

**Course Name : Computer Engineering Group**

**Course Code : CO/CM/IF/CD**

**Semester : Second**

**Subject Title : Electrical Technology**

**Subject Code : 12026**

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	02	03	100	--	--	25@	125

**NOTE:**

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

**Rationale:**

This subject is restricted to second year diploma in electronics & telecommunication, computer engineering and information technology. Technicians / supervisors from all branches of engineering are expected to have some basic knowledge of electrical engineering. Also the technicians working in different engineering fields have to deal with various types of electrical drives and equipment. Hence, it is necessary to study electric circuits, different types of electrical drives, their principles and working characteristics.

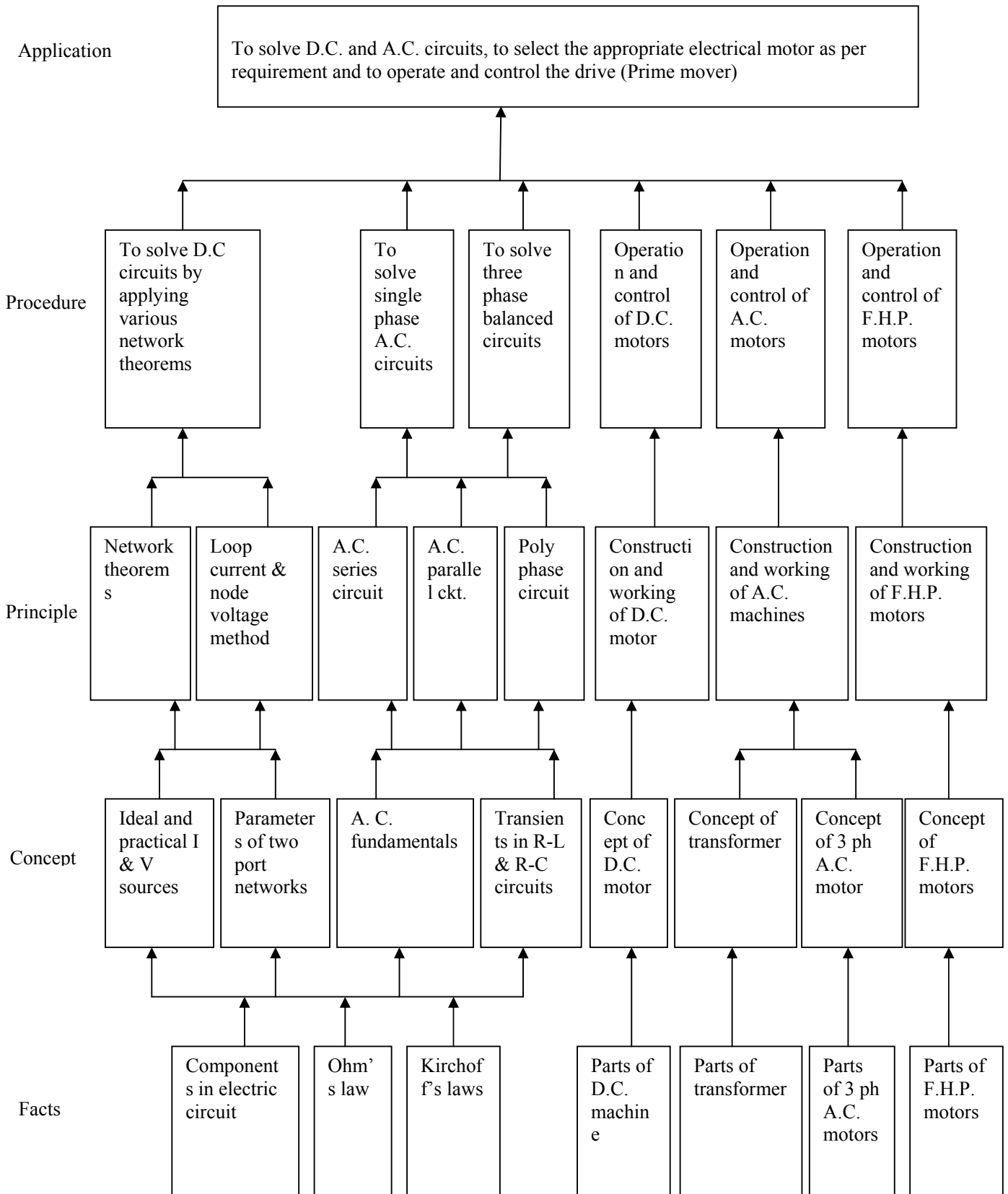
This subject covers analysis of ac and dc networks, working principles of commonly used ac and dc motors and their characteristics. The basic concepts studied in this subject will be very useful for understanding of other higher level subjects in further study.

