

III Term (Core)

7 Hours / Week

Total Hours : 84

Major Divisions

- Unit I Electrostatics And D.C. Circuits
- Unit II Network Theorems
- Unit III Single Phase A.C Circuits
- Unit IV Polyphase A.C. Circuits And Resonant Circuits
- Unit V Storage Batteries

Unit I Electrostatics and D.C. Circuits**17 hrs****a) Electrostatics**

Electric Flux - Electric Flux Density – Electric field intensity – Electric potential – Coulomb's laws of electrostatics – concept of capacitance – relationship between Voltage, Charge and Capacitance – energy stored in a capacitor – capacitance of parallel plate capacitor – capacitors in series and in parallel – types of capacitors and their applications – Problems in above topics.

b) D.C. Circuits

Basic Concepts of current, emf, potential difference, resistivity, temperature coefficient of resistance – Ohm's law – applications of Ohm's law – work, power energy – relationship between electrical, mechanical and thermal units – resistance – series circuits – parallel and series parallel circuits – Kirchoff's laws – Problems in the above topics.

Unit II Network Theorems**17 Hrs**

Network – Branches – Nodes – Kirchoff's laws – Mesh current and Node voltage analysis – Star and Delta transformations – Thevenin's Theorem - Norton's Theorem, Superposition Theorem and Maximum power transfer theorem. (Problems in D.C Circuits only)

Unit III Single phase A.C Circuits**17 Hrs**

J Notations – rectangular and polar coordinates – Sinusoidal voltage and current – instantaneous, peak, average and effective values – form factor and peak factor (derivations for sine wave) – pure resistive, inductive and capacitive circuits – RL, RC, RLC series circuits – impedance – phase angle – phasor diagram – power and power factor – power triangle – apparent power, active and reactive power – parallel circuits (two branches only) – conductance, susceptance and admittance – problems on all the above topics.

Unit IV Polyphase A.C. Circuits and Resonant Circuits**17 Hrs****a) Polyphase A.C. Circuits**

Significance of 3 phase circuits – Star, Delta connections – Phase sequence – Balanced load – Relation between voltages, currents of line and phase values in star and delta connection – Problems in balanced loads of star and delta connections – Measurement of 3 phase power using two wattmeter method (Derivation and Problems) – Star and Delta connected unbalanced loads (No problems) – Symmetrical components (No problems)

b) Resonant Circuits

Resonance : Series resonance – Effects of varying inductance and capacitance in series RLC circuit – Selectivity – 'Q' factor - Resonance Frequency – Bandwidth – Half power frequencies.

Parallel resonance – Two branch parallel circuits, Q Factor – Resonance Frequency – Band width – problems.

Unit V Storage Batteries**16 Hrs**

Classification of cells – construction – chemical action and physical changes during charging and discharging of lead acid, nickel iron and cadmium cells – indication of fully charged and discharged battery – defects and their remedies – capacity – methods of charging - testing – maintenance – applications – maintenance free batteries – lithium cells and mercury cells.

Reference Books:

Name of the Book	Author	Publisher
Electric circuit theory	Dr. M. Arumugam &	Khanna
Publishers, New Delhi	N. Premkumar	

3202 ELECTRICAL MACHINES – I
III Term (Core)

7 Hours / Week

Total Hours : 84

Major Divisions

- Unit I Electromagnetism
- Unit II DC Generators
- Unit III DC Motors
- Unit IV Transformers
- Unit V Maintenance of Machines

Unit I Electromagnetism

17 Hrs

Magnetic materials – Permanent and Electro Magnets – Applications – Basic Electro magnetic laws – Maxwell's Cork Screw Rule – Polarity of Solenoid – Magnetic quantities (Flux, Flux density, MMF, Reluctance, Magnetizing force, Permeability, Relative Permeability) – Faraday's laws of Electro magnetic induction – Lenz's law – Fleming's right hand and left hand rule – types of induced emf – Inductance – Expressions of dynamically induced emf – Self and mutually induced emf – Magnetic force and torque – Magnetisation curve – Hysterisis and Eddy current losses – Energy stored in Magnetic field – Lifting power of Electromagnet (Simple problems in all topics).

