

## 12. Master of Physiotherapy (MPT)

### Introduction

The first formal physiotherapy education program in Nepal was established in 1983 at the Institute of Medicine (IOM) at Tribhuvan University, Kathmandu as a 3-year physiotherapy certificate program. This course ran until 1990. From 2003-2008, a 3-year physiotherapy certificate program commenced at Dhulikhel Medical Institute (DMI) on the campus of Kathmandu University at Dhulikhel. This was upgraded to the Bachelor of Physiotherapy (BPT) education (4 and ½ years) in 2010 for the first time in Nepal. Since then many colleges have come up in and around the valley. However, Nepal needs to produce competent graduates who can practice autonomously with an advanced level of knowledge and practical skills with clinical reasoning ability and implement evidence based approach to the physiotherapy assessment and management of patients. To improve the health outcomes of any community in Nepal, it is important that physiotherapist have the highest education and training to work in specialized health care settings to improve the health outcomes of the community in the country. This issue could be addressed with specialized physiotherapist holding Master of Physiotherapy (MPT) degree in different fields such as Musculoskeletal, Neurology, Cardiopulmonary, Community, Paediatrics, Geriatrics and Women's Health.

### A. Eligibility:

- a. Bachelor of Physiotherapy or equivalent from institutions recognized by government of Nepal.
- b. Registered in Nepal Health Professional Council
- c. Registered in the respective council of applicant's own country for foreign candidates.
- d. Candidate should score minimum of 50<sup>th</sup> percentile in the Entrance Examinations conducted by Medical Education Commission for being eligible to be in the merit list.

### B. Examination Format:

- a. Question type: Single best response type of multiple choice questions
- b. Option: Four options (A, B, C, D)
- c. Number of questions: 200
- d. Full marks: 200
- e. Cognitive ratio: Recall:Understanding:Application - 50:30:20
- f. Duration: 3 hours

### C. Weightage:

S.N.	Topics	Marks
	<b>Physiotherapy theory and practice</b>	<b>70</b>
1.	Biomechanics/Kinesiology	20
2.	Therapeutic exercises and exercise prescription	24
3.	Pain sciences and physiotherapy management (including electrotherapy)	9
4.	Exercise physiology	6
5.	Ethics, evidence-based practice and research	6
6.	Health promotion, sociology, and psychology	5
	<b>Clinical physiotherapy subjects</b>	<b>100</b>
7.	Musculoskeletal physiotherapy (including sports)	24
8.	Neurological physiotherapy	20
9.	Cardiopulmonary physiotherapy	20
10.	Community physiotherapy	10

S.N.	Topics	Marks
11.	Geriatric physiotherapy	6
12.	Paediatric physiotherapy	10
13.	Women's health physiotherapy	10
	<b>Basic medical science</b>	<b>30</b>
14.	Anatomy	11
15.	Physiology	5
16.	Pathology	5
17.	Microbiology	3
18.	Biochemistry	3
19.	Pharmacology	3

#### D. Content Elaboration

##### 1. Biomechanics/Kinesiology

- Basic concepts in biomechanics/ kinesiology including centre of gravity, line of gravity, force, newton's law, friction, stability, equilibrium, levers, type of muscle work and contraction ranges of muscle work, etc.
- Biomechanics of tissues and structures of the musculoskeletal system: bone, articular, cartilage
- tendons, ligaments, peripheral nerves, skeletal muscle
- Biomechanics, kinesiology and pathomechanics in upper extremity, lower extremity, vertebral column, thorax and chest wall, temporal mandibular joint
- Biomechanics/kinesiology of posture and its deviations
- Biomechanics/kinesiology of gait and its deviations

##### 2. Therapeutic exercises and exercise prescription

- Therapeutic exercises: impact on physical function, classification, techniques, indications, contraindications, assessment and evaluation of patient
- Starting and derived positions: fundamental starting position-standing, sitting, kneeling, lying, and hanging
- Movement principles, classification, types, effects, indication, contraindication, precaution, technique, and prescription: stretching, passive movement, assisted exercises, active-assisted, free exercise, and resisted exercises
- Soft tissue mobilisation, mobilization, relaxation, traction, PNF, suspension therapy, balance and coordination exercises
- Therapeutic Gymnasium: equipments in the gymnasium, set up of gymnasium, and its importance
- Breathing exercises: types, techniques, effects, uses
- FITT principle

