EXERCISE THERAPY

Examination at the end of : II year **Instruction hours: 330**
i) Theory 80 marks + IA 20 marks
ii) Practical 60 marks
iii) Oral 20 marks + Practical IA 20 marks

COURSE DESCRIPTION**:**

In this course the student will learn the principles, technique and effect of exercise as a therapeutic modality in the restroration of physical function.

COURSE OBJECTIVES:

The objective of this course is that after 330 hours of lectures, demonstrations, practicals and clinics the student will be able to list the indications and contraindications of various types of exercise therapy, demonstrate the different techniques and describe their effects.

COURSE OUTLINE:

I. MECHANICS: [15 hours]

Define the following terms and describe the principles involved with suitable examples.

i. Force: Composition of force, Parallelogram of forces.

ii. Equilibrium: Stable, unstable, neutral.

iii. Gravity: Centre of gravity, Line of gravity.

iv. Levers: 1st , 2nd and 3rd order. Their examples in the human body and their practical application in physiotherapy, Forces applied to the body levers.

v. Pulleys: Fixed, Movable

vi. Springs ; Series, Parallel.

vii. Tension.

viii. Elasticity : Hooks law.

ix. Axis: Sagittal, Frontal, Horizontal.

x. Planes: Sagittal, Frontal, Horizontal

xi. Definitions of: Speed, Velocity, Work, Energy, Power, Acceleration, Momentum, Friction and Inertia.

II. MUSCLE ACTION: [9 hours]

i. Muscle work: Isotonic (concentric, eccentric), isometric (static)

ii. Group actions: Agonists (prime movers), antagonists, synergists, fixators

iii. Angle of muscle pull, mechanical efficiency of the muscles.

III. PELVIC TILT: [6 hours]

Describe the following:

i. Normal pelvic tilts, alterations from normal: anterior tilt (forward), posterior tilt (backward) lateral tilt.

ii. Muscles responsible for alterations and pelvic rotation.

iii. Identification of normal pelvic tilts, pelvic rotation and altered tilts and their corrective measures.

IV. STARTING POSITIONS: [18 hours]

Describe the following starting positions, their muscle work effects and uses. Specify the importance and derived positions for each one.
Standing, kneeling, sitting, lying, hanging.

V. MOVEMENTS: [13 hours]

Explain the following terms with suitable examples:

i. Anatomic movements: Flexion, Extension, Abduction, Inversion, Eversion, Supination, Pronation, Internal rotation, External rotation, Gross flexion, Gross extension, Trunk side flexion.

ii. Surface anatomy of the individual joints.

iii. Rhythm of movement.

iv. Timing of movement.

v. Duration of movement

vi. Classification of movement : Active, Passive.

vii. Effects of exercise : Physiological effects, Therapeutic effects.

viii. List the indications and contraindications of the following and demonstrate the technique for each:

a. *Active movements :* Voluntary (free, active assisted, assisted resisted, resisted), Involuntary (associated, reflex, peristaltic / visceral, cardiac).
b. *Passive movements:* Relaxed passive, mobilizing passive (forced P.M. manipulations, serial manipulations), passive stretching.

VI. RELAXATION: [12 hours]

i. Describe: Relaxation, Muscle fatigue, Muscle spasm.

ii. Describe: General causes, signs and symptoms of tension (mental and physical)

iii. Factors contributing to fatigue, types of relaxation (local and general), indications of relaxation, techniques of relaxation.

iv. Breathing exercises - different types

v. Demonstrate the techniques of relaxation (local and general).

VII. PASSIVE MOVEMENTS: [22 hours]

i. Describe the types, techniques, indications and contraindications, physiological effects and passive movements of joints.

ii. Demonstrate passive stretching of following muscles / muscle groups of each upper limit and describe the indications, contraindications, physiological effects, advantages and disadvantages: pectoralis major, biceps brachii, triceps brachii, long flexors of the fingers.

iii. Lower limb: rectus femoris, iliotibial band (tensor fascia lata) gastrocnemius, soleus, hamstrings, hip adductors, iliopsoas.

iv. Neck: Sternocleidomastoid.

VIII. ACTIVE MOVEMENTS: [15 hours]

i. Describe the types, techniques, indications and contra indications, physiological effects, advantages and disadvantages of active movements for the following muscle groups: Shoulder abductors, shoulder forward flexors, Triceps brachii, hip abductors, hip flexors, quadriceps femoris, abdominal muscles, back extensors.

ii. Describe the home programme for strengthening neck muscles and back extensors.

