

JHARKHAND RAI UNIVERSITY



Bachelor of Physiotherapy (BPT)

THIRD SEMESTER SYLLABUS

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DEPARTMENT OF PHYSIOTHERAPY (BPT)

Duration: Four years Six months
Academic Year: 2022 – 2026
Syllabus

COURSE SCHEME											
BATCH 2022-2026											
BACHELOR OF PHYSIOTHERAPY											
CHOICE BASED CREDIT SYSTEM											
SEMESTER III											
S.No	CODE	COURSE TITLE	Periods			Evaluation Scheme				Subject Total	Credit
			L	T	P	Assignment	TA	Total	ESE		
1	23A301	PATHOLOGY & MICROBIOLOGY	4	0	0	20	10	30	70	100	4
2	23A302	BIOMECHANICS -I	3	0	0	20	10	30	70	100	3
3	23A303	ADVANCE EXERCISE THERAPY - I	4	0	0	20	10	30	70	100	4
4	23A304	PRINCIPLES OF BIOELECTRICAL MODALITIES - I	4	0	0	20	10	30	70	100	4
5	40BPT. 203	LEADERSHIP AND MANAGEMENT SKILLS	2	0	0	20	10	30	70	100	0
PRACTICAL/SESSIONAL											
1	23A302 P	BIOMECHANICS - I	0	0	2			30	20	50	1
2	23A303 P	ADVANCE EXERCISE THERAPY- I	0	0	4			30	20	50	2
3	23A304 P	PRINCIPLES OF BIOELECTRICAL MODALITIES - I	0	0	4			30	20	50	2
TOTAL									650	20	

Program: Bachelor of Physiotherapy (BPT)

Semester: Third

Course: Pathology & Microbiology

Course Code: 23A301

L	T	P	Credits
4	0	0	4

COURSE LEARNING OBJECTIVE:

CLO1: To acquire the knowledge of concepts of cell injury and changes produced in different tissue.

CLO2: To give the generalize idea about pathological changes in different system in human body.

CLO3: To learn about immunology and hematological disease.

COURSE OUTCOME

At the end the course the candidate will able to

CO1: Acquire the knowledge of concepts of cell injury and changes produced there by in different tissues and organs; capacity of the body in healing process.

CO2: Recall the etio-pathogenesis, the pathological effects and the clinico-pathological correlation of common infection and non-infectious disease.

CO3: Acquire the knowledge of concepts of neoplasia with reference to the etiology, gross and microscopic features, diagnosis and prognosis in different tissues and organs of the body.

CO4: Correlate normal and altered morphology of different organ systems indifferent diseases needed to understand the disease process and their clinical significance (with special emphasis to neuro-musculo-skeletal and cardiovascular – respiratory system).

CO5: Acquire knowledge of common immunological disorders and their resultant effects on the human body.

CO6: Understand in brief, about the hematological diseases and investigations necessary to diagnose them and determine their prognosis.

CO7: To have sound knowledge of the agents responsible for causing human infections pertaining to CNS, CVS, musculoskeletal and Respiratory system.

UNIT 1: Basics of Pathology: Inflammation, injury and repair. **Oncology:** Classification, gross pathological state, cancer pain syndrome (Brief description) **Skin:** Etio-pathogenesis, gross pathology of commonly occurring skin Diseases, Burns, Pressure ulcers (Brief description).

UNIT 2: Cardiovascular system: Etio-pathogenesis, gross pathology of conditions- aging, IHD, MI, CCF, HT, RHD, Congenital heart disease, Arteriosclerosis, Thrombo-angitis, Vasomotor-Raynaud's, venous thrombosis, Gangrene, Lymph edema. **Haematology:** (Brief description) – Etio-

pathogenesis, gross pathology of conditions anaemia, polycythaemia, leukaemia, haemolytic disease, and haemophilia.

UNIT 3: Respiratory system: Etio-pathogenesis, gross pathology of conditions - aging, Pneumonia, Pulmonary TB, Bronchiectasis, COPD, Bronchial Asthma, Restrictive Lung disease, Occupational lung disease. **Musculoskeletal system:** Etio-pathogenesis, gross pathology of conditions - Osteomalacia, Osteoporosis, Osteomyelitis, Osteoarthritis, rheumatoid arthritis, Gout, spondyloarthropathy, Osteonecrosis, Myofascial pain syndrome. Biological responses to trauma, bone and soft tissue immobilization.