Unit II DC Generators

17Hrs

Principle of operation – Constructional details Types of D.C. Generators – Emf equation (Simple problems) – Lap and Wave winding (No winding diagram) – Different types of excitation – OCC of separately excited and self excited (shunt & compound generators) – Load characteristics of Self excited (Series, shunt & compound generators) – Critical resistance – Conditions for self excitation – Armature reaction – Effects and methods of compensation of Armature reaction - Commutation – Causes of voltage drop – Losses – Efficiency – Electrical, mechanical and commercial efficiency– maximum efficiency problems – Applications of D.C. Generators

Unit III DC Motors

17Hrs

Principle of operation – Torque, Back emf & Speed equations (Simple problems) – Classification – Characteristics of Shunt, Series & Compound motors – Applications – Speed control – Field control and Armature control – Necessity of starter – 3 point starter, 4 point starter – Losses and efficiency – Testing (Load test & Swinburne's test) (Problem)

Unit IV Transformers

17 Hrs

Principle of operation – Constructional details (Types of cores, spiral, helical & disc windings) – Emf equation – Voltage ratio (Simple problems) – Phasor diagram of transformer on no load & load (lagging pf, leading pf & upf) – equivalent circuit – Voltage regulation (Simple problems) – Losses & efficiency – OC & SC tests – Condition for maximum efficiency (Simple problems) – All day efficiency (Simple problems) – Principle of auto transformer – Saving in copper (Simple problems) – Applications.

Three phase transformers – Different connections – Parallel operations – Load sharing – Conditions for parallel operation – Cooling methods – Protective devices & accessories (Conservator, Breather, Bucholz relay & Explosive vent) – Necessity of tap changers – On load & off load tap changers – Rating & Specification – Factory tests on transformers – Open delta & Scott connection – Tertiary winding

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Cause of sparking in commutator – Defects in commutator and remedies, under cutting mica-Resurfacing of commutator-brushes-Functions and requirements-Brush holder-Function and different types-staggering of brushes-Brush pressure-Defect in DC armature winding-Growler-Importance of plants maintenance preventive maintenance - Breakdown maintenance-Production maintenance-Roll of maintenance engineer-Industrial hazard Causes of accidents and their prevention - protective devices - Role of safety engineer - I.E. Rules on safety.

Reference Books :

Sl.No.	Name of the Book	Author	Publisher
1	Electrical machines A course of Electrical Engg	.K.Bhattacharya, TTTI, Chandigar	Principal, Tata McGraw Hill Publishing Company, New Delhi
2	A course in Electrical Technology (Volume-2)	B.L. Theraja	S.Chand & Co., New Delhi
3	Operation and Maintenance of Electrical Machines	B.V.S. Rao	Khanna Publishers, New Delhi

3203 ELECTRONIC DEVICES AND CIRCUITS

III Term (Core)

6 Hours / Week

Total Hours : 72

Major Divisions:

Unit I	:	Electronic Passive And Active Components
Unit II	:	Special Semiconductor Devices And Integrated Circuit
Unit III	:	Rectifiers, Filters And Power Supplies
Unit IV	:	Amplifiers
Unit V	:	Power Amplifiers And Oscillators

UNIT I Electronic Passive and Active Components

14Hrs

Passive Components :

Resistors – Types – Materials – Colour code- Specification, Inductors – Types – Specification. Capacitors – Types – Specification.

Active Components :

Semiconductor Diode – Zener diode – Varactor diode - Junction Transistors –Principle of Operation and Characteristics of NPN and PNP Transistors - Unijunction Transistor - Field Effect Transistor – JFET - MOSFET (Depletion and Enhancement Mode) - Comparison between JFET and MOSFET.

UNIT II Special Semiconductor Devices and I.C Fabrication

14 Hrs

Principle of operation, Characteristics and applications of SCR – Triac - Diac - Quadrac – Silicon Control Switch – Gate Triggered Oscillator – Silicon Unilateral Switch – Insulated Gate Bipolar Transistor - LDR - Photo Diode - Solar Cell - LED and LCD.

Introduction to IC technology – IC family and advantages of ICs.

UNIT III Rectifiers, Filters and Power supplies

14 Hrs

Circuit and operation of Half wave rectifier, Full wave Rectifier and Bridge rectifier – Ripple factor and Efficiency - Comparison of Rectifiers (Description only) – Three phase Rectifiers (Half wave and Full wave) circuit and operation.