##### 3. Pain sciences and physiotherapy management (including electrotherapy)

- Pain theories
- Neuro pathophysiology of pain
- Pain modulation, pain gate theory
- Pain assessment tools
- Psychological, social, environment, and economic aspects of both acute and chronic pain
- Pain management: pharmacology aspect, manual therapy, electrotherapy modalities, cognitive behavioral therapy

- Thermotherapy, cryotherapy
- Current: low frequency currents, medium frequency currents, high frequency currents, other therapeutic currents
- Biofeedback

#### **4. Exercise physiology**

- Pre-exercise evaluation
- Diet and nutrition, ergogenic aids
- Measurement of fitness components and sports skills
- Physiological effects of exercise on body systems
- Metabolic consideration:  $VO_2$  max, lactate threshold, RQ, energy expenditure in terms of calorimetry, body composition, energy balance, health related aspects of exercise
- Muscle fatigue, muscle spasm and tension: factors contributing to fatigue and relaxation
- Exercise prescription for health and fitness with special emphasis to cardiovascular disease, obesity, diabetes etc.
- Applied exercise physiology: aerobic power training, anaerobic power training, special aids in performance and conditioning
- Exercise at different altitudes, exercise at various climatic conditions, exercise and aging
- Principles of aerobic exercises & its physiological response, testing as basis of aerobic program

#### **5. Ethics, evidence based practice and research**

- Terminologies: morals, values, conduct, service, respect, code, behavior, professionalism, ethics, bioethics, etc
- Fundamental principles: autonomy, beneficence, justice, non-maleficence
- Ethical principles, professionalism, ethical viewpoint and decision making
- Ethical issues in research
- Evidence based practice: Introduction, components, steps of evidence-based practice, implication of EBP in physiotherapy clinical practice and research
- Clinical decision making (CDM): process, influencing factors, characteristics, conceptual frameworks for the interaction of CDM and patient management based on ICF
- Level of evidence, searching for evidence (literature review)
- Psychometric properties including validity and reliability
- Common research terminologies
- Hypothesis Testing: Null Hypothesis, Alternative hypothesis
- Probability and Sampling: probability, population and samples, sampling distribution, sampling methods, survey in research
- Research design: qualitative and quantitative research designs
- Parametric and non-parametric tests

#### **6. Health promotion, sociology and psychology**

- Health and disease: definitions, concepts, indicators of health
- Concepts of disease control and prevention, Modes of Intervention
- The role of socio-economic and cultural environment in health and disease

- Epidemiology of non-communicable diseases and conditions: cardio vascular diseases: coronary heart, disease, hypertension, stroke, rheumatic heart disease, cancer, diabetes, obesity
- Legislation, health policy, health care system in Nepal
- Sociology and health, socialization, social group, family, community, culture, caste system, social change, social control, social problems of the disabled, social security, social worker
- Psychology: nature, methods, and scope of psychology, intelligence, and learning, motivation, frustration, and personality, emotion and health; reactions to loss and disability, stress, compliance, and applications of counselling.

## **7. Musculoskeletal physiotherapy (including sports)**

- Fracture, and dislocations of upper extremity, lower extremity and spine
  - Classification of fractures, fracture healing, factor influencing fracture healing & complications of fracture & its management, cast, bracing and mobilization
  - Assessment and physiotherapy management
- Deformities: classification, clinical features, assessment and physiotherapy management of common congenital and acquired deformities of foot, knee, hip, shoulder, elbow and wrist including hand and spine
- Infective, metabolic condition: classification, clinical features, assessment and physiotherapy management of osteomyelitis, tuberculosis, pyogenic infection, TB joints etc.
- Arthritis and joints diseases: classification, clinical features, assessment and physiotherapy management of osteoarthritis, rheumatoid arthritis, ankylosing spondylitis, spondylolisthesis etc
- Classification, clinical features, assessment and physiotherapy management of soft tissue injuries of upper extremity, lower extremity and spine– like sprains, strains, tenosynovitis and contractures etc.
- Amputation, arthroplasty, joint replacement, osteotomy: classification, types, clinical features, operative procedures, complications, assessment and physiotherapy management
- Bone and joint tumors: classification, clinical features, assessment and physiotherapy management
- Peripheral nerve injuries: classification, clinical features, principle of tendon transfer and its procedure, assessment and physiotherapy management, assistive technologies
- Assessment and physiotherapy management of reconstructive surgeries for poliomyelitis, leprosy, crush injuries etc
- Degenerative conditions: classification, clinical features, assessment and physiotherapy management of cervical and lumbar spondylosis, osteoarthritis, canal stenosis etc
- Principles of injury prevention, principles of training & physiotherapy assessment and management/rehabilitation in sports injuries
- Younger athlete: musculoskeletal problems, management, children with chronic illness and nutrition
- Older athlete-physiological changes with aging, benefits, risks of exercise in elderly, exercise prescription guidelines for elderly
- Sports nutrition, psychology, drugs
- Orthosis and prosthesis: principle, types uses
- Concept of Prehabilitation in various musculoskeletal conditions