UNIT 4: CNS AND PNS: Etio-pathogenesis, gross pathology of conditions - Aging, Meningitis, Encephalitis, Parkinson's, Amyotrophic lateral sclerosis, Ataxias, Multiple Sclerosis,, Neuropathies (Carcoat Marie Tooth's disease, Compression and entrapments, diabetic, G.B syndrome), Poliomyelitis and post-polio syndrome, Myasthenia Gravis.

UNIT 5: Microbiology-I: Immunology: Brief description of immune system, immunity, immune responses & immune deficiency Immunology, Hypersensitivity disorders. **Infectious diseases:** Brief description of classification of microorganisms, identification. Sterilization and disinfections with special reference to principles of antiseptics and prevention of communicable diseases in clinical practice.

UNIT 6: Microbiology-II Brief description of identification of infectious diseases; principles of prevention of infectious diseases caused by common pathogens - streptococci, staphylococci, gonococci, Meningococci, salmonella, V. cholerae, E. coli, shigella, tetanus, Diphtheria, M. leprae, M. tuberculosis, Poliomyelitis, Rabies, Malaria, Amoebiasis, Helminthiasis, Scabies, ringworm, candidiasis.

Suggested Readings:

Text Books:

1. Harsh Mohan, *Textbook of Pathology*, Jaypee Brothers.
2. Bhatia & Lal, *Essential of Medical Microbiology*, Jaypee Brothers.

Reference Books:

1. Vasanthi Kainathan, *Concise Book on Pathology*, Jaypee, New Delhi.

Note: Latest editions of all the suggested books are recommended

Program: Bachelor of Physiotherapy (BPT)
Semester: Third
Course: Biomechanics -1
Course Code: 23A302

L	T	P	Credits
3	0	0	3

COURSE LEARNING OBJECTIVE:

CLO1: The primary purpose of this paper is understanding basic biomechanics of human body.

CLO2: To learn about muscle contraction and relaxation.

CLO3: To gain knowledge about posture and ergonomics and its correction.

COURSE OUTCOME

At the end of the course candidate will able to

CO1: Understand and apply various concepts and terminology within the area of biomechanics.

CO2: Describe how biomechanical factors influence motion in sport and exercise.

CO3: Demonstrate an understanding of statics, Kinematics and Kinetics in human movement.

CO4: Evaluate movement and estimate force on human structures during exercise.

CO5: Demonstrate an understanding of how changes of movement patterns and techniques will influence the load on human tissues during movement.

UNIT 1: Mechanics: Introduction to mechanics including motion, forces, parallel forces system vectors. Newton's Law of motion, concurrent force system-composition forces, Center of Gravity, line of gravity, stability and equilibrium, law of inertia. Levers, torque, mechanical advantage. Moment arm and anatomic pulleys.

UNIT 2 Joint Structure and Function: Basic principles of joint design and a human joint, Tissues present in human joint including dense fibrous tissue, bone, cartilage and connective tissue, Classification of joints, Joint function, Kinematics chains and range of motion. General effects of injury and disease.

UNIT 3: Muscle Structure and Function: Mobility and stability functions of muscle, Elements of muscles structure and its properties, Factors affecting muscle tension. Types of muscle, contraction and muscles work, Classification of muscles and their functions, Group action of muscles, coordinated movement.

UNIT 4: Posture: Definition, factors responsible for posture, relationship of gravity on posture
Postural imbalance: Factors responsible for imbalance in static and dynamic positions including ergonomics.

Suggested Readings:

Text Books:

1. – Norkin & Levange, *Joint Structure and Function-A comprehensive Analysis*, F.A Davis.
2. Norkins & White, *Measurement of joint motion-A guide to goniometry*, F.A Davis.

Reference Books:

1. Smith, *Brunnstrom's clinical kinesiology*, F.A Davis.

Note: Latest editions of all the suggested books are recommended.

