# Final State Examination Topics

**Department:** **Clinical Rehabilitation Dept.**

**Study Programme:** **Physiotherapy – Bachelor study**

**FSE Subject:** **Medical Rehabilitation and Physiotherapy**

**Kinesiology and Kinesiotherapy**

1. **General Kinesiology:**

Muscle strength. Definition. Physiology and pathophysiology. Biomechanics. Possibilities of objective assessment and measurement – theoretically, clinically and instrumentally.

2. **General Kinesiology:**

The importance of joint range of motion for motor function. Evaluation of active and passive ranges. Factors influencing the quality of measurement and the actual range of motion in joints. Determination of angular movements. Relative insufficiency of multi-joint muscles. Practical applications for clinical diagnosis and kinesiotherapy.

3. **General Kinesiology:**

Basic functions of skeletal muscle. The importance of different modes of muscle involvement for physiological movement - within a single muscle (types of contraction) and within muscle synergies (co-contraction, antagonism, synergism, etc.). The contribution of skeletal muscle function in neuromuscular stabilization of the movement segment. **4. General Kinesiology:**

The effect of gravity on the human body, including the importance of antigravity muscles. Postural activity and reactivity. Physical and functional (neurophysiological) aspects affecting posture. Possibilities of objective assessment of posture.

5. **General Kinesiology:**

Muscle tone – kinesiological and pathokinesiological content of the terms hypotonus, hypertonus, spasticity, rigidity. Possibilities of functional coordination (co-activation) of muscles. Clarification of the concept of "synergistic antagonism" of muscles in a movement segment, including an example.

6. **General (Patho)Kinesiology:**

Theoretical and clinical-empirical categories of joint function disorders. The barrier phenomenon. Joint play. Joint blockage and possibilities of its influence. Joint-muscle functional patterns.

7. **General (Neuro)Kinesiology:**

Functional control of movement at the spinal level. The importance of α-motoneurons, γ-motoneurons, interneurons and autonomic neurons in the motor activity of an individual.

8. **Applied Kinesiology:**

Principle, execution and interpretation of the myotatic (proprioceptive) reflex. Explanation of the "gamma loop". Practical applications for clinical functional diagnosis and kinesiotherapy.

**9. Applied (Patho)Kinesiology:**

Functional (reversible) muscle pathology (functional muscle hypertonia, trigger point, muscle shortening, functional hypotonia, inhibition of muscle function).

**10. Special Kinesiology:**

The human gait. Temporal and spatial characteristics of the main moments of the standing and swing phases. Interpretation of clinical gait analysis results. The most common locomotion disorders.

**11. Special Kinesiology:**

Bipedal stand. Kinesiological characteristics of mutual kinetics and kinematics of the lower limbs (hip joints), pelvis and trunk. Description of movement strategy in solobalance. Evaluation and examination of standing (Romberg). Pelvic tilt and other relevant parameters in the standing examination. Trendelenburg/Duchenne symptom.

**12. Special Kinesiology:**

Structural and functional components of the spinal motion segment (disc, intervertebral joints, fixation ligaments, muscles). Disc hydrodynamics – influence of static and dynamic load. Pathology of the intervertebral disc.

**13. Special Kinesiology:**

Chest movements. Kinesiology of the thoracic spine, sternum, individual ribs, diaphragm and other muscles of ventilation. Classification of respiratory movements.

**14. Special Kinesiology:**

Kinesiology and patho-kinesiology of the cervical spine (dynamics of this section of the spine and its disorders, function of autochthonous and superficial muscles).

**15. Special Kinesiology:**

Movements of the functional complex of the shoulder. Mechanics of individual connections of the brachial plexus. Description and significance of the so-called scapulo-humeral rhythm in shoulder plexus mobility. Kinesiology and pathokinesiology of m. biceps brachii.

**16. Special Kinesiology:**

Static (stabilization) and dynamics of the hip joint. Interpretation of the collodiaphyseal and anteversion angle of the femoral neck. Muscular and ligamentous components providing stabilization of the hip joint. Kinesiology of flexion, extension and abduction in the hip. Trendelenburg test.

**17. Kinesiotherapy:**

Proprioceptive neuromuscular facilitation. Historical context of the methodology. Main principles and strategies of PNF, individual techniques of proprioceptive facilitation. Diagonal movement patterns.

**18. Kinesiotherapy and Occupational Therapy:**

The most commonly used kinesiotherapy and occupational therapy methodologies in neurological patients. Basic differences in the therapeutic approach to "central" and "peripheral" polio.

**19. Kinesiotherapy:**

Background and brief principles of physiotherapeutic methodologies that use the so-called primitive (phylogenetically old) types of locomotion. Kinesiological content of reflexive turning and reflexive crawling according to Vojta. Clarification of principles of action, indications, contraindications, limitations and results.

**20. Kinesiotherapy:**

Sister Elizabeth Kenny's method. Historical context, theoretical background, basic principles and the best known procedures used. The most common indications of the methodology, its usefulness and contraindications.

