INSTITUTE	**FACULTY OF PHYSIOTHERAPY**
PROGRAM	**BACHELOR OF PHYSIOTHERAPY**
SEMESTER	**1**
COURSE TITLE	**FUNDAMENTALS OF ELECTRO PHYSICAL AGENTS**
COURSE CODE	**BPT-105**
COURSE CREDITS	**8**

Objective:

1 Explain fundamental principles of physics related to electricity production and its transmission.

2 Explain the production, physiological and therapeutic effects Biophysics, principles, therapeutic uses, indications, contraindications electrical stimulation agents

3 Demonstrate competencies in operational skills of equipment, patient preparation, and techniques of application of electrical stimulation agents.

4 Discuss the physiology and pathophysiology of pain.

5 Discuss theories of pain and their implications to physiotherapy clinical decision-making.

6 Explain physiological effects, therapeutic uses, indications, contraindications, and demonstrate competencies in equipment maintenance, care, and safety precautions.

Course Outcomes: After completion of this course, student will be able to:

1 Explain fundamental principles of physics related to electricity production and its transmission.

2 Explain the production, physiological and therapeutic effects Biophysics, principles, therapeutic uses, indications, contraindications electrical stimulation agents

3 Demonstrate competencies in operational skills of equipment, patient preparation, and techniques of application of electrical stimulation agents.

4 Discuss the physiology and pathophysiology of pain.

5 Discuss theories of pain and their implications to physiotherapy clinical decision-making.

6 Explain physiological effects, therapeutic uses, indications, contraindications, and demonstrate competencies in equipment maintenance, care, and safety precautions.

Pre-requisite of course:A basic knowledge of human biology and physics is typically a prerequisite.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
120	0	60	50	30	20	50	50

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Contents : Unit	Topics	Contact Hours
1	**Introduction to electricity** Physical Principles In Relation to Physiotherapy: 1. Structure and Properties of matter-solids, liquids and gases, adhesion, surface tension, viscosity, density and elasticity. Structure of atoms, molecules, elements and compounds, election theory, static and current electricity. 2. Conduction, Insulators, Potential difference, Resistance and Intensity. Ohm's Law its application to AC and DC currents. 3. Rectifying Devices-Thermionic valves, semiconductors, Transistors, Amplifiers, Transducers, Oscillator Circuits. Capacitance, Condensers in DC and AC circuits. 4. Display devices and indicators-analogue & digital., Effects of Current Electricity 1. Chemical effects- ions and electrolytes, ionization, production of E.M.F by chemical actions. Magnetic effects, Molecular theory of Magnetism. Magnetic fields, electromagnetic induction. 2.Milli ammeter and voltmeter, transformers and chose coil, thermal effects-joules law and heat production. 3.Physical principles of light and its properties. 4.Physical principles of sound and its properties 5.Electromagnetic spectrum-biophysical application. , Electrical Supply 1. Brief outline of main supply of electric current. Dangers short circuits, electric shocks. 2.Precautions safety devices, earthing, fuses etc. First and initial management of electric shock.	30
2	**Low Frequency Currents** Low Frequency Currents Introduction to direct, alternating and modified currents. 1. Iontophoresis: Biophysics, principles, therapeutic uses, indications, contra indications, operational skills of equipment and patient preparation. 2. Faradic current: Biophysics, principles, therapeutic uses, indications, contra indications, operational skills of equipment and patient preparation. 3. Interrupted direct current: Biophysics, principles, therapeutic uses, indications, contra-indications, operational skills of equipment and patient preparation. 4.Transcutaneous Electrical Nerve Stimulations (TENS) Types of low frequency, pulse widths, frequencies and intensities used as TENS applications, Theories of pain relief by TENS. Principles of clinical application, effects and uses, indications, contraindications, precautions. Operational skills of equipment patient preparation.	30
3	**Electrical Reactions and Electro-Diagnostic Tests** Electrical Reactions and Electro-Diagnostic Tests . 1. Electrical stimuli and normal behavior of nerve and muscle tissue. Types of lesions and development of reaction of degeneration.2. Faradic/Intermittent direct current test. 3. S.D. Curve and its application. Chronaxie, Rheobase and pulse ratio.	30

Contents : Unit	Topics	Contact Hours
4	**Superficial Heating Modalities** Infrared Rays-Wavelength, frequency, types and sources of IRR generation techniques of irradiation, physiological and therapeutic effects indications, contraindications, precautions, Operational skills of equipment and patient Preparation. , Superficial Heat: Paraffin wax bath, moist heat, electrical heating pads. 1. Mechanism of production. 2. Mode of heat transfer. 3. Physiological & therapeutic effects. 4. Indications, contraindications, precautions, operational skills of equipment and patient preparation.	30
Total Hours		**120**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practical** Identify components and safety devices involved in electric supply of the electrotherapy department. , Experience sensory and motor stimulation of nerves and muscles by various types of low frequency currents on self. , Locate and stimulate different motor points region wise including the upper & lower limb, trunk face. On human model, Demonstrate the application of special techniques of low frequency current including Faradic foot bath, faradism under pressure , Demonstrate the application of techniques of Iontophoresis., Demonstrate the plotting of strength duration curve and find out Chronaxie and Rheobase. , Demonstrate the techniques of application of various types of IR lamps to various body regions. , Demonstrate the techniques of application of paraffin wax bath to various body regions, Demonstrate the techniques of application of TENS to various body regions	60
Total Hours		**60**

Textbook :

1 Electrotherapy Explained: Principles & Practice, John Low, Ann Reed, Valma J. Robertson, Butterworth-Heinemann, 2006

2 Clayton’s Electrotherapy, Angela Forster, Nigel Palastanga (later editions edited by Sheila Kitchen & Sarah Bazin), Saunders (Baillière Tindall imprint), 1996

References:

1 Principles & Practice of Electrotherapy , Principles & Practice of Electrotherapy , Joseph H. Kahn, Churchill Livingstone, 1994

2 Clinical Electrotherapy, Clinical Electrotherapy, Currier, Nelson, Hayes, Appleton & Lange, 1999

3 Therapeutic Heat & Cold , Therapeutic Heat & Cold , Justus F. Lehmann, Williams & Wilkins, 1990

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
0.00	0.00	35.00	35.00	30.00	0.00

Instructional Method:

1 Lecture
2 Flipped class
3 Video demonstration
4 Demonstration
5 Lab works

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