

**MASTER OF PHYSIOTHERAPY (M.P.T.)  
POST GRADUATE DEGREE PROGRAMME**

**ORDINANCE No. V (16A)**

**Date of Passed: 06.10.2008 (Academic Council Meeting)**

**Passed by : Academic Council,  
Swami Vivekanand Subharti University,  
Meerut**

**Agenda No. : 6**

**Effective from : Academic Session 2008-2009**



**FACULTY OF PHYSIOTHERAPY & ALLIED  
HEALTH SCIENCES**

**SWAMI VIVEKANAND SUBHARTI  
UNIVERSITY, MEERUT**

# **ORDINANCE**

**PROGRAMME :**

**MASTER OF PHYSIOTHERAPY  
(MPT)**

**Discipline: CARDIOPULMONARY**

# Swami Vivekanand Subharti University, Meerut

## Subharti Physiotherapy College

### Ordinance Relating to Master of Physiotherapy (MPT) Course

- 1- This ordinance may be called the “Ordinances Relating to Master of Physiotherapy (Physical Therapy) Course”.
- 2- The ordinance shall come in to force with immediate effect.

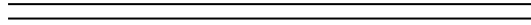
#### Chapter-1

### TITLE, & ELIGIBILITY OF ADMISSION

- 1- **OBJECTIVE:** To Train Physiotherapists who will be able to:
  - Assume leadership roles in departments.
  - Assume enhanced patient care responsibilities.
  - Formulate and implement educational Programs.
  - Analyze and undertake research.
- 2- The name of Degree to be awarded shall be Master of Physiotherapy (MPT) in the faculty of Physiotherapy.
- 3- Course Program & duration –
  - a. **Name:** Master’s of Physiotherapy  
(Cardiopulmonary)
  - b. **Nature:** Regular and full time.
  - c. **Duration:** Two Years course, designated as;

<b>First</b>	<b>year</b>	<b>MPT</b>
<b>Second</b>	<b>Year</b>	<b>MPT</b>
  - d. **Pattern:** Annual System
- 4- The medium of Teaching/Instruction and examination will be in English.

- 5- (a) A student seeking admission to the Master of Physiotherapy must have passed regular full time Bachelor of Physiotherapy (B.P.T.) course from any recognized institute/ University by U.G.C. and Indian Association of Physiotherapy (IAP).
- (b) The eligible students may be called for an Entrance test prescribed by the University.



THE CURRICULUM6- Academic Calendar -

I & II year = Session – September/October of every year  
Annual examination = every year in August

7- Teaching Hours –

The following shall be the distribution of teaching hours for the course of study.

**MPT CARDIOPULMONARY – FIRST YEAR**

<b>Subject Code</b>	<b>Subject</b>	<b>Hours</b>
MPT-C 101(T)	Basic of Computer Application	50
MPT-C 102(T)	Medical and Surgical Management of Disorders of the Cardiopulmonary System	100
MPT-C 103(T)	Physiotherapy Management in Disorders of the Cardiopulmonary System-I	125
MPT-C 104(T)	Physiotherapy Management in Disorders of the Cardiopulmonary System-II	125
MPT-C 105(P)	Physiotherapy Management in Disorders of the Cardiopulmonary System (Lab. Hours)	50
MPT-C 106(T)	Research Methodology and Biostatistics	100
MPT-C 107	Seminars on Clinical Issues	100
	Clinical Practice	1100
<b>Total</b>		<b>1750 Hrs.</b>

**SECOND YEAR**

<b>Subject Code</b>	<b>Subject</b>	<b>Hours</b>
MPT 201(T)	Pedagogy in Physiotherapy Education	100
MPT 202(T)	Management, Administration and Ethical Issues	75
MPT 203(T)	Biomechanics	150
MPT 203(P)	Biomechanics (Lab. Hours)	25
MPT 204	Dissertation	200
MPT 205	Seminars on Clinical Issues	100
	Clinical Practice	1100
<b>Total</b>		<b>1750 Hrs.</b>

**EXAMINATIONS****8- Examination****(A) Total papers:**

<b>Total theory papers</b>	<b>:</b>	<b>7</b>
<b>Total Practical</b>	<b>:</b>	<b>1</b>
<b>Total Viva Voce</b>	<b>:</b>	<b>1</b>
<b>Dissertation</b>	<b>:</b>	<b>1</b>

Mode of Curriculum delivery and execution includes classroom teaching, assignment, tests, lab, work, project, case studies, participation in relevant events, Group Discussion, etc.