Program: Bachelor of Physiotherapy (BPT)

Semester: Third

Course: Advanced Exercise Therapy -1

Course Code: 23A303

L	T	P	Credits
4	0	0	4

COURSE LEARNING OBJECTIVE:

CLO1: The primary purpose of this paper is to impart advanced knowledge about mobilization technique.

CLO2: Understanding of the skill of use of advanced concepts & techniques like stretching, PNF, Resistance Exercise.

CLO3: To makes student ready for future to practice as a qualified Physiotherapist.

COURSE OUTCOME

At the end of the course candidate will able to

CO1: Know how to describe various factors that contributing to fatigue and tension.

CO2: Students will understand and explain the various therapeutic equipment for the improvement in muscle strength, mobility, endurance, ambulation etc.

CO3: Understand and able to make out normal and abnormal range of motions. Students will make out the strength of different muscles.

CO4: Understand principles and procedures, indications, contraindications and precautions, appropriate methods of application of each of the assessment strategy and treatment techniques hands on and on models of stretching, joint mobilization, PNF, MMT etc.

UNIT 1: Joint mobilization: Definition – Mobilization, Manipulation, indications, limitations, contraindications and precautions, applications of Mobilization technique to various joints, Principles of Maitland, Mulligan and Mckenzi joint Manipulation techniques.

UNIT 2: Stretching: Definition, properties of soft tissue, mechanical and neurophysiological properties of connective tissue, mechanical properties of non-contractile tissue. Determinants, type and effect of stretching, precautions, general applications of stretching technique.

UNIT 3: Resisted exercise: Definition – Strength, power, endurance. Guiding principle of resisted exercise, determinants, types Manual and Mechanical Resistance Exercise, Isometric Exercise, Dynamic Exercise - Concentric and Eccentric, Dynamic Exercise - Constant and Variable Resistance.

UNIT 4: Isokinetic Exercise, Open-Chain and Closed- Chain Exercise, precautions, contraindications. Progressive Resistance Exercise - de Lormes, Oxford, MacQueen, Circuit Weight Training, Plyometric Training—Stretch-Shortening Drills, Isokinetic Regimens.

UNIT 5: Proprioceptive Neuromuscular Facilitation – Principles, Diagonal patterns of movements, Basic procedures, Upper Extremity Diagonal patterns, Lower Extremity Diagonal Patterns. Technique in PNF – Rhythmic Initiation, Repeated Contractions, Reversal of Antagonists, Alternating Isometrics, Rhythmic Stabilization.

UNIT 6: Manual Muscle Testing: Principles, types, grading, benefits, precaution, limitation.

Suggested Readings:

Text Books:

1. Kisner & Colby, *Therapeutic Exercises Foundations and Techniques*, F A Davis.
2. Gardiner, *Principle of Exercise Therapy*, C.B.S Delhi.

Reference Books:

1. Vos et al, *Propoceptive Neuromuscular Facilitation*, Williams & Wilkins.
2. Hollis, *Practical Exercise Therapy*, Blackwell Scientific Publications.

Note: Latest editions of all the suggested books are recommended.

Program: Bachelor of Physiotherapy (BPT)
Semester: Third
Course: Principles of Bioelectrical Modalities – 1
Course Code: 23A304

L	T	P	Credits
4	0	0	4

COURSE LEARNING OBJECTIVE:

CLO1: The primary purpose of this paper is to recall the basic physics principles.

CLO2: To impart basic knowledge and understanding of certain common electrical components.

CLO3: To acquire the skill of application of agents of electrotherapy.

COURSE OUTCOME

At the end of the course candidate will able to

CO1: Recall the physics principles & amp; Laws of Electricity, Electro-magnetic spectrum & amp.

CO2: Describe effects of environmental & amp; man made electro-magnetic field at the cellular level & amp; risk factors on prolonged exposure.

CO3: Describe the main electrical supply, electric shock – precautions.

CO4: Enumerate production of various therapeutic electrical currents. Describe the panel diagrams of the machines.

CO5: Describe in brief, certain common electrical components such as transistors, valves, capacitors, transformers etc.; the simple instruments used to test / calibrate these components (such as potentiometer, oscilloscope etc.) of the circuitry.

CO6: Describe and identify various types of electrodes used in therapeutics, describe electrical skin resistance & significance of various media used to reduce skin resistance.

CO7: Describe and apply various types low frequency current.

