Electrical Engineering & Circuit Analysis	3	1	0	4	30	-	30	70	-	70	100
DFUNDEX204	Fundamentals Of Electrical And Electronics Engineering	3	0	0	3	30	-	30	70	-	70	100
DINTREX205	Introduction to Computer	3	0	0	3	30	-	30	70	-	70	100
DINTREX206	Introduction to Computer Lab	0	0	2	1	-	25	25	-	25	25	50
DAPPLEX207	Applied Physics –II Lab	0	0	2	1	-	25	25	-	25	25	50
DFUNDEX208	Fundamentals Of Electrical & Electronics Engineering Lab	0	0	2	1	-	25	25	-	25	25	50
DBASIEX209	Basic Electrical Engineering & Circuit Analysis Lab	0	0	2	1	-	25	25	-	25	25	50
Total		14	3	8	21	150	100	250	350	100	450	700

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I Year II Semester

L	T	P
3	1	0

DAPPLEX201 APPLIED MATHEMATICS II

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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DAPPLEX202: 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.

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**DBASIEX203 BASIC ELECTRICAL ENGINEERING &
CIRCUIT ANALYSIS**

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.

LIST OF BOOKS

- 1. J. P. Ryder- Network Filters & Transmission Line- PHI
- 2. A. Chakravorty- An Introduction to Network, Filters & Transmission Line- Dhanpat rai & Co.
- 3. D. R. Chaudhry- Network Analysis- Dhanpat Rai & Co.
- 4. V. K. Aatre- Network Theory & Filter Design- New Age International Pub.

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**DFUNDEX204: Fundamentals of Electrical and
Electronics Engineering**

COURSE CONTENTS

UNIT- I Overview of electronic components: (12 Periods)

Active and Passive components, Resistor, Capacitor, Inductor and their types. Introduction to semiconductor, Intrinsic and Extrinsic semi-conductors, P-N Junction diode - forward and reverse bias, V-I characteristics, Zener diode, LED. Bipolar Junction Transistor - PNP and NPN Transistor and their characteristics. Basics of FET, MOSFET.

UNIT- II Basic measuring instruments: (06 Periods)

Basic concept of Ideal and non-ideal voltage and current sources, sinusoidal and non sinusoidal waveforms, ammeter, voltmeter, wattmeter and digital multimeter, CRO (Block diagram, working and its uses)

UNIT –III Overview of Digital Electronics: (10 Periods)

Analog and digital signal, advantages of digital system. Introduction to Logic levels and Boolean Algebra, Basics of number system, Logic Gates-Truth Table and Symbol of AND, OR, NOT, NAND, NOR, ExOR, ExNOR Gates. Introduction to Latch, Flip Flops, Combinational Circuit and Sequential Circuit.

UNIT -IV Electric and Magnetic Circuits: (8 Periods)

Definitions of basic terms, such as Current, Resistance, EMF, Potential Difference, Power and Energy, Ohm's Law and its limitation, Kirchhoff's laws; M.M.F, magnetic force, flux, permeability, hysteresis loop, reluctance, leakage factor and BH curve; Electromagnetic induction, Faraday's laws of electromagnetic induction, Lenz's law; Dynamically induced emf; Statically induced emf; Equations of self and mutual inductance; Analogy between electric and magnetic circuits.

UNIT -V A.C. Circuits: (10 Periods)

Cycle, Frequency, Periodic time, Amplitude, Angular velocity, RMS value, Average value, Form Factor Peak Factor, impedance, phase angle, and power factor; Mathematical and phasor representation of alternating emf and current; A.C in resistors, inductors and capacitors; A.C in R-L series, R-C series, RL-C series circuits; Power in A. C. Circuits, power triangle; Relationship between line and phase voltage and line and phase current in Star and Delta connections.

Unit -VI Transformers and Machines: (10 Periods)

Single phase transformer: Construction, working principle, types, EMF equation, transformation ratio of transformers. Brief idea of Auto transformer. Machines: DC machines: Types, EMF equation of generator and motor. Single Phase Induction Motor: Principle of operation and introduction to methods of starting. Three Phase Induction Motor: Construction and Principle of operation.

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DINTREX205: 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.

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DINTREX206: INTRODUCTION TO COMPUTER LAB

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0	0	2

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.

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L	T	P
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DAPPLEX207: APPLIED PHYSICS-II LAB

Note: Any 4 experiments are to be performed.

2. Determination of coefficient of friction on a horizontal plane.
3. Determination of 'g' by plotting a graph T^2 versus l and using the formula $g = 4\pi^2 / \text{Slope of the graph line}$
4. Determine the force constant of combination of springs incase of 1. Series 2.Parallel.
5. To verify the series and parallel combination of Resistances with the help of meter bridge.
6. To determine the velocity of sound with the help of resonance tube.
7. Determination of viscosity coefficient of a lubricant by Stoke's law.
8. Determination of E_1/E_2 of cells by potentiometer.
9. Determination of specific resistance by Carry Foster bridge.
- 10.Determination of resistivity by P.O.Box.
11. Verification of Kirchhoff's Law.
12. To draw Characteristics of p-n Junction diode.
13. 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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L	T	P
0	0	4

**DFUNDEX208: Fundamentals of Electrical and Electronics
Engineering Lab**

List of Practicals

1. Identify various passive and active electronic components in the given circuit.
2. Determine the value of given resistor using digital multi-meter to confirm with color code.
3. Exercise of soldering and de-soldering of components in circuits.
4. To study performance of PN-junction diodes and draw its V-I characteristics.
5. To measure frequency, time period and amplitude of a sinusoidal signal using CRO.
6. To measure voltage and current using digital multi-meter.
7. To verify the truth tables for all logic gates – NOT, OR, AND, NAND, NOR, XOR, XNOR.
8. Implement and realize Boolean Expressions with Logic Gates
9. Verify the Kirchhoff's laws.
 10. Measure voltage, current and power in 1-phase circuit with resistive load.
 11. Measure voltage, current and power in R-L series circuit.
 12. Verify the ohms law.
13. Use of voltmeter, ammeter, and watt-meter.
14. Connect resistors in series and parallel combination on bread board and measure its value using digital multi-meter.
15. Connect capacitors in series and parallel combination on bread board and measure its value using multi-meter.

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L	T	P
0	0	2

DBASIEX209: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.