Course Name: Production Engineering/ Production Technology **Course Code:** PT/PG

SEMESTER : Fourth

SUBJECT TITLE: Electrical Technology **Subject Code:** 9055

Teaching and Examination Scheme :

Teaching scheme			Examination scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
03	--	02	03	80	20	50@	-	-	150

Rationale:

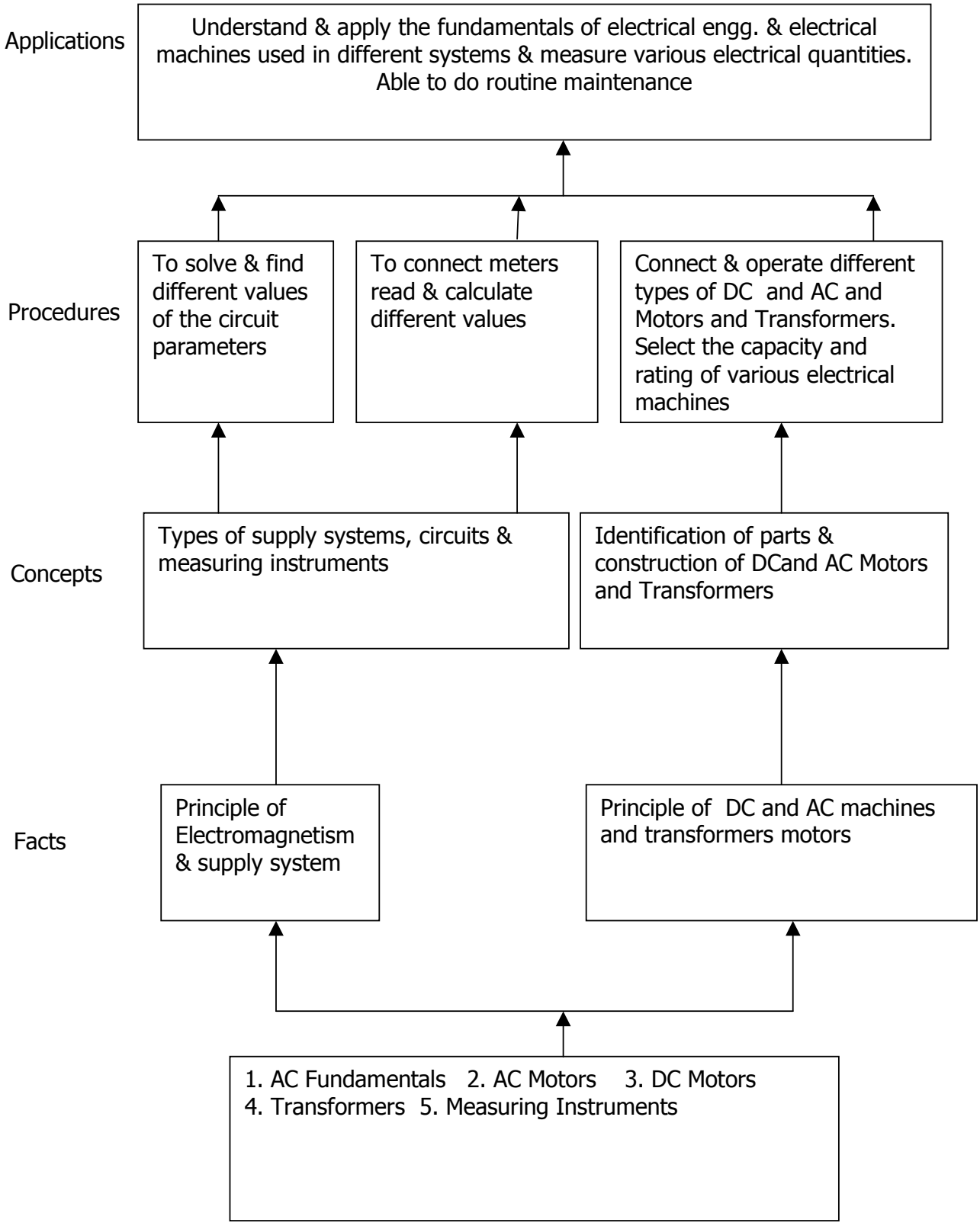
This subject is classified as Engg Science subject, which intends to teach students facts, concepts, principles & procedure of operating electrical machines, circuits & systems and their applications. This subjects deals with measurements of electrical quantities to judge the performance of electrical machines. This subject is important as most of the drives are electrical drives and the knowledge of this subject helps in running and maintaining various electrical machines and drives.