- (i) The students admitted to the course shall attend lectures, practical classes, clinical training/ attachments and seminars as prescribed by the College/University.
- (ii) Every student shall be required to appear in the written sessional examination in various subjects and/or practical as may be prescribed by the College/University.
- (vi) The last date of receipt of admission forms and fees in the college office for the University Examination shall be fixed by the University from time to time.
- (v) The student shall be examined in such theory papers and practical examinations as may be prescribed in the syllabus.

**(B) INTERNAL ASSESSMENT:**

- (a) There shall be tests in each subject in each academic year. These will carry weightage in the total marks. Marks shall be notified within one week of the test.
- (b) These tests could be in the form of written tests, quizzes, symposia assignment, group discussion, etc.
- (c) A promoted student / ex- student, who has to reappear in the annual examination of the paper will retain internal assessment marks of the previous year.
- (d) In the case of readmission the student shall have to go through the internal assessment (IA) process afresh and shall retain nothing of the previous year.

## MPT

### (C) ANNUAL EXAMINATIONS:

Annual examination of theory and practical shall be conducted at the end of each session as outlined below:

- |    |                              |               |  |
|----|------------------------------|---------------|--|
| a. | Mode:                        | Theory Papers | Written Only   |
|    |                              | Lab Hours     | Written, Demonstration and Viva Voce   |
|    |                              | Viva Voce     | Viva Voce  |
| b- | Duration:                    | Theory        | 3 hours  |
|    |                              | Practical     | Up to three hours per student  |
| c- | Examiner                     | Theory        | 01 (either internal or external) from the panel  |
|    |                              | Practical     | 02 (1 internal and 1 external) from the panel  |
|    |                              |               | *Panel to be prepared by the Board of Studies and approved by the Vice Chancellor  |
|    |                              | Viva Voce     | 02 (1 internal and 1 external from the panel)  |
| d- | Moderation of Theory Papers: |               | For papers set by external examiners only.<br>Change cannot be more than 30% after consultation with the teacher who has taught the paper.         |
| e- | Dissertation evaluation      |               | There will be one internal and one external evaluator for each Dissertation and a viva voce will be conducted after Dissertation approval by both. |

### (D) PROMOTION:

A student has to pass in theory and in Practical separately

**I Year:** A student will not be promoted from I year to II year if he / she fails in more than 2 theory papers and/or practical exam. The student will appear for failed paper in the next year examination of the subject in which he/she is failed.

Example: A student who fails in MPT 103 or MPT 104 or MPT 105 will have to appear in all three i.e. MPT 103, MPT 104, MPT 105 in next subsequent examination.

**II year:** A student will be declared Pass in the II year if he/ she cleared all the papers of the II year and whose thesis has been approved and has passed in the viva voce of the thesis failing which this student shall appear as an ex- student for the failed examination.

Example: A student who fails in MPT 203 or MPT 203(P) will have to appear in both MPT 203, MPT 203(P) as an ex- student.

**(E) CLINICAL PRACTICE:**

Students engage in clinical practice in Physiotherapy Departments in the Orthopedics/ Neurology/Cardiopulmonary/Sports/ Pediatrics Physiotherapy setting to enhance their clinical skills and apply theoretical knowledge gained during teaching sessions.

**(F) THESIS / DISSERTATION:**

A Research Dissertation is compulsory and should embody the student's own work carried in the elective area under the supervision of a recognized guide qualified for the purpose and as per the SVSU norms.

A Research proposal should be submitted to the University for Approval within six (6) months of admission to the course.

The completed Research Dissertation should be submitted three (3) months in advance of the written, oral, clinic and practical examination.

**(G) PG TEACHERS:**

A PG Teacher/Guide must have at- least 5 years of full time teaching and clinical experience in Physiotherapy subjects.

For other specific qualification of teachers please refer to the recommendations on the qualifications of Teachers prescribed by the Indian Association of Physiotherapists (IAP).

**(H) EXAMINERS:**

A PG teacher as defined above is eligible to be appointed as an examiner.

There shall be at least two examiners in each thesis and clinical examinations out of which, at-least one shall be an external examiner. The external examiners who fulfill the conditions should ordinarily be invited from another recognized Institution / University, preferably from outside the state.