- Common investigations used in musculoskeletal conditions
- Common outcome measures in musculoskeletal conditions: NPRS, PSFS etc

## **8. Neurological physiotherapy**

- Motor control and motor learning theories
- Neuroplasticity: introduction and principles of neuroplasticity
- Vestibular disease: different vestibular diseases, symptoms, assessment and physiotherapy management
- Clinical features of the following neurological disorders: hydrocephalus, spina bifida, cranio vertebral junction anomalies etc
- Stroke: gross localization, types, effects of lesion, pathophysiology, clinical features, assessment and physiotherapy management
- Spinal cord diseases: types, clinical features, assessment and physiotherapy management of multiple sclerosis, syringomyelia, motor neuron disease, transverse myelitis, spinal arachnoiditis, cervical myelopathy etc
- Spinal cord injury (SCI): clinical manifestations and complications following SCI, assessment and physiotherapy management of SCI
- Brain stem lesion: types, clinical features, assessment and physiotherapy management
- Cerebellar disturbances: presentation and classical symptoms of cerebellar disease, assessment and physiotherapy management
- Assessment and physiotherapy management following ataxia: strategies to improve balance, coordination and proprioception, vestibular exercises, approach to extremity ataxia
- Movement disorders: types, clinical features, assessment and physiotherapy management
- Traumatic brain injury: classification, clinical features, assessment and physiotherapy management
- Infectious disease of nervous system: types, clinical features, assessment and physiotherapy management of encephalitis, meningitis, brain abscess etc
- Parkinsonism: causes, pathophysiology, clinical feature, assessment and physiotherapy management
- Neuropathies: classification, axonal vs segmental neuropathies clinical features, assessment and physiotherapy management of diabetic neuropathy, GBS, HMSN etc
- Myasthenia gravis: causes, signs and symptoms, assessment and physiotherapy management
- Peripheral nerve injury: causes, signs and symptoms, assessment, tendon transfer, assessment and physiotherapy management
- Bell's palsy, facial palsy and trigeminal neuralgia: classification, causes, clinical features, assessment and physiotherapy management
- Intracranial tumors: broad classification, signs and symptoms, assessment and physiotherapy management
- Neurogenic bladder: micturition reflex, bladder dysfunctions following SCI, types of neurogenic bladder, complications following bladder dysfunction, assessment and physiotherapy management
- Neurological treatment and approaches: bobath, roods, brunstrom, motor relearning,
- CIMT, PNF, biofeedback etc
- Common neurological investigations: NCV, SD curve, EMG studies

- Common outcome measures in neurological conditions: Berg balance scale, FIM, Barthel index, MMSE, SCIM, ASIA, TUG

## **9. Cardiopulmonary physiotherapy**

- Diseases of respiratory system: physiology, clinical presentation in relation to diseases, restrictive and obstructive pulmonary disease
- Assessment and physiotherapy management in restrictive and obstructive pulmonary disease
- Physiotherapy in pulmonary conditions: bronchial hygiene therapy, therapeutic positioning, ventilatory muscle training, techniques to improve lung expansion, PNF respiration, dyspnea relieving techniques, pulmonary rehabilitation
- Cardiovascular conditions: physiology, clinical presentation, assessment and physiotherapy management in ischemic heart disease, congestive heart failure etc: risk factor modification (through lifestyle and nutrition), cardiac rehabilitation,
- Peripheral vascular disease: physiology, clinical presentation, assessment and physiotherapy management
- Burns: degrees of burns and, management, reconstructive surgery, complications, assessment and physiotherapy management including splinting, positioning, scar management
- Cardiothoracic surgery: surgical approach, incisions (like thoracotomy, thoracoplasty, lobectomy, pneumonectomy, decortication, CABG, valvular surgery, congenital, heart disease surgeries), assessment and physiotherapy management
- Abdominal surgery: incisions, types, complications, assessment and physiotherapy management following various abdominal surgeries
- Causes, clinical features, assessment and physiotherapy management of diabetes, obesity/metabolic syndrome, cancer - lung/breast cancer, organophosphorous poisoning etc
- ICU and critical care: types of ICU, equipments, ventilators - modes and types (invasive and non-invasive), airways - endotracheal/tracheostomy/face mask/oropharyngeal/ nasopharyngeal, weaning, suctioning
- Common investigations in cardiopulmonary conditions
- Common outcome measures in cardiopulmonary conditions

