

Subject Code: 1PT1010105	Subject Title: BIOMEDICAL PHYSICS (Fundamentals of Electrotherapy)
Pre-requisite Subject	- NONE -

Objectives of course:

1. To understand the basic concepts of electricity and magnetism.
2. To understand the mains supply, shock and its precautions.
3. To understand the electrical components used in the electric circuit.
4. To understand the purpose of electrodes and gels in electrotherapy.
5. To understand the physiology of pain.

Learning outcomes:

At the end of the course the candidate will be able to:

1. Recall the physics principles & Laws of Electricity, Electro-magnetic spectrum.
2. Describe the main electrical supply, electric shock – precautions.
3. Enumerate types & production of various therapeutic electrical currents. Describe the panel diagrams of the machines.
4. Describe electro magnetism.
5. Describe in brief, certain common electrical components such as capacitor, transistors, valves, capacitors, transformers etc & the simple instruments used to test / calibrate these components (such as potentiometer, oscilloscope etc) of the circuitry; & will be able to identify such components.
6. Describe & identify various types of electrodes used in therapeutics, describe electrical skin resistance & significance of various media used to reduce skin resistance.

Teaching Scheme (Hours)			Evaluation Scheme (Marks)					
Lecture	Practical	Total	Theory(T)		Practical(P)		Total Marks	
			University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	Theory	Practical
50	0	50	40	10	-	-	50	-

Subject Contents			
Sr. No.	Topic	Total Hours	Weight (%)
1	Main Supply: Production of Electricity, Types, Distribution, Earthing, Types of Plugs & Switches. Fuse		
2	Shock: Types (Electric Shock, Earth Shock), Definition, Severity, Effects, Causes and Precautions.		
3	Static Electricity: Theories of Electricity, Production of Electric Charge, Characteristic of Charged body, Potential and Capacity, Potential Difference.		
4	Current Electricity : EMF, Resistance, Intensity, Ohm's Law, DC and AC resistance in Series / Parallel, Devices for regulating Intensity (Types, Construction and working of Rheostat), Electric energy and power, Thermal Effects of Electric (Joule 's Law).		
5	Condenser: Principles, Capacity (Measurement and factors determining), Types and Construction, Electric field, Charging and discharging of the condenser, Duration of		

	discharge through inductance, capacitive reactance and uses of condenser.		
6	DC: Sources-Cell and rectified AC. Rectification of AC: Thermionic Valves (Diode and Triodes) Metal rectifier, Types of rectification (Half and full wave – Voltage halving and Westinghouse Bridge)		
7	Smoothing Circuit. Semi Conductors: Types, semiconductor diodes & Transistors.		
8	Magnetism: Nature, Type, Molecular Theory of Magnetism, Property of Magnet, Magnetic Effect of Electric Current, Electromagnets, Milliamperemeter & Voltmeter (Construction and working), Meters for measuring Ac.		
9	Electro Magnetic Induction: Principles (Faraday's/Lenz's law), Production.		
10	Direction of Induced EMF, Strength of induced EMF, Types (Self and Mutual) and inductive reactance. Eddy Currents.		
11	Dynamo Transformers (Functions, Types, Constrictions)		
12	Choke coil (Types and functions)		
13	Electrical Skin Resistance: Electrode Used, electrode Gels		
14	Electromagnetic Spectrum: Electromagnetic Radiation: Laws Governing EMR, Laws of Reflection, Refraction, Absorption, Attenuation, Cosine law, Inverse square law. Grothus law		
15	Physiology of Pain.		
Total Hours		50	