**21. Kinesiotherapy:**

Rational forms of physiotherapy in intensive care, especially with regard to the modification of spontaneous ventilation and spasticity in patients after cerebrovascular insults and craniocerebral injuries.

**22. Special Kinesiology:**

Knee joint motor skills. Muscular stabilization of the knee, functional co-activation of periarticular muscles. Involvement of major muscle groups in knee flexion and extension in open and closed chain movement. Definition and significance of the so-called knee joint lock.

**23. Special Kinesiology:**

Basic knowledge of elbow and wrist kinesiology. Kinematics of pronation and supination of the forearm, dorsiflexion and duction movements in the wrist. The importance of the radius, interosseous membrane, proximal and distal radioulnar connections in the mechanics of the upper extremity periphery.

**24. Special Kinesiology:**

Basic knowledge of hand kinesiology. Kinematics of functional connections of the carpus and hand, thumb and individual fingers. Importance of interosseous and lumbrical muscles. Basic classification of grips and their characteristics in the most common clinical disorders. Functions of the human thumb. The concept of stereognosia. Ideomotorics of the hand.

**25. Special Kinesiology:**

Basic knowledge of kinesiology of the ankle joint. Kinesiology of the talocrural and subtalar joint. The importance of the different functional groups of the tibial muscles for gait.

**26. Special Kinesiology:**

Basic knowledge of foot kinesiology. Kinesiological content of individual movements: dorsal flexion, plantar flexion, pronation and supination. Functional interpretation of individual foot arches for overall posture and locomotion.

**27. General (Neuro)Kinesiology:**

Functional control of movement at the supraspinal level. The importance of brainstem structures for motor function. Function of the reticular formation. Vestibular system – structure and function.

**28. General (Neuro)Kinesiology:**

The function and influence of the cerebellum on the motor skills of the individual. The importance of the cerebellum under physiological and pathological conditions in the control of functional movement (neocerebellar syndrome, paleocerebellar syndrome).

**29. General (Neuro)Kinesiology:**

Functional control of movement at the subcortical level (basal ganglia, thalamus, limbic system). Contribution of each system to the motor activity of the individual. Functional control subcortical circuits. The importance of neurotransmitters – the influence of dopamine on the motor system.

**30. General (Neuro)Kinesiology:**

Functional control of movement at the cortical level (importance of the primary motor cortex). Pyramidal and extrapyramidal pathways. Ideokinetic motor control.

**31. Special Kinesiology:**

Kinesiology and pathokinesiology of the lumbar spine (dynamics of this section of the spine and its disorders, function of autochthonous and superficial muscles, stabilization system of the spine).

**32. Special Kinesiology:**

Pelvic kinesiology and pathokinesiology – dynamics and statics of the pelvis, SI joints, pelvic floor muscle function).

**Physiatry – Balneology**

1. **Physiatry:**

Physiotherapy, physical therapy - definition and division. Electrotherapy. Classification of electrotherapy according to the frequency of electric current. General indications and contraindications for physical therapy (PT). Indications according to the effect of PT on different stages of musculoskeletal diseases (specify peracute, acute, subacute and chronic stages).

Galvanotherapy. The nature of the effect of galvanic current on tissues, the most commonly used applications, use in modern rehabilitation practice. Iontophoresis - its principles, possibilities and problems of use.

2. **Physiatry:**

Thermotherapy. Basic categorization and forms of thermotherapy used in practice. The physiological basis of the effect of heat. Indications and usefulness of different forms of positive thermotherapy in patients.

The physiology of local and general effects of cold on the human organism. Indications and contraindications. Therapeutic forms of cold application in rehabilitation practice.

3. **Physiatry:**

Low-frequency electrotherapy. The most common forms of low-frequency currents used in clinical practice. Rational indications and effectiveness of therapy.

Diadynamic currents. Classification of other electrotherapeutic procedures. Biophysical and biological effects. Different forms of these currents, their indications and therapeutic usefulness.

Transcutaneous electroneurostimulation (TENS). Classification of other electrotherapeutic procedures and physical and indicative definitions. Biophysical and biological effects. Different forms of TENS, their indications and therapeutic usefulness.

4. **Physiatry:**

Electrotherapy. The action of medium-frequency currents. Basis of biological and clinical effect. The most commonly used forms of medium-frequency currents in rehabilitation practice. Indications, contraindications, advantages and disadvantages compared to other forms of electrotherapy.

5. **Physiatry:**

High-frequency electrotherapy. Physical and commonly used divisions of high-frequency currents. Biological effect on the tissues of the human body. Indications and usefulness of high-frequency electrotherapy. Short-wave and microwave diathermy. Physical nature, biological effects, indications, contraindications and therapeutic usefulness.

6. **Physiatry:**

Ultrasound in rehabilitation practice. Physico-chemical and biological (cellular) nature of ultrasound energy action on human tissues. Main indications and contraindications. Therapeutic usefulness.

7. **Physiatry:**

Classic massage. Biological basis of the effect of massage as mechanotherapy. Principle and therapeutic significance of individual techniques referred to as classical massage. Indications, contraindications, therapeutic usefulness.