## **10. Community physiotherapy**

- Community : definition, types of community
- Legislation, health policy, social security for PWD's in Nepal
- Models of disability, classification of disability according to the Nepal government
- Role of community, government, INGO and NGO and physiotherapist in disability prevention and health promotion
- Current situation of disability in Nepal; Local, national and international organisations working in the disability sector
- Sustainable development goal
- Concept, principles, need, objectives & scope of community based rehabilitation.
- Exercise prescription according to ACSM to various age group (children and adolescence, old adults) in common diseases in various settings.
- Compare and contrast physiotherapy intervention in treating different patient in institution based and community based rehabilitation.
- CBR matrix, CBR management cycle: planning, management and rehabilitation
- Preventive and community health physiotherapy for healthy population

- Prescribing and devising low cost locally available assistive aids, Creating a barrier free environment
- Social worker in community based rehabilitation, Definition, methods and role of social work
- Vocational assessment and rehabilitation
- Industrial health and ergonomics: Occupational hazards, Common occupation diseases, work related musculoskeletal disorders, Evaluation of table worker, Role of physiotherapy for various professionals in working posture (office design, Short break exercises etc).
- Disaster management: Role of Physiotherapist in prevention, preparedness, response and recovery
- Wheelchair prescription: wheelchair users; wheelchair service; wheelchair mobility; sitting upright; pressure sores; appropriate wheelchair; cushions; transfers

### **11. Geriatric physiotherapy**

- Normal aging and well elderly
- Biology of aging and physiological changes in various system
- Fitness assessment and exercise prescription
- Functional assessment and management
- Pain and fatigue assessment and management
- Balance and falls assessment and management
- Ambulation assessment and management
- Endurance assessment and management
- Mental health and ageing (eg. dementia, depression) management

### **12. Pediatric physiotherapy**

- Normal developmental milestones, Primitive reflexes in children
- Physical and behavioral differences between pre-term and full-terms neonates, complications of low birth weight
- Physiotherapy management of high risk pregnancies, prevention of neonatal and postnatal infections, metabolic problems
- Assessment and management of cerebral palsy using neuro-developmental therapy: rood's approach, constraint induced movement therapy etc
- Physiotherapy management in attention deficit hyperactive disorder and autism
- Assessment and physiotherapy management in pediatric conditions including; duchene's muscular dystrophy, spina bifida, torticollis, autism and behavioral issues, congenital dislocation of hip, CTEV, vertical talus, blount disease, perthe's disease, slipped capital femoral epiphysis, limb length discrepancies and osteogenesis Imperfecta.
- Assessment and physiotherapy management in cardiorespiratory conditions: Bronchiectasis, lung abscess and bronchial asthma, cystic fibrosis, IRDS, Bronchopulmonary dysplasia, pneumonia, lung abscess, asthma, bronchitis, bronchiolitis, pertusis, chronic lung disease, Congenital heart disease etc.
- Assessment and physiotherapy management in movement disorder - chorea, athetosis, dystonia, choreoathetosis, ataxia
- Role of physiotherapy in PICU and NICU
- Common investigation in paediatric conditions
- Common outcome measures in paediatric conditions
- Immunization schedule for children

- Treatment, prevention and correction of deformity

### **13. Women's health physiotherapy**

- Physiological, anatomical, and musculoskeletal changes during pregnancy
- Assessment and physiotherapy management during pregnancy eg. musculoskeletal conditions
- Prenatal, complications, physiotherapy assessment and management
- Physiotherapy intervention during labor and delivery
- Postpartum, complications, physiotherapy assessment and management
- Causes, clinical features, assessment and physiotherapy management in pelvic pain, pelvic inflammatory diseases, diastases recti etc.
- Menopause: effects in emotions, musculoskeletal system, assessment and physiotherapy management
- Urinary incontinence, fecal incontinence, pelvic organ prolapse: causes, types, outcome measure, assessment and physiotherapy management
- Types, causes, clinical features, physiotherapy assessment and management in gynecological disorders
- Common investigation and outcome measures in uro-gynaecological disorders