Objectives:

Student will be able to:

1. Identify the type of Electric supply system.
2. Use the tariff system & calculate energy requirements and cost of energy.
3. Identify different types motors, transformers and drives.
4. Select suitable drive as per the requirements.
5. Apply knowledge of Electric heating & welding for various operations in manufacturing processes.
6. Supervise routine maintenance of electrical machines and supply systems.

Learning structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	Introduction to Electrical power supply system Generation, Transmission, Distribution & Utilization. AC supply & DC supply	**02**	**04**
02	AC Fundamentals: cycle, frequency, phase, period, max, average, r.m.s. value. Concept of current, voltage, power & energy in R, L, & C circuits (simple numericals only) Three phase supply: Star & Delta circuit, Line & Phase relation, power equation.	**07**	**12**
03	DC Motor: Construction and principle of operation. Speed torque characteristics. Types, specifications & ratings and applications. Types of insulation used.	**07**	**12**
04	Transformer: Construction and principle of operation. EMF equation and transformation ratio. Load test, efficiency and regulation. Specifications & rating. Auto transformer & 3 phase transformer concept only. Applications of transformers.	**07**	**12**
05	AC motor: Construction and principle of operation of 3 phase induction motor. Speed torque characteristics, slip, speed control (VFD), reversal of rotation, starters. Single phase motor, universal motor, stepper motor & servo motor. Motor specification & ratings. Applications of these motors in various fields. Testing of motors. Industrial applications: Classification of drives, factors for selection of motor for different drives, Enclosures & Mountings	**07**	**12**
06	Alternator: Construction, principle of operation & applications. Self and separate excitation. Synchronous Motor- Construction, principle of operation, methods of starting & applications	**03**	**04**
07	Electric heating: Working principle & types selection of system, specifications & rating. Electric welding : rating of transformers for arc welding and resistance welding, special characteristics of welding transformers, Fault finding and repairs.	**05**	**08**
08	Electro-metallurgical & Electro Agro Systems: Concept & principle used in electroplating, Electrical machines used in electro-agro systems (irrigation pumps)	**03**	**04**
09	Electric safety, tariff & power conservation, necessity of Earthing, types safety tools, first aid measures, types of tariff, pf improvement only methods, energy conservation & audit, fire extinguishing methods adopted in electrical engineering.	**07**	**12**
	Total	**48**	**80**

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, earthing resistance and other electrical quantities.
4. Calibrate electrical instruments.
5. Use of safety devices while working.
6. Prepare energy consumption bill with present tariff structure.

List of Practical:

1) For a given resistive & inductive series & parallel circuit, select ammeter, voltmeter & wattmeter. Make the connections and measure current, voltage and power drawn by the circuit. Measure it by clip on meter & compare it.

2) For a given DC Shunt/Series motor, select suitable meters, make connections as per diagram, check the connections and run the motor. Take the meter readings to draw speed torque characteristics. Make suitable changes in the connections to reverse the direction of rotation.

3) For the above given motor prepare a circuit to control its speed above & below normal, plot its graph.

4) List specifications of given single phase transformer. Perform no load test on the transformer to find transformation ratio,

5) Connect an electronic energy meter to a load, take reading & prepare energy consumption bill with present tariff structure

6) Prepare actual wiring on a board to study and operate one lamp controlled by one switch, staircase wiring, godown wiring using casing capping.
7) One assignment on MCCB, ELCB, wires & cables, Different types of lamps their specifications.

8) Observe Electric wiring of main building in your campus list the accessories used and draw a general layout.
9) Observe earthing system of your laboratory and institute building , measure its resistance & list its significance.

10) Prepare trouble-shooting chart of AC and DC motors and identify the faults of a motor or a transformer.

11) Visit a foundry / welding / fabrication / factory unit & prepare a report based on following: 1. Type of wiring, 2. Specifications of motors and transformers used, 3. Total electrical connected load, 4.Safety measures employed, 5. Power/energy consumption per month, 6. Measures taken for energy conservation.

Learning Resources:
Books:

Sr.No.	Author	Title	Publisher
1	E. Hughes	Electrical Technology	ELBS
2	H. Cotton	Electrical Technology	Pitman
3.	B. L. Theraja	Electrical Technology Vol I To Iv	S. Chand
4.	V. K. Mehta	Electrical Technology	Dhanpat Rai and Sons

Catalogues of transformer and motor manufacturing companies should be referred for trouble shooting practicals.