IX. PROGRESSIVE RESISTANCE EXERCISE [15 hours]

i. Describe the following exercises, their advantages and disadvantages and demonstrate the techniques of the following types of PREs : Fractional System, Macqueens set system, Mcqueens power system.

ii. Demonstrate practically each system using : Delormes boot, dumbells, sand bags in pulleys, powder board and suspension therapy.

X. MUSCLE GRADING: [25 hours]

i. Describe the types of muscle grading, key to muscle grading, techniques of muscle testing.

ii. Demonstrate the skill to grade the individual and group muscles of upper and lower limb, neck and trunk muscles.

XI. GONIOMETRY: **[25 hours]**

i. Describe the normal range of various joints. Describe goniometer, range of measuring systems (180), foot, trunk and head, techniques of goniometer.

ii. Demonstrate measuring of individual joint range using goniometer.

iii. Demonstrate measurement of limb girth (using measuring tape) : arm, forearm, thigh, calf.

XII. RE-EDUCATION OF MUSCLES: **[18 hours]**

i. Describe the term re-education of muscles and the techniques, spatial summation and temporal summation.

ii. Demonstrate the various re-education techniques and facilitating methods for various groups of muscles.

iii. Demonstrate the progressive exercises in strengthening by using various applications: (according to their muscle power) Grade-I to Grade-IV.

iv. Functional re-education — Mat exercises.

XIII. SUSPENSION THERAPY: **[15 hours]**

i. Describe the basic principle of simple pendulum and pendular movement.

ii. Describe the type of suspension: Pendular, axial, eccentric fixation (anterior, posterior, medial & lateral).

iii. Explain the indications and technique for each type of suspension.

iv. Demonstrate axial and eccentric fixation for mobilizing, strengthening and re-education of various muscles and joints.

XIV. HYDROTHERAPY: **[12 hours]**

i. Describe Hydrostatic pressure, upward thrust of water buoyancy.

ii. List the indications and contra-indications for hydro therapy.

iii. Describe the dress of patients and the therapist and necessary hydrotherapy equipment.

iv. Types of hydro therapy: Sterile pool contrast bath, whirlpool bath, hubbard tank.

v. Construction of hydrotherapy tank : Design of construction, safety features, cleaning the pool, water heating systems, hygiene of patient and pool.

XV. JOINT MOBILITY: **[20 Hours]**

Describe the following:

i. Joint ranges (outer range, middle range, inner range), individual joint structures, joint movements (anatomic, accessory), causes of joint range limitations, prevention of joint stiffness, positioning (physiological resting position).

ii. Passive range of movement, methods of relaxation, active exercises, manual mobilization techniques.

iii. Forced passive movements : small amplitudes, large amplitudes.

iv. Muscle strengthening techniques (PNF): Hold-relax, slow reversal, rhythmic stabilization, repeated contractions.

v. Accesory movements : Posterior, anterior, superior and inferior glide, traction and approximation.

vi. Indications and contra-indications for mobilisation of individual joints; demonstrate practically the various mobilisation techniques for individual joints and teaching home programme.

XVI. CRUTCH WALKING: [10 hours]

i. Describe the following: Components of a crutch, types of classification of crutches, characters of good crutch, preparing a patient for crutch walking, crutch walking muscles, measurement of crutches (axillary piece, hand piece), crutch stance, crutch palsy, types of crutch walking (4 point, 3 point, 3 point (non -weight bearing and partial weight bearing), modified 3 point (paraplegic and shuffling gait, swing to and swing through)

ii. Demonstrate crutch measurement (sitting, standing and lying positions) and various types of crutch walking (even ground, stairs and ramps).

XVII. POSTURE: [11 hours]

i. Describe the following : Posture (static and dynamic), Definition of good posture, Muscles responsible for good posture. Postural mechanisms, Definition of abnormal posture (Kyphosis, Scoliosis, Lordosis, Kypho-scoliosis, Kypholordosis), Assessment of posture (inspection, Scoliosis, Lordosis, Kypho-scoliosis, Kypholordosis), Assessment of posture (inspection, measurement — length of legs, width of pelvis, plumb line — R.O.M. of trunk in flexion, extension, side flexion and rotation.

ii. Describe and demonstrate postural correction by : Strengthening of muscles, Mobilisation of trunk, Relaxation. Active correction of the deformities, passive correction (traction), postural awareness, abdominals and back extensors.

iii. Outline principles in bracing of the trunk and surgical correction.

iv. Demonstrate practically : Identification of abnormal posture, and postural corrective measures.

