1st Year B.P.T.

Subject: Human Anatomy (Subject Code BPT-101)

Goal – To provide the student with the necessary Anatomical knowledge & skills to practice as a qualified Physiotherapist

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Objectives-

1] Musculo – Skeletal

i) The student should be able to identify & Describe Anatomical aspects of muscle bones & joints, & to understand and Analyze movements.

ii) To understand the Anatomical basis of various clinical conditions e.g. trauma, deformities, pertaining to limbs & spine.

iii) To be able to localize various surface land-marks;

iv) To understand & describe the mechanism of posture & gait the Anatomical basis of abnormal gait.
2] In NEURO – Anatomy –
i) to identify & describe various parts of C.N.S. – fore – brain, Midbrain, Hind-brain Brain stem, courses of cranial nerves; functional components, course distribution. Anatomical bases of clinical lesions:
ii) to describe the source & course of spinal tracts;
iii) to describe blood circulation of C.N.S. & spine;
iv) be able to identify the components of various Trans – sections.

3] THORAX – to identify & describe various components of the contents of the Thorax – with special emphasis to tracheo-bronchial tree, & cardio – pulmonary system.

4] CIRCULATORY – I) be able to identify & describe the source & course of major arterial venous & Lymphatic system, with special emphasis to extremities, Spine & Thorax

5] PSYCHO-MOTOR –
i) to be able to demonstrate the movements of various joints –
ii) distinguish cranial & peripheral nerves
iii) distinguish major arteries, veins & Lymphatics with special emphases to extremities, & spine.

Syllabus
1] General Anatomy

Including Histology – Basic tissues like epithelial, Connective, muscular, nervous, system.

2. Musculo Skeletal Anatomy - (General) ........... (10 hrs)

a) Anatomical positions of body, axes, planes, common anatomical terminologies (Groove, tuberosity, trochanters etc). b) Connective tissue classification.

c) Bones- Composition & functions, classification and types according to morphology and development. d) Joints-definition-classification, structure of fibrous, cartilaginous joints, blood supply and nerve supply of joints. e) Muscles – origin, insertion, nerve supply and actions

A. Upper Extremity : (35 hrs)

a. Osteology : Clavicles, Scapula, Humerus, Radius, Ulna, Carpals, Metacarpals, Phalanges.

b. Soft parts: Breast, pectoral region, axilla, front of arm, back of arm, cubital fossa, front of fore arm, back of fore arm, palm, dorsum of hand, muscles, nerves, blood vessels and lymphatic drainage of upper extremity.

c. Joints : Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand.

d. Arches of hand, skin of the palm and dorsum of hand.
B. Lower Extremity ...........................................(25 hrs)
b. Soft parts: Gluteal region, front and back of the thigh (Femoral triangle, femoral canal and inguinal canal), medial side of the thigh (Adductor canal), lateral side of the thigh, popliteal fossa, anterior and posterior compartment of leg, sole of the foot, lymphatic drainage of lower limb, venous drainage of the lower limb, arterial supply of the lower limb, arches of foot, skin of foot.

C. Trunk & Pelvis ......................... (20 Hrs)
a. Osteology: Cervical, thoracic, lumbar, sacral and coccygeal vertebrae and ribs
b. Soft tissue: Pre and Para vertebral muscles, intercostals muscles, anterior abdominal wall muscles, Inter-vertebral disc.
c. Pelvic girdle and muscles of the pelvic floor

3. Regional Anatomy .................. (80 Hrs)
Following is region-wise distribution

Thorax:
a) Cardio – Vascular System .................(10hrs)
Mediastinum: Divisions and contents
Pericardium: Thoracic Wall: position, shape and parts of the heart; conducting System; blood Supply and nerve supply of the heart;
names of the blood vessels and their distribution in the body – region wise.

b) Respiratory system (15 hrs)
Outline of respiratory passages
Pleura and lungs: position, parts, relations, blood supply and nerve supply; Lungs emphasize on bronchopulmonary segments
Diaphragm: Origin, insertion, nerve supply and action, openings in the diaphragm, intercostal muscles and Accessory muscles of respiration: Origin, insertion, nerve supply and action.