**Objectives:**

The student will be able to:

- Solve dc circuits by using different techniques and network theorems
- State mathematical equations for transients in R-L and R-C circuit
- Solve series and parallel ac circuits with R, L and C
- Know importance, working and construction of single phase transformer
- Explain construction, working, performance and applications of various types of ac and dc machines

**Learning Structure:**



Chapter	Name of the Topic	Hours	Marks
1.	<b>D. C. Circuits</b> 1.1 Review of introduction to electricity - current, resistance, emf and potential difference, Ohm's law, D.C. sources, series and parallel circuit. 1.2 Concept of open and short circuit 1.3 Kirchoff's current and voltage law 1.4 Maxwell's loop current method 1.5 Node analysis 1.6 Concept of ideal and practical current and voltage sources, Source conversion. 1.7 Star / Delta and Delta / star conversion (no derivation) (Numerical on above) 1.8 Network terminology – active, passive, linear, non-linear, bilateral, unilateral networks.	14	20
2.	<b>A.C. Fundamentals</b> 2.1 Difference between A.C. and D.C. quantity 2.2 Advantages of A.C. over D.C. 2.3 waveform of sinusoidal A.C. cycle 2.4 Generation of single phase A.C. by elementary alternator 2.5 Definitions: instantaneous value, cycle, amplitude, time period, frequency, angular frequency, R.M.S. value, Average value for sinusoidal waveform, Form factor, Peak factor (no derivation but simple numerical on it) 2.6 Vector representation of sinusoidal A.C. quantity, review of phasor algebra, representation of A.C. quantity in rectangular and polar form. 2.7 Phase angle, phase difference, concept of lagging and leading – by waveforms, mathematical equations and phasors. 2.8 Pure resistance in A.C. circuit – waveforms, equations and vector diagram (no derivation) 2.9 Pure inductance in A.C. circuit – waveforms, equations and vector diagram (no derivation) 2.10 Pure capacitance in A.C. circuit – waveforms, equations and vector diagram (no derivation) 2.11 Concept of impedance and impedance triangle. 2.12 Power – active, reactive and apparent, power triangle. 2.13 Power factor and its significance. 2.14 R-L series circuit – vector diagram, voltage and current equations. 2.15 R-C series circuit – vector diagram, voltage and current equations. 2.16 R-L-C series circuit – vector diagram, voltage and current equations. 2.17 Simple numerical on R-L, R-C and R-L-C series circuit.	16	24
3	<b>Poly phase Circuits</b> 3.1 Advantages of 3 phase system over 1 phase system 3.2 Principle of 3-phase e. m. f. generation and its wave form 3.3 Concept of phase sequence and balanced and unbalanced load	10	16

	3.4 Relation between phase and line current, phase and line voltage in Star connected and Delta connected balanced system. (no derivation) 3.5 Calculation of current, power, power factor in a 3 phase balanced system (simple numerical)		
<b>4</b>	<b>Transformer</b> 4.1 Working principle of transformer, classification, brief description of each part its function and material used. 4.2 Emf equation (no derivation) 4.3 Voltage ratio, current ratio and transformation ratio. 4.4 kVA rating of a transformer 4.5 Simple numerical based on 4.2 to 4.4 4.6 Auto transformer – comparison with two winding transformer, applications. 4.7 Isolation transformer	<b>10</b>	<b>16</b>
<b>5.</b>	<b>Rotating Machines</b> 5.1 Review of force on current carrying conductor, Flemings left hand rule 5.2 D.C. motor Construction – (Sectional view with labels to major parts) 5.3 Principle of operation 5.4 Types of D.C. motors with their connection diagrams. 5.5 Introduction to single phase induction motors 5.6. Simple connection diagrams to indicate single phase induction motors. 5.7 Stepper motor – types, principle of working and applications 5.8 Servo motor – types, principle of working and applications	<b>10</b>	<b>16</b>
<b>6.</b>	<b>Installation, Earthing and Troubleshooting</b> 6.1 Types of S. P. Switches, Sockets and different wiring accessories for simple circuits. 6.2 Fuses, their need, uses and ratings. 6.3 Needs of earthing for equipments. 6.4 Types of earthing ( Pipe and Plate earthing) 6.5 Troubleshooting in supply boards, supply cords and small UPS specially used in computers (up to 1 kVA)	<b>04</b>	<b>08</b>
<b>Total</b>		<b>64</b>	<b>100</b>

**Practical:**

Skills to be developed:

Intellectual skills:

1. Identify and select suitable electrical instruments for measurement
2. Identify and give specifications of electrical motors and transformers
3. Interpret wiring diagrams for various applications.

4. Identify safety equipments required.
5. Decide the procedure for setting experiments.

Motor skills:

1. Draw wiring diagram
2. Make wiring connections to connect electrical equipments and instruments.
3. Measure electrical power and other electrical quantities.
4. Use of safety devices while working.

**List of Practical:**

1. Verification of Kirchhoff's laws.
2. Draw single line diagram of simple S.P. switch with three pin socket connection.
3. To determine the resistance, impedance and inductance of a choke coil. (Use of D.C. source for measurement of resistance and A.C. source for measurement of inductance is expected)
4. To draw vector diagram and to determine power factor of R-L-C series circuit.
5. To determine the relationship between line and phase values in three phase balanced star and delta connected load.
6. To determine transformation ratio of single phase transformer.
7. To draw a neat sketch of plate earthing.
8. To fabricate a switch board with three s.p. switches, one three pin socket for three points with single phase supply along with earthing.
9. Study of any one stepper motor in your laboratory. Write a report based on the following points.  
Rating (Specification)

**Note:** All the above 09 experiments are compulsory.

**Learning Resources:**

**Books:**

Sr. No.	Authors	Title	Publisher
01	Mittle and Mittal	Basic Electrical Engineering	Tata McGraw Hill
02	B. L. Theraja	Electrical Technology Vol – I and II	S. Chand & company
03	E.Hudges	Electrical Engineering	Pearson Education New Delhi.
04	V.K.Mehata	Electrical Technology	S. Chand & company