Filters – Types- Operation of Capacitor Filter, LC Filter, PI Filter and RC Filter (Circuit and description only) – Need for bleeder resistor.

Regulated power Supply- Types- Circuit and principle of operation of Zener Voltage Regulator - Series Regulated Power Supply with Over Load Protection - Positive Voltage Regulator using IC 78xx and Negative Voltage Regulator using IC 79xx. Basic concept of SMPS and UPS (Block Diagram and explanation only).

Half wave and Full wave Voltage Doublers - Clippers and Clampers (Using Diodes only).

UNIT IV Amplifiers

15 Hrs

Definitions – General Classification of Amplifiers – CB, CC, CE Amplifier principles and operation – Need for Biasing arrangement – Fixed Bias, Collector to Base Bias, Self Bias – operating point – DC and AC load lines - Comparison of CB, CC, CE Amplifier Characteristics with respect to voltage gain, current gain, input impedance and output impedance.

Cascaded Amplifiers- RC coupled amplifier- Frequency response curve- dB notation- definition of Lower cut off frequency and Upper cut off frequency - Band width. Distortion in amplifiers- noise in amplifiers. Emitter Follower- Darlington Emitter Follower – Direct Coupled Amplifiers (Common Emitter connection only)- Differential Amplifier.

UNIT V Power Amplifiers and Oscillators

15 Hrs

Power Amplifiers- Class A, Class B, Class AB, Class C - Pushpull Amplifier- Complementary symmetry Pushpull Amplifier- Effect of negative Feedback in Amplifiers.

Introduction- Barkhausen Criteria- Classification of Oscillators- Circuit Diagram and Operation of Hartley Oscillator, Colpitt's Oscillator, Tuned Collector Oscillator, RC Phase Shift Oscillator, Wien Bridge Oscillator, Crystal Oscillator using IC MM 5369 and UJT relaxation Oscillator

Reference Books :

Sl.No.	Name of the Book	Author	Publisher
1	Electronics Devices Application and Integrated Circuits	1. Mathur 2. Kulshreshtha 3. Chadha	Umesh Publications, New Delhi 6.
2	Integrated Circuits	K.R.Botkar	Khanna Publishers, New Delhi
3	Electronic devices and Circuits – An Introduction	Allen Mottershed	Prentice – Hall of India (P) Ltd, New Delhi
4	Electronic Devices and Circuits	1. Salivahanan 2. N.Sureshkumar 3. A.Vallavaraj	Tata McGraw Hill Publishing Company, New Delhi.

3204 ELECTRICAL MACHINES - I LABORATORY**III Term(Core)****6 Hours / Week****Total Hours : 72****List of Experiments :**

1. Calibration of Volt Meter and Ammeter.
2. O.C.C of self excited shunt generator.
3. Load test on a DC Shunt Generator.
4. Load test on a DC Compound Generator.
5. Load test on a DC Series Generator.
6. Load test on a DC Shunt Motor.
7. Load test on a DC Compound Motor.
8. Load test on a DC Series Motor.
9. Predetermination of efficiency of DC M/c by doing Swinburne's tests.
10. Load test on the given single phase transformer.
11. Breakdown Voltage Test and Acidity test on transformer oil.
12. Load sharing of two single phase transformer.
13. Predetermination of efficiency and regulation of the single phase transformer by doing OC & SC tests.
14. Study of DC Motor Starters.
15. Measurement of three phase power by two wattmeter method
16. Speed control of DC shunt Motor
17. Phasing out test on Three Phase Transformer
18. Pairing of three Phase Transformer

3205 ELECTRONIC DEVICES AND CIRCUITS LAB

III Term (Core)

6 Hours / Week

Total Hours : 72

List of Experiments :