XVIII. GAIT: [18 hours]

i. Define gait and center of gravity of the human body.

ii. Describe muscles responsible for normal gait, six determinants of gait (pelvic rotation, pelvic tilt, hip flexion, lateral displacement of pelvis, knee flexion, in stance phase, normal foot pattern during walking).

iii. Describe the walking cycle : Stance (heel strike, foot flat, mid stance, and foot off), Swing (acceleration, mid swing and deacceleration).

iv. Describe the following pathological gaits : Gluteus medius Gait, Gluteus maximus gait, Hip flexor weakness gait, Quardriceps weakness gait, Foot drop gait,

hemiplegic gait, Ataxic waddling gait, Equinus gait, Calcaneus gait, Equinovarus gait.

v. Demonstrate skill in identifying pathological gait and proper gait training.

XIX. COORDINATION: **[12 hours]**

i. Define balance (static and dynamic)

ii. Explain the mechanism of neuromuscular co-ordination.

iii. Describe the incoordination due to : Lower motor neuron lesions (flaccidity) Upper motor neuron lesions (spasticity) Cerebellar lesions, Loss of kinaesthetic sense (tabes dorsalis, syringomyelia, leprosy), Imbalance due to muscular disease.

iv. Describe re-education of balance.

v. Describe re-education of co-ordination: Frenkels exercises, proprioceptive neuromuscular facilitation (PNF) techniques.

vi. Demonstrate the re-education techniques of balance and coordination.

XX. COMPLICATION OF BED REST: **[9 hours]**

i. Describe the complications of patients on prolonged bed rest.

ii. Burgers exercises

iii. Demonstrate maintenance exercises for patients on prolonged bed rest.

XXI. Describe briefly: **[30 hours]**

A. Soft Tissue Manipulation:

i. History of massage.

ii. Mechanical points to be considered

iii. Points to be considered while giving massage

a. Manipulations.

b. The time of the day for treatment.

c. The comfort and support of the patient (draping and positioning)

d. Position of operator (therapists stance)

e. Using body weight

f. Contact and continuity

g. Techniques, indications and contra — indications.

iv. Physiological effects of massage on various systems of body. Effects on: Excretory system, Circulatory system, Muscular system, Nervous system & Metabolic system.

B. Define and describe the various manipulation techniques used in massage.

1. Stroking manipulation: Effleurage, stroking
2. Pressure manipulations: Kneading, squeezing, stationary, circular ironing (reinforced kneading), finger kneading, petrissage (picking up, wringing, rolling), frictions.
3. Percussion manipulation: tapotement, hacking, clapping, beating & pounding.
4. Shaking manipulations: vibration, shaking.

C. Define and describe the technique, effects, uses and contra-indications of the following manipulations:

1. Stroking manipulations.
2. Pressure manipulations.
3. Percussion manipulations.
4. Shaking manipulations.

D. Demonstrate the following techniques on patients / models:

i. Massage for upper limb:

a. Scapular region

b. Shoulder joint

c. Upper arm

d. Elbow joint

e. Forearm

f. Wrist joint

g. Hand.

ii. Massage for lower limb:

a. Thigh

b. Knee joint

c. Leg

d. Foot (including ankle joints and toes)

iii. Massage for back:

a. Neck and upper back

b. Middle and lower back

c. Gluteal region, arm & leg.

iv. Massage for the face

References: -

1. Principles of Exercise Therapy — Dena Gardener.
2. Practical Exercise Therapy — Hollis.
3. Therapeutic Exercise foundation & techniques — Kisner.
4. Muscle testing and function - F.Kendal.
5. Muscle testing - Danial & Worthinghams.
6. Measurement of joint motion — a guide to Goniometry - Cynthia Norkin.
7. Therapeutic Exercise foundation and techniques - Carolyn Kisner.
8. Text Book of Therapeutic Exercise - S. Lakshmi Narayana.
9. Fundamentals of Physiotherapy - Kumar
10. Principle of Exercise Testing and Interpretation - Kalrlman Wasswerman.
11. Exercise Therapy - Prevention and Treatment of disease - John Gormly.
12. Manual of massage and measurement — Edith. M.Prosser.
13. Massage for therapists — Margaret Hollis.
14. Principal and practice of Therapeutic Massage - Akhoury Gourang Sinha.
15. Hand book of Clinical Massage - Mario - Paul — Cassar.

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