UNIT 1: Fundamentals of Electricity & Magnetism-I: DC Currents -Modern concept of electricity: fundamental electric charges (proton and electron), bound and free electrons, free electrons and current, static electric charge, charging of an object potential and capacitance, potential difference and EMF. **A. C. currents:** Sinusoidal wave from, frequency, wavelength, Amplitude and phase of a sine wave, Average & RMS value of a sine wave.

UNIT 2: Quantity of electricity: Magnitude of current, conductors and insulators, resistance of conductor and Ohm's law, resistances in series and parallel. **Capacitors:** Electric field around a capacitor, charging and discharging a capacitor, types of capacitor with application of each in Physiotherapy department. **Rheostat:** series and shunt Rheostat with application of each in the Physiotherapy department.

UNIT 3: Fundamentals of Electricity & Magnetism- II: Electric Current: Thermal effect, chemical effect (ionization) and magnetic effect. Electric shock, Earth shock, causes and its

prevention. **Magnetism:** Magnetic - non-magnetic substances and their properties, properties of magnet, molecular theory, poles of magnet and its properties, magnetic lines of force and their properties, Electromagnetism, magnetic effects of electric current, Electromagnetic induction, Lenz's law, Inductor and Inductance types of inductor, reactance and impedance.

UNIT 4: Thermionic Valves: Thermionic emission, Diode and Triode valves and their characteristics, Construction and application of Cathode Ray Oscilloscope. **Semiconductor Devices:** Intrinsic and extrinsic semiconductors, advantages of diode and transistors devices. Basing of Diode and their characteristics, Light Emitting Diodes, integrated circuits. **Electronic Circuits:** Rectifiers & smoothing circuits, Oscillators - Sinusoidal TYPES. **A.C. & D.C. meters:** Functions and applications of Ammeter and volt meters, Ohm meters, Wheat stone bridge.

UNIT 5: Introduction to Therapeutic currents- I: Low Frequency Currents: Introduction of direct, alternation & modified currents, **Direct Current** – Production, Physiological and therapeutic effects of constant current, anode and cathode, Galvanism, Ionization and their application in various conditions Modified Direct Current –various pulses, duration and frequency and their effect on nerve and muscle tissue. Production of interrupted and surged current and their effects ,Physiological and therapeutic effects, principles of clinical application, indications, contra indications, precautions, operational skill of equipment & patient preparation. Iontophoresis –principles of clinical application, indication, contraindication, precaution, operational skill of equipment and patient preparation.

UNIT 6: Transcutaneous Electrical nerve stimulation (TENS)- Type of low frequency, pulse widths, frequencies & intensities used as TENS application, Theories of pain relief by TENS, Principle of clinical application effects & uses, indications, contraindications, precautions, operational skills of equipment & patient preparation.

Suggested Readings:

Text Books:

1. *Froster, A. and Palastanga, N*, Clayton's Electrotherapy: Theory and Practice, AITBS, Delhi 1999.
2. Singh, Jagmohan, *Textbook of Electrotherapy*, Jaypee, New Delhi.

Reference Books:

1. Jhon, Low & Ann, Reed Butterworth Heine, *Electrotherapy Explained: Principles*, Oxford 2000.

Note: Latest editions of all the suggested books are recommended.

Program: Bachelor of Physiotherapy (BPT)
Semester: Third
Course: Leadership and Management Skills
Course Code: 40BPT.203

L	T	P	Credits
2	0	0	0

Course Learning Objective:

The Module is designed to:

- CLO1:** Help students to develop essential skills to influence and motivate others.
- CLO2:** Inculcate emotional and social intelligence and integrative thinking for effective leadership.
- CLO3:** Create and maintain an effective and motivated team to work for the society.
- CLO4:** Nurture a creative and entrepreneurial mindset.
- CLO5:** Make students understand the personal values and apply ethical principles in professional and social contexts.

Course Outcome:

Upon completion of the course students will be able to:

- CO1: Examine various leadership models and understand/assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision.
- CO2: Learn and demonstrate a set of practical skills such as time management, self management, handling conflicts, team leadership, etc.
- CO3: Understand the basics of entrepreneurship and develop business plans.
- CO4: Apply the design thinking approach for leadership.
- CO5: Appreciate the importance of ethics and moral values for making of a balanced personality.