**Chapter – 4**

**AWARD OF DEGREE**

**9- Award of Degree**

- i) A student will be awarded a MPT Degree only on successful completion of the course including clinical practice for both the years.
- ii) The entire course of study in MPT for first and second year must be completed within 4 years of the date of admission.

Chapter – 5**RE-ADMISSION & ATENDANCE****10- Re-admission –**

- (i) A student having failed in the annual examination may be registered for re-admission as an ex-student to class he/she studied last, within the prescribed period of registration. No enrolment & college fee shall be charged in such cases.
- (ii) If a candidate's name is struck off the roll of the college, he/she may be re-admitted to the same class at the discretion of the Principal/Dean in the same academic year or within the period of registration, if re-admission is sought in any subsequent year. No enrolment fee shall be charged in such a case and a remark in the University register shall be deemed as equivalent to fresh enrolment.
- (iii) A re-admitted student will be governed by the same rules and regulations by which the other regular students of that year will be governed except that ex-students shall not be required to attend theory or practical classes.

**11- Attendance –**

All the students (except ex-students) are expected to attend all the classes of theory and practical and no case less than 75% of the theory and practical exams separately in each subject in each academic year. In addition attendance in the study tours as prescribed in the course shall also be compulsory. Five marks out of the internal assessment marks in each paper and practical are earmarked for regularity in attendance, to be awarded in the following marks:

95% or above attendance in each paper	-	5 marks
90% or above but below 95% attendance	-	4 marks
85% or above but below 90% attendance	-	3 marks
80% or above but below 85% attendance	-	2 marks
75% or above but below 95% attendance	-	1 marks

MPT

Chapter-6

**SCHEME OF EXAMINATIONS**

**12- Marks Distribution**

Note: **IA** : Internal Assessment, **AE** : Annual Exam

**MPT (CARDIOPULMONARY)**

**First Year**

<b>Course Code</b>	<b>Subject</b>	<b>IA</b>	<b>AE</b>	<b>Total</b>
MPT-C 101(T)	Basic of Computer Application	-	-	P / F
MPT-C 102(T)	Medical & Surgical Management in Disorder of the Cardiopulmonary System	50	100	150
MPT-C 103(T)	P.T. Management in Disorder of the Cardiopulmonary System-I	50	100	150
MPT-C 104(T)	P.T. Management in Disorder of the Cardiopulmonary System-II	50	100	150
MPT-C 105(P)	P.T. Management in Disorder of the Cardiopulmonary System-Practical	100	400	500
MPT-C 106(T)	Research Methodology & Biostatistics	50	100	150
MPT-C 107	Seminars on Clinical Issues	100	-	100
<b>Total</b>				<b>1200</b>

**Second Year**

<b>Course Code</b>	<b>Subject</b>	<b>IA</b>	<b>AE</b>	<b>Total</b>
MPT 201(T)	Pedagogy in Physiotherapy Education	50	100	150
MPT 202(T)	Management, Administration & Ethical Issues	50	100	150
MPT 203(T)	Biomechanics	50	150	200
MPT 203(P)	Biomechanics-Viva	50	100	150
MPT 204	Dissertation	-	-	P / F
MPT 205	Seminars on Clinical Issues	100	-	100
<b>Total</b>				<b>700</b>

**GRAND TOTAL I and II: 1900**

**Chapter – 7****RESULTS****13- MINIMUM PASS MARKS:**

The minimum pass marks in each subject (Theory and Practical separately) shall be 50%. However, a student has to clear the annual practical and viva voce examination without the benefit of the internal assessment marks.

**14- CLASSIFICATION OF SUCCESSFUL STUDENT:**

- a. The result of successful student who fulfils the criteria for the award of MPT degree shall be classified at the end of the completion of the programme as follows:
- |                                  |   |               |
|----------------------------------|---|---------------|
| (i) Passed with honors           | - | 80% and above |
| (ii) Passed with distinction     | - | 75% and above |
| (iii) Passed with first division | - | 60% and above |
| (iv) Passed                      | - | 50% and above |
- b. A student will be declared to have passed with a distinct in a particular subject if he/she obtains a distinction in that paper.
- c. A student shall be awarded a gold medal if he / she has secured the highest marks in aggregate amongst all the students of that particular specialty who have passed all the examinations in the first attempt.