Segmental reflexology massage. Physiological nature and clinical effects of reflex massages in individual segments (sectors) of the human body. Types and forms of reflex massages used. Description of individual sequences, indications and contraindications, therapeutic use.

**8. Physiatry:**

Electrodiagnostics and electrotherapy. Hoorweg-Weiss curve (I/t). The importance of the curve in electrotherapy. Use of the obtained I/t curve data in specific conditions of clinical pathology (denervation - pseudoparesis, reinnervation, etc.). Description of the practical procedure for electrodiagnosis and electrostimulation of denervated muscle.

Basic terms used in electrodiagnosis and electrotherapy of denervated muscles (axonal damage of peripheral nerve - axonotmesis and neurotmesis). The importance and usefulness of electrostimulation. Accommodative quotient (AQ) and its use in diagnosis and electrotherapy.

The importance of electrical stimulation of healthy (non-denervated) muscle. Electrogymnastics of striated muscles. Basic types of currents used, indications, contraindications, therapeutic use.

**9. Physiatry:**

Mechanotherapy. Physical and biological aspects of the effect of mechanical energy on the tissues of the human body (musculoskeletal system, ligaments) with regard to its applicability in rehabilitation practice. Definition of different types of mechanotherapy. Therapeutic effect of traction (distraction) on the joint and tissues. Forms of traction used.

**10. Physiatry:**

Balneotherapy. Division and definition of balneotherapy and its relation to rehabilitation. Physiological and psychosomatic effects of balneotherapy, therapeutic significance in individual (most common) diseases.

Climatotherapy - principle and effects, indications, introduction of therapeutic spas using climatotherapy.

**11. Physiatry:**

Hydrotherapy. Basic division of hydrotherapy procedures. Physical and biological aspects of hydrotherapy on the human body. Full body hydrotherapy procedures - indications and therapeutic usefulness of individual procedures.

Partial and local baths and wraps. Physical and biological effects, therapeutic indications of these procedures in modern rehabilitation.

**12. Physiatry:**

Phototherapy. Basic classification. Physical and biological principles. Indications and contraindications, the most common forms of phototherapy with infrared and ultraviolet light.

Laser therapy. Origin and biological effects of laser energy used in rehabilitation. Classification of lasers and their therapeutic significance. Indications and contraindications of laser therapy. Biolamp and its rational use in therapy.

**13. Physiatry:**

Magnetotherapy. Physical nature, biological effects. Use in rehabilitation practice - indications, contraindications.

**Physiotherapy and Comprehensive Rehabilitation in Clinical Disciplines**

1. Physiotherapy and compensatory rehabilitation of patients after stroke.
2. Physiotherapy and compensatory rehabilitation of patients with transverse spinal cord lesions.
3. Physiotherapy and compensatory rehabilitation of patients with extrapyramidal syndrome.
4. Physiotherapy and compensatory rehabilitation of patients with cerebellar syndrome.
5. Physiotherapy and compensatory rehabilitation of lower limb amputees.
6. Physiotherapy and compensatory rehabilitation of patients with chronic low back pain.
7. Physiotherapy and compensatory rehabilitation of patients with chronic obstructive pulmonary disease.
8. Physiotherapy and compensatory rehabilitation of patients with rheumatoid arthritis.
9. Physiotherapy of patients with enthesopathy of the upper limb.
10. Physiotherapy of patients with polyneuropathy of the lower limbs.
11. Physiotherapy of patients with peripheral paresis of the upper limb.
12. Physiotherapy of patients with peripheral paresis of the lower limb.
13. Physiotherapy of patients after intrathoracic surgery, especially lung surgery.
14. Physiotherapy of patients after intrathoracic surgery, especially cardiac surgery.
15. Physiotherapy of patients after proximal femur fractures, shoulder TEP.
16. Physiotherapy of patients after total hip arthroplasty.
17. Physiotherapy of patients after total knee arthroplasty.
18. Physiotherapy of patients after brachial plexus injuries.
19. Physiotherapy of patients after anterior cruciate ligament replacement (ligamentum cruciatum anterius).
20. Physiotherapy of patients after spinal injuries (vertebral fractures with neurological and non-neurological damage).
21. Physiotherapy and compensatory rehabilitation of patients with arterial hypertension.
22. Physiotherapy and compensatory rehabilitation of patients with coronary heart disease and after acute myocardial infarction.
23. Physiotherapy and compensatory rehabilitation in children with chronic respiratory disease (cystic fibrosis, bronchial asthma).
24. Physiotherapy and compensatory rehabilitation in children with cerebral palsy.
25. Physiotherapy and compensatory rehabilitation in patients with multiple sclerosis.
26. Physiotherapy of patients with scoliosis.
27. Physiotherapy of patients after neurosurgery for discogenic compressive syndromes in the lumbar spine.
28. Physiotherapy of patients after cervical spine stabilization surgery for cervical myelopathy.
29. Physiotherapy of patients with peripheral paresis (plexus) of the facial nerve.
30. Indications and contraindications for physiotherapy of patients with venous insufficiency in the lower limbs.