Module 1- Leadership Skills

a. Understanding Leadership and its Importance

- What is leadership?
- Why Leadership required?
- Whom do you consider as an ideal leader?

b. Traits and Models of Leadership

- Are leaders born or made?
- Key characteristics of an effective leader
- Leadership styles
- Perspectives of different leaders

c. Basic Leadership Skills

- Motivation
- Team work
- Negotiation
- Networking

Module 2 - Managerial Skills

a. Basic Managerial Skills

- Planning for effective management
- How to organise teams?
- Recruiting and retaining talent
- Delegation of tasks
- Learn to coordinate
- Conflict management

b. Self Management Skills

- Understanding self-concept
- Developing self-awareness
- Self-examination
- Self-regulation

Module 3 - Entrepreneurial Skills

a. Basics of Entrepreneurship

- Meaning of entrepreneurship
- Classification and types of entrepreneurship
- Traits and competencies of entrepreneur

b. Creating Business Plan

- Problem identification and idea generation
- Idea validation
- Pitch making

Module 4 - Innovative Leadership and Design Thinking

a. Innovative Leadership

- Concept of emotional and social intelligence
- Synthesis of human and artificial intelligence
- Why does culture matter for today's global leaders

b. Design Thinking

- What is design thinking?
- Key elements of design thinking:
 - Discovery
 - Interpretation
 - Ideation
 - Experimentation
 - Evolution.

- How to transform challenges into opportunities?
- How to develop human-centric solutions for creating social good?

Module 5- Ethics and Integrity

a. Learning through Biographies

- What makes an individual great?
- Understanding the persona of a leader for deriving holistic inspiration
- Drawing insights for leadership
- How leaders sail through difficult situations?

b. Ethics and Conduct

- Importance of ethics
- Ethical decision making
- Personal and professional moral codes of conduct
- Creating a harmonious life

Bibliography and Suggested Readings:

Books

- Ashokan, M. S. (2015). *Karmayogi: A Biography of E. Sreedharan*. Penguin, UK.
- Brown, T. (2012). *Change by Design*. Harper Business.
- Elkington, J., & Hartigan, P. (2008). *The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World*. Harvard Business Press.
- Goleman D. (1995). *Emotional Intelligence*. Bloomsbury Publishing India Private Limited.
- Kalam A. A. (2003). *Ignited Minds: Unleashing the Power within India*. Penguin Books India.
- Kelly T., Kelly D. (2014). *Creative Confidence: Unleashing the Creative Potential Within Us All*. William Collins.
- Kurien V., & Salve G. (2012). *I Too Had a Dream*. Roli Books Private Limited.
- Livermore D. A. (2010). *Leading with cultural intelligence: The New Secret to Success*. New York: American Management Association.
- McCormack M. H. (1986). *What They Don't Teach You at Harvard Business School: Notes From A Street-Smart Executive*. RHUS.
- O'Toole J. (2019) *The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good*. Harpercollins.
- Sinek S. (2009). *Start with Why: How Great Leaders Inspire Everyone to Take Action*. Penguin
- Sternberg R. J., Sternberg R. J., & Baltes P. B. (Eds.). (2004). *International Handbook of Intelligence*. Cambridge University Press.

E-Resources

- Fries, K. (2019). 8 Essential Qualities That Define Great Leadership. *Forbes*. Retrieved 2019-02-15 from <https://www.forbes.com/sites/kimberlyfries/2018/02/08/8-essentialqualities->

that-define-great-leadership/#452ecc963b63.

- How to Build Your Creative Confidence, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence.
- India's Hidden Hot Beds of Invention Ted Talk by Anil Gupta - https://www.ted.com/talks/anil_gupta_india_s_hidden_hotbeds_of_invention
- Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - .
"A Leader Should Know How to Manage Failure" <https://www.youtube.com/watch?v=laGZaS4sdeU>.
- Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review*, 85(6): 60.
- NPTEL Course on Leadership - <https://nptel.ac.in/courses/122105021/9>.