**15- SPAN PERIOD**

- A. A student must pass in all course in a maximum of 2 attempts. Admission of those who fail to clear any course in 2 attempts will be cancelled irrespective of their year of studying.
- B. The entire course of MPT should be completed within a period of 4 years from the date of admission to the program.

**MASTER OF PHYSIOTHERAPY (M.P.T.)  
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**FACULTY OF PHYSIOTHERAPY & ALLIED  
HEALTH SCIENCES**

**SWAMI VIVEKANAND SUBHARTI  
UNIVERSITY, MEERUT**

# **SYLLABUS**

**PROGRAMME :**

**MASTER OF PHYSIOTHERAPY  
(MPT)**

**Discipline: CARDIOPULMONARY**

**1<sup>st</sup> year**

# **CARDIOPULMONARY**

## **MPT 1.1            MEDICAL AND SURGICAL MANAGEMENT OF DISORDERS OF THE CARDIOPULMONARY SYSTEM**

This course provides the student with information on the epidemiology, Pathomechanics, clinical presentation, relevant diagnostic test and medical and surgical management of disorders of the cardiopulmonary system.

Students will be able to use this information in planning and tailoring effective, specific, safe Physiotherapy treatment programmes.

Following are the topics to be included but not limited to:

### **CARDIOLOGY AND PULMONOLOGY**

#### **CARDIOLOGY**

Epidemiology, Pathomechanics, clinical presentation, relevant diagnostic test (ECG, Echo cardiography, cardiac catheterization, Radionuclide scanning, stress testing, ABG, Labs, etc.) and medical management of disorders of the cardiac system.

- 1) Assessment of symptoms of heart disease
- 2) Disorders of Cardiac rate, Rhythm and condition
- 3) Cardiac Arrest
- 4) Cardiac failure
- 5) Shock
- 6) Rheumatic fever
- 7) Congenital heart disease
- 8) Disease of the heart valve
- 9) Infective Endocarditis
- 10) Ischemic heart disease
- 11) Hypertension
- 12) Orthostatic hypotension
- 13) CPR
- 14) Pericarditis
- 15) Heart disease in pregnancy
- 16) Degenerative arterial disease

- 17) Inflammatory arterial disease
- 18) Raynaud's disease
- 19) Venous thrombosis
- 20) Peripheral Vascular disease
- 21) Cardio myopathy
- 22) Disease of the pericardium

## **PULMONOLOGY**

Epidemiology, pathomechanics, clinical presentation, relevant diagnostic tests (PFT, Labs etc.) and medical management of disorders of the pulmonary system.

- 1) Obstructive pulmonary diseases
- 2) Infection of the Respiratory system.
- 3) Interstitial and infiltrative pulmonary disorders
- 4) Pulmonary disorders due to exposure to Organic and inorganic pollutants
- 5) Pulmonary disorders due to systemic inflammatory disease
- 6) Pulmonary vascular disease
- 7) Diseases of the pleura
- 8) Respiratory failure
- 9) Supplemental Oxygen and Oxygen delivery devices in Chronic Respiratory Disease
- 10) Neuromuscular and Skeletal disorders leading to Global Alveolar Hypoventilation
  - Myopathies
  - Spinal Muscular Atrophies
  - Poliomyelitis
  - Motor Neuron Disease
  - HSMN
  - Kyphoscoliosis
  - Pectus Carinatum
  - Pectus Excavatum
- 11) Pathophysiology of paralytic – Restrictive pulmonary syndromes
- 12) Conventional Approaches to managing N-M-Ventilatory failure
- 13) Mechanical ventilation: Concepts, Physiological effects and complications

## **CARDIOTHORACIC SURGERY**

Surgical management of the above conditions, indication, contra- indications for surgery, precautions after surgery. Also included:

- 1) Closed v/s Open Heart Surgery
- 2) Incisions
- 3) Preoperative Assessment of Patients
- 4) Pre and post op Blood gas exchange
- 5) Haemodynamic performance of CTVS Patients.
- 6) Emergencies in CTVS
- 7) A – V Shunt
- 8) Heart Transplant
- 9) Left Ventricular Assistive devices
- 10) Procedures on Sternum, chest wall, diaphragm, mediastinum, oesophagus
- 11) Cardiopulmonary Bypass
- 12) Maintaining and Removing Artificial Airways.

## **MPT 1.2**

## **PHYSIOTHERAPY MANAGEMENT IN DISORDERS OF THE CARDIOPULMONARY SYSTEM -I**

This course provides students with the principles of Physiotherapy management in disorders of the cardiopulmonary system and the application of these principles in specific disorders.