### **14. Anatomy**

- General structure and function of cells, epithelium, connective tissue, cartilage, bones, muscle, joints, nervous tissue
- Musculoskeletal system (upper limb, lower limb, spine, head and neck), cardiovascular system, lymphatic system, respiratory system genitourinary system, abdomen, perineum, pelvis, neuroanatomy
- Applied anatomy

### **15. Physiology**

- Cell structure and function, body fluid, blood composition
- Respiratory system, autonomic nervous system, cardiovascular system, nervous system, genitourinary system, endocrine system, excretory system, special senses, skin
- Neuromuscular physiology
- Environmental and applied physiology

### **16. Pathology**

- Inflammation, cell injury, degeneration, necrosis, gangrene, healing and repair
- Circulatory disturbances: hemorrhage, embolism, thrombosis, infraction, shock, volkmann's ischemic contracture etc
- Blood disorder: anemia, bleeding disorder etc
- Cardiovascular system: coronary heart disease, congenital heart disease etc
- Respiratory system: bronchitis, asthma, bronchiectasis, emphysema, COPD, pneumonia etc
- Bones and muscles: arthritis, spondyloarthropathy, fracture etc
- Peripheral nervous system and muscles: neuropathies, poliomyelitis, myopathies etc
- Central nervous system: infection, demyelinating disease, degenerative disease, stroke, TBI etc.
- Tumors, neoplasia
- Growth and its disorders, like hypertrophy, hyperplasia & atrophy
- Autoimmune diseases

- Metabolic diseases: diabetes mellitus and gout etc.

### **17. Microbiology**

- Terminologies: parasite, host, vector, formite, contagious disease, infectious disease, epidemic, endemic, pandemic, zoonosis, epizootic
- Bacteriology: classification, morphology, virus infections eg. hepatitis
- Parasitology, virology, mycology: structure, classification
- Mode of transmission of diseases
- Sterilization and disinfectant
- Infection: source of infection and entry & its spread
- Common pathogenic bacteria and diseases: respiratory tract infections, meningitis, enteric infections, anaerobic infections, urinary tract infections, leprosy, tuberculosis and miscellaneous infections
- Immunity: natural and acquired
- Allergy and hypersensitivity
- Hospital acquired infections

### **18. Biochemistry**

- Cell: morphology, structure, functions of cell, cell membrane, nucleus, chromatin, mitochondria, endoplasmic reticulum, ribosome
- Carbohydrates, lipids & proteins: definition, functions, sources, classification & metabolism
- Vitamins: definition, classification
- Nucleic Acids: DNA and RNA: types, prokaryotic transcription, translation
- Bioenergetics: Concept of free energy change, energetic reaction and endergonic reactions, concepts regarding energy rich compounds
- Water metabolism, mineral metabolism, muscle metabolism
- Nutrition: nutritional aspects of carbohydrate, fat and proteins, balanced diet, metabolism in exercise and injury, diet for chronically ill and terminally ill patients
- Connective tissue: mucopolysaccharides, connective tissue proteins, glycoproteins
- Hormones: general characteristic, mechanism of hormone actions

### **19. Pharmacology**

- Routes of drug administration, pharmacokinetics, pharmacodynamics
- Drugs affecting ANS, parasympathetic nervous system, sympathetic nervous systems
- Mechanism of action, indications, adverse effects and contraindication of Aspirin, Paracetamol and celecoxib
- Drugs affecting peripheral (Somatic) nervous System: Skeletal Muscle Relaxants: Local Anesthetics
- Anti-inflammatory drugs and related autacoids: histamine, bradykinin, 5-HT and their antagonists; prostaglandins and leukotrienes, antirheumatic drugs and drugs used in gout
- Non-steroidal antiinflammatory drugs (NSAIDs): classification NSAIDs on the basis of their mechanism of action: non-selective COX inhibitor, preferential COX-2 inhibitor, selective COX-2 inhibitor and analgesic-antipyretic with poor anti-inflammatory action
- Renal and CVS: diuretics; renin-angiotension system and its inhibitors, drug treatment of hypertension, angina pectoris, myocardial infarction, heart failure, and hypercholesterolemia

- Drugs affecting CNS: general anesthetics, alcohol, opioid analgesics, antiepileptic drugs, drug therapy for Neurodegenerative disorders
- Endocrines: parathyroid hormone, vitamin D, calcitonin and drugs affecting calcium balance, thyroid and antithyroid drugs; adrenocortical and anabolic steroids, insulins and oral hypoglycaemic agents, oral contraceptives
- Drugs affecting respiratory system: drug therapy of bronchial asthma and chronic obstructive pulmonary disease
- Drug interactions

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