I. Devices

1. Draw the forward and reverse characteristics of semiconductor diode. Determine its Cut-in voltage.
2. Draw the forward and reverse characteristics of zener diode. Determine its Cut-in voltage and break down voltage.
3. Draw the I_D Vs V_{DS} characteristics for various gate voltages of the given FET.
4. Draw the I_A Vs V_A characteristics of the given SCR. Determine the gate current for different anode voltages.
5. Draw the VI characteristic of the given Diac. Determine the Cut-in voltage.
6. Draw the VI characteristics of the given Triac. Determine the gate current for different anode voltages.
7. Draw the VI characteristics of the given LDR under (a) various illumination level at constant supply voltage and (b) various supply voltages at constant illumination level.
8. Draw the VI characteristics of the given LED. Determine the conduction voltage for satisfactory brightness.
9. a) Draw the input characteristics (I_B Vs V_{BE} for various V_{CE}) for the given transistor under CE configuration. Determine the input resistance.
b) Draw the output characteristics (I_C Vs V_{CE} for various I_B) for the given transistor under CE configuration. Determine the output resistance.
10. Draw the VI characteristics of IGBT.
11. Characteristics of UJT

II. Circuits:

1. Construct halfwave and Full wave Rectifier Circuits using diodes and observe the input and output waveforms with and without filter.
2. Construct a bridge Rectifier Circuit using diodes and observe the input and output waveforms with and without filter.
3. Construct a voltage regulator using IC 7812. Determine the load regulation and line regulation.
4. Construct a RC coupled amplifier and plot the frequency response characteristics. Determine the lower and upper cut-off frequency and bandwidth.
5. Construct a relaxation oscillator using UJT and trace the waveform. Measure the frequency.
6. Construct a series pass transistor voltage regulator and determine the regulation.
7. Study of CRO and controls

**3206 MS-OFFICE LAB
III Term(Core)**

3 Hours / Week

Total Hours : 36

- **WINDOWS** : Introduction to Windows Environment.

- **Word:**
Introduction to Word – Creating a document – Working with a document – Saving - Editing files - Cut - Copy - Paste – Find and Replace etc.

Tools in Word:
Editing with Spelling and Grammar – Creating table and Modifying table - Formatting tables - Mail merge - Print.

- **Excel:**
Screen structure – Building a work sheet Entering Date – Entering data in a series – Formatting cells - Rows – Columns – Sheet – Sort - Filter – Forms - Sub totalling – Calculating using formula and functions – Formatting and Printing – Creating a Chart

- **PowerPoint :**
Slides - Creating a Presentation - Features of PowerPoint - Clip Art - Adding Clip Art to a slide.

List of Experiments :

WINDOWS

- 1 **WordPad – Requisition letter for Diploma Certificate**
Apply Bold, Italic, Underline, Alignment, Different Colors, Apply different fonts, Inserting Date, Set Paper size, Margins

- 2 **Paint :**
Drawing Circles, Square, Lines, Polygon, Text Box, Flip / Rotate, Stretch / Skew and the usage of all other icons in the Tool Box.

- 3 **Calculator**
Calculating the Sin, Cos, Square, Cube, Exp, Factorial, Logarithm, Natural Logarithm of a number and Memory options (MC, MR, MS and M+ Options)

WORD 2000

- 4 Create a newsletter in such a way as to implement Cut, Copy, Paste, Find and Replace commands.

- 5 Create your class Time Table using Table command

- 6 Create a Quotation format for purchasing electrical items and prepare the Quotation for 5 companies using Mail Merge command

- 7 Create a Requisition letter for Attendance Certificate. - While typing the letter, type with spelling, grammar and punctuation mistakes. Rectify it with the Spelling and Grammar features

EXCEL 2000

- 8 Type I Year mark of 10 students and calculate student wise Total and Average. Also calculates subject wise Total & Average and apply AutoFormat
- 9 Prepare a calendar for the current year by dragging.
- 10 Create a database of 20 records with the following fields.
SIno Salesman Product Qty Rate Total
- Note: Salesman* : Dinesh, Krishnan, Rajendran and Arun
Product * : Computer, Printer, Modem and Scanner
- The above mentioned 4 Salesmen and 4 Products should be repeated throughout the database. Create 3 copies in 3 sheets and apply Sort, Filter and Subtotal for the above database.
- 11 Creating a chart for a) Monthly Sales of a Company and b) 1 year total mark of 10 students

PowerPoint 2000

- 12 Create a presentation for Office 2000 (Minimum 6 Slides, use Clipart also)
- 13 Create a presentation about Electronic Industries (Minimum 6 Slides, use Clipart also)
- 14 Create a presentation about Computers (Minimum 6 Slides, use Clipart also)
- 15 Create a presentation about your polytechnic. (Minimum 6 Slides, use Clipart also)