Through lectures, case conferences, journal discussions and class discussions students will be able to set up a treatment programme tailored to the patient's needs.

Following are the topics to be included but not limited to:

### **SECTION –I GENERAL PRINCIPLES**

- 1) P.T. Assessment
- 2) Mobilization and Exercises (strengthening conditioning and endurance)
- 3) Body positioning
- 4) Airway Clearance Techniques
  - Postural Damage
  - Forced Expiratory technique
  - Breathing exercises
  - Percussion and vibration
- 5) Exercise testing and exercise training
- 6) Bio – feed back
- 7) Respiratory Muscle training
- 8) Ventilator
- 9) Humidification and Aerosol therapy
- 10) Applying and Evaluating Bronchial Hygiene therapy
- 11) Outcomes of pulmonary Rehabilitation
- 12) Functional adaptations
- 13) Prevention of Morbidity and Mortality with the use of physical aids
- 14) PT in ICU
- 15) Techniques for facilitating ventilatory pattern
- 16) Respiratory therapy equipment and adjuncts to cardiopulmonary therapy
- 17) Principles and prescription of pulmonary Rehabilitation
- 18) PT in neonatal ICU
- 19) Diabetes and Exercise

### **SECTION – II PHYSIOTHERAPY MANAGEMENT IN SPECIFIC CONDITIONS**

Assessment and management of condition as listed in MPT 1.1

**MPT 1.3**

**P.T. Management in disorders of the Cardiopulmonary system –  
II Topics as listed in MPT 1.1**

**MPT 1.4**

**PHYSIOTHERAPY MANAGEMENT IN DISORDERS OF  
THE CARDIOPULMONARY SYSTEM (LAB HOURS)**

Students will be instructed via demonstration, hands of techniques, field visits and case conferences on specific techniques used in management of patients with neurological disorders.

Students will on their experiences at the clinical postings to formulate a treatment plan for cases presented at the case conference.

## **MPT 1.5 RESEARCH METHODOLOGY AND BIostatISTICS**

Students will be provided an understanding of statistical measures used in the analysis and interpretation of research data. Information on research designs and their implementation will be provided

This course will be the students to read critique research articles and understand and apply the principles of research to perform a guided research as part of their course requirement following are the topics to be included but not limited to:

### **SECTION – I RESEARCH METHODOLOGY**

- 1) How to read critique research.
- 2) Introduction to research: framework; levels of measurement; variables.
- 3) Basic research concepts; validity and reliability.
- 4) Design, instrumentation and analysis for qualitative research
- 5) Design, instrumentation and analysis for quantitative research
- 6) Design, instrumentation and analysis for quasi – experimental research
- 7) How to write a research proposal
- 8) The use and Protection of Human and Animal Subjects.

### **SECTION – II BIostatISTICS**

- 1) Descriptive and Inferential statistics
- 2) Types of data: Qualitative and Quantative
- 3) Frequency distributions
- 4) Describing data with Graphs
- 5) Describing data with Averages Mode, Median, Mean
- 6) Describing variability Variance, Standard deviation, etc.
- 7) Normal Distributions
- 8) Interpretation of r
- 9) Hypothesis testing
- 10) T tests
- 11) ANOVA
- 12) Probability
- 13) Type I and Type II errors.
- 14) Parametric and Non-Parametric tests
- 15) Which test to use

- 16) Basic of computers – Hardware and Software
- 17) Basic of Computer Applications – Windows, MS Word, Power Point, etc.
- 18) Simple statistical Analysis using available software

## **MPT 1.6                      SEMINARS ON CLINICAL ISSUES**

These will serve as a platform for students to integrate components of patient management. Students will give presentations on topics provide to them.

### **CLINICAL PRACTICE**

Students will engage in clinical practice in physiotherapy department in the cardiopulmonary setting to enhance their clinical skills and apply theoretical knowledge gained during teaching sessions.

# **SYLLABUS**

**PROGRAMME :**

**MASTER OF PHYSIOTHERAPY  
(MPT)**

**2<sup>nd</sup> year**

**COMMON FOR ALL BRANCHES**

**COMMON FOR ALL BRANCHES**

**MPT 2.1 PEDAGOGY IN PHYSIOTHERAPY EDUCATION**

This course will provide students student information on improving their teaching skills in the classroom and clinical setting.