Abdomen: .......................(8 Hrs)

Peritoneum: Parietal peritoneum, visceral peritoneum, folds of peritoneum, functions of peritoneum. Large blood vessels of the gut Location, size, shape, features, blood supply, nerve supply and functions of the following: stomach, liver, spleen, pancreas, kidney, urinary bladder, intestines, gall bladder.
Pelvis: Position, shape, size, features, blood supply and nerve supply of the male and female reproductive system.

Endocrine glands: .................. (5hrs)
Position, shape, size, function, blood supply and nerve supply of the following glands: Hypothalamus and pituitary gland, thyroid glands, parathyroid glands, Adrenal glands, pancreatic islets, ovaries and testes, pineal glands, thymus.

Head and Neck: .....................(20 hrs)
Osteology: Mandible and bones of the skull. Soft parts: Muscles of the face and neck and their nerve and blood supply-extra, ocular
muscles, triangles of the neck, Gross anatomy of eyeball, nose, ears and tongue. Facial muscles & T.M. joint.

5. Neuro Anatomy ..........................(50 hrs)

Organization of Central Nervous system - Spinal nerves and autonomic nervous system mainly pertaining to cardiovascular, respiratory and urogenital system, Cranial nerves, Peripheral nervous system, Peripheral nerve, Neuromuscular junction, Sensory end organs, Central Nervous System Spinal segments and areas, Brain Stem, Cerebellum, Inferior colliculi, Superior Colliculi, Thalamus, Hypothalamus, Corpus striatum, Cerebral hemisphere, Lateral ventricles, Blood supply to brain, Basal Ganglia, The pyramidal system, Pons, medulla, extra pyramidal systems, Anatomical integration.

SCHEME OF EXAMINATION

THEORY – 80 MARKS + Int. assessment – 20 marks Total .......... 100 Marks

Model question paper – 80 Marks

Section A) Q1) M.C.Q.

-based on Single best response ....................... [20 x 1] --- 20 marks – [20 minutes]

This question should include topics covered in syllabus –

Section B) S.A.Q.

Q2) Answer any Five out of Six -......................... [ 3 x 5] -------------------

15 marks

This question should include

v] circulatory system.
Q3) Answer any 3 out of 4 .................................. [ 5 x 3] --------------------------
15 marks
This question should include i] Thorax ii] soft parts upper limb iii] soft part lower limb
iv] soft parts Thorax /spine / neck

Section C) L.A.Q.
Q4) Compulsory – based Musculo Skeletal system [including Kinesiology] 15marks
Q5) should be based on Neuro-Anatomy [including cranial nerves with emphasis to V,VII, VIII, IX & XII nerves

................................................................. 15 marks

OR
Q5) ...........................................................................................................15 marks

PRACTICAL – 80 MARKS + Internal assessment – 20 marks = Total 100 marks
should include
1] Spots --------------------------------------------------------------- 60 marks
2] Viva --------------------------------------------------------------- 15 marks
Journal ------------------------------------- 05 marks

INTERNAL ASSESSMENT
THEORY:
Two exams – Terminal and prelims of 80 marks each TOTAL 160 marks
Section A) Q1) M.C.Q.-based on Single best response – [20 x 1] --
20marks
This question should include topics covered in syllabus-
Section B) S.A.Q.- Q.2)-Answer any Five out of Six [3 X 5]-------------------
- 15marks
This question should include
i)-Digestive ii)-uro-genital iii)-reproductive system
iv]-special senses-eye/ear/skin v]-circulatory system
Q.3) - Answer any 3 out of 4 [5 X 3]-------------------------- 15 marks
This question should include
i]-Thorax
ii)-soft parts upper limb
iii]-soft part-lower limb
iv]-soft parts Thorax/ spine / neck
Section C) L.A.Q-Q.4) based Musculo Skeletal system [including
Kinesiology]--- 15 marks
Q.5) should be based on Neuro-Anatomy [including cranial nerves with
Emphasis to V, VII, VIII, IX & XII nerves ------------------ 15 marks
OR
Q.5) -------------------------------------------- 15
marks
I.A. to be calculated out of 20 marks
PRACTICAL:
Two exams – Terminal and prelims of 80 marks each TOTAL 160
marks
1. SPOTS ---------------------------------------- 60 MARKS
2. Viva ---------------------------------------- 15 marks
3. Journal -------------------------------------- 05 marks
I.A. to be calculated out of 20