Program: Bachelor of Physiotherapy (BPT)

Semester: Third

Course: Biomechanics -1 Practical

Course Code: 23A302P

L	T	P	Credits
0	0	2	1

COURSE LEARNING OBJECTIVE:

CLO1: The primary purpose of this paper is to give basic concept of axis and plane and related to human body.

CLO2: To give basic idea about different force and its application in human body.

CLO3: To makes student ready for future to practice as a qualified Physiotherapist.

COURSE OUTCOME

At the end of course candidate will able to

CO1: Define motion, axis, plane and its types in relation to human body.

CO2: Apply force in human body using different point of application.

CO3: Use angle of pulls of muscle concept in treating.

CO4: Use the concept of gravity, line of gravity, center of gravity, equilibrium, lever, pulley in human body.

CO5: Utilize the knowledge of spring, elasticity, pulley in treating.

CO6: Analysis posture and its deformities and correction using biomechanics knowledge.

1. Motion: definition, types of motion, plane and axis of motion, factor determining the kind and modification of motion.
2. Force - Definition, diagrammatic representation of force, point of application, classification of forces, concurrent, coplanar and co-linear forces, composition and resolution of forces, angle of pulls of muscle.
3. Gravity - Definition, line of gravity, Centre of gravity.
4. Equilibrium - Supporting base, types, and equilibrium in static and dynamic state.
5. Levers - Definition, function, classification and application of levers in physiotherapy & order of levers with example of lever in human body.
6. Pulleys - system of pulleys, types and application.
7. Elasticity - Definition, stress, strain, HOOKE'S Law.
8. Springs - properties of springs, springs in series and parallel, elastic materials in use.
9. Posture – dynamic and static posture, kinetic and kinematics of posture, analysis of posture, effect of age, pregnancy, occupation on posture.

Note: Student must maintain a logbook. The duly completed logbook should be submitted during practical examination.

Program: Bachelor of Physiotherapy (BPT)
Semester: Third
Course: Advanced Exercise Therapy – 1 Practical
Course Code: 23A303P

L	T	P	Credits
0	0	4	2

COURSE LEARNING OBJECTIVE:

CLO1: To acquire the skills to practice advanced concepts like mobilization, PNF etc

CLO2: To skills in various physiotherapy technique like Stretching, resistance exercise etc.

CLO3: To build student as a qualified Physiotherapist and to justify their work.

COURSE OUTCOME

At the end of the course candidate will able to

CO1: Do Joint Mobilization to individual joint.

CO2: Do Stretching of individual and group muscles.

CO3: Apply Resisted exercises to individual and group muscles, open and closed kinematic exercises.

CO4: Demonstrate and perform PNF patterns to upper and lower limb.

CO5: Assess the muscle grade of upper & lower limb and trunk.

1. Joint Mobilisation to individual joint.
2. Stretching of individual and group muscles.
3. Resisted exercises to individual and group muscles, open and closed kinematic exercises.
4. PNF patterns to upper and lower limb.
5. MMT for upper limb, lower limb and trunk.

Program: Bachelor of Physiotherapy (BPT)
Semester: Third
Course: Principles of Bioelectrical Modalities – 1 Practical
Course Code: 23A304P

L	T	P	Credits
0	0	4	2

COURSE LEARNNG OBJECTIVE

- CLO1:** To provide exposure to students & gain skilled knowledge of therapeutic agents used in rehabilitation.
- CLO2:** To acquire the skills to plot SD Curve using Stimulator
- CLO3:** To makes student ready for future to practice as a qualified Physiotherapist.

COURSE OUTCOME

At the end of the course candidate will able to

- CO1: Apply bioelectrical principles knowledge in electro therapy.
- CO2: Demonstrate electrotherapy instruments, principles of their functioning, usage, choice of dosage and safety implications for human beings.
- CO3: Apply TENS, Iontophoresis technique etc.
- CO4: Plot SD Curve, Chronaxie, Rheobase in graph.

1. Demonstration of Bioelectrical principle.
2. Demonstration of electrotherapy instruments, principles of their functioning, usage, choice of dosage and safety implications for human beings.
3. Plotting SD graph, diagnosis using electro diagnostic test – FG test and SD curve.
4. Stimulation of motor points, stimulation of individual muscle and group muscle, Iontophoresis.
5. Placement of electrodes in TENS with dosimeter for various indications.