Following are the topics to be included but not limited to:

1) Philosophy of education and Emerging Issues in Education

Meaning, Functions and Aims of Education.

Formal, Informal and Non-formal Education.

Agencies of Education

Current Issues and Trends in Higher Education

Issue of quality in Higher education, Autonomy and Accountability, Privatisation, Professional Development of Teachers, Education of Persons with Disabilities.

Need for Educational Philosophy

Some Major Philosophies, Idealism Naturalism, pragmatism and their Implications for Education.

2) Concept of Teaching and Learning

Meaning and Scope of Educational Psychology

Meaning and Relationship between Teaching and Learning

Learning Theories

Dynamics of Behavior

Individual Differences

3) Curriculum

Meaning and Concept

Basis of Curriculum Formulation Development

Framing Objectives for Curriculum

Process of Curriculum Development and Factors Affecting

Curriculum Development

Evaluation of Curriculum

4) Method and Techniques of Teaching

Lecture, Demonstration,  
Discussion, Seminar, Assignment, Project and Case Study.

5) Planning for Teaching

Bloom's Taxonomy of Instructional Objectives, Writing Instructional Objectives in Behavioral terms. Unit planning and Lesson Planning.

6) Teaching Aides

Types of Teaching Aides  
Principles of Selection, Preparation & Use of Audio- Visual aides.

7) Measurement and Evaluation

Nature of Educational Measurement: Meaning, Process, Types of Tests.  
Construction of an Achievement Test and its Analysis Standardised Test  
Introduction of some Standardised tools, Important Tests of Intelligence, Aptitude, Personality.  
Continuous and Comprehensive Evaluation

8) Guidance and Counseling

Meaning and Concepts of Guidance and Counseling Principles  
Guidance and Counseling Services for Students and Faculty members  
Faculty Development and Development of Personnel for P.T. Services

9) Clinical Education

Awareness and Guidance to the Common People about Health and Diseases and Available Professional Services Patient Education  
Education of the Practitioners

## **MPT 2.2 MANAGEMENT, ADMINISTRATION AND ETHICAL ISSUES**

This course deals with basic issues of management of assist the practitioner in efficiently addressing issues related to the organization and administration of a Physiotherapy Department.

Following are the topics to be included but not limited to:

## **SECTION – I            MANAGEMENT**

Management – functions of management, Evolution of management through scientific management theory, classical theory – systems approach – contingency approach.

Management process – planning, organization, direction, controlling decision making. Introduction to personal management – staffing recruitment selection, performance appraisal, collective bargaining, discipline, job satisfaction. Quantitative methods of management – relevance of statistical and / or techniques in management

Marketing – market segmentation, marketing research production planning pricing, channels of distribution, promotion, consumer behavior, licenser.

Total Quality Management – basis of quality management – acid for quality control quality assurance program in hospitals, medical audit, and international quality systems.

## **SECTION –II ADMINISTRATION**

Hospital as an organization – functions and types of hospitals selected clinical supportive and ancillary services of a hospital, emergency department, nursing, physical medicine and rehabilitation, clinical supportive and ancillary services of a hospital, emergency department nursing physical medicine and rehabilitation, clinical laboratory, pharmacy and dietary dep. Roles of physical therapist, Physical therapy director Physiotherapy Supervisor, Physiotherapy assistant, Physiotherapy aide, Occupational therapist, Home health aide, volunteer. Direct care and referral relationships and confidentially.

## **LEGAL PROFESSIONAL ETHICAL ISSUES**

Physical therapy: Definition and development. The implications and conformation to the rules of professional conduct. Legal responsibility for their actions in the professional context and understanding the physiotherapist's liability and obligations in the case of medical legal action. Code of ethics A wider knowledge of ethics relating to current social and medical policy in the provisions of health care. Functions of the relevant professional associations education body and trade union. The role of the international health agencies such as the world health organizations. Standards of practice for physical therapies current issues.

## **MPT 2.3    BIOMECHANICS**

Students will be able to identify & apply principles of biomechanics while setting up individualized treatment protocols.

1) **FUNDAMENTAL MECHANICS**

- 1- Forces
- 2- Moments
- 3- Newton's Laws
- 4- Static Equilibrium
- 5- Composition and resolution of forces
- 6- Dynamic Equilibrium
- 7- Force Systems
- 8- Levers
- 9- Pulley systems
- 10- Density and mass
- 11- Segmental dimensions
- 12- Stress and strain
- 13- Modulus of rigidity and modular of elasticity
- 14- Poisson's effect
- 15- Strain energy
- 16- Static and cyclic load behaviors
- 17- Load
- 18- Load sharing and load transfer

2) **KINEMATICS**

- 1- Types of motion
- 2- Location of motion
- 3- Magnitude of motion
- 4- Direction of motion
- 5- Angular motion and its various parameters
- 6- Linear motion and its various parameters
- 7- Projectile motions

3) **KINETICS**

- 1- Definition of forces
- 2- Force vectors
- 3- Naming of Force
- 4- Force of gravity and Cog

- 5- Stability
- 6- Reaction forces
- 7- Equilibrium
- 8- Linear forces system
- 9- Friction and its various parameters.
- 10- Parallel force systems
- 11- Concurrent force systems
- 12- Work powers and energy
- 13- Moment arms of force
- 14- Force components
- 15- Equilibrium of force

4) **MUSCLE MECHANICS**

- 1- Structure and composition of muscle
- 2- Fiber length and cross section area
- 3- Mechanical properties
- 4- EMG changes during fatigue and contraction
- 5- Changes in mechanical properties because of ageing and exercised and immobilization.
- 6- Clinical applications

5) **LIGAMENT AND TENDON MECHANICS**

- 1- Structure and composition
- 2- Mechanical properties
- 3- Cross sectional area measurements
- 4- Muscle tendon properties
- 5- Temperature sensitivity
- 6- Changes in mechanical properties because of aging, exercise and immobilization
- 7- Mechanoreceptors
- 8- Clinical applications

6) **JOINT MECHANICS**

- 1- Joint design
- 2- Joint categories
- 3- Joint functions
  - i. Arthrokinematics
  - ii. Osteokinematics
  - iii. Kinematic chains
- 4- Joint forces, equilibrium and distribution of these forces
- 5- Degenerative changes in weight bearing joints and compensatory actions
- 6- Joint stability and its mechanisms
- 7- Clinical applications

7) **MEASUREMENT INSTRUMENTS**

- 1- Goniometer
- 2- Accelerometer
- 3- Photo Optical Devices
- 4- Pressure Transducers and Force Plates
- 5- Gait Analyzer
- 6- Isokinetic Device
- 7- EMG
  - Electrophysiology of Muscle Contraction
  - Recording
  - Processing
  - Relationship between EMG and Biomechanical Variables

8) **MECHANICAL ENERGY, WORK AND POWER**

- 1- Definitions
- 2- Positive and Negative work of muscles
- 3- Muscle mechanical power
- 4- Causes of inefficient movement
  - i. Co-Constrictions
  - ii. Isometric contraction against gravity jerky movement
  - iii. Energy generation at one joint & absorption at another
  - iv. Energy flow
- 5- Energy storage

9) **GAIT**

- 1- Gait parameter
  - i. Kinetic
  - ii. Kinematic
  - iii. Time-Space
- 2- Pathological gait
- 3- Running
- 4- Stair climbing
- 5- Changes in gait following various surgeries/diseases/disorders

10) **ORTHOSIS AND PROSTHESIS**

- 1- Orthosis of spine
- 2- Orthosis of upper limb
- 3- Orthosis of lower limb
- 4- Prescriptions checkouts and proper fittings
- 5- Biomechanical principles governing them
- 6- Aids used in management of disability.

11) **CARDIOPULMONARY MECHANICS**

- 1- Cardiac Mechanics
- 2- Pulmonary mechanics
- 3- Vascular Mechanics

**MPT 2.3A BIOMECHANICS (LAB HOURS)**

This involves application of topics in MPT 2.3 via demonstrations, field visits and case presentations.

**MPT 2.4 DISSERTATION**

As part of the requirement for the Master's degree the student is required to undertake a research study under the guidance of a guide and co-guide. Issues of neurological disorders may be studied on patients or normal individuals.

## **MPT 2.5 SEMINARS ON CLINICAL ISSUES**

These will serve as a platform for students to integrate various components of patient management. Students will give presentations on topics provided to them.

### **CLINICAL PRACTICE**

Students will engage in clinical practice in Physiotherapy Departments in the Neurology/Orthopedics/Cardiopulmonary Conditions/Sports Physiotherapy setting to enhance their clinical skills and apply contemporary knowledge gained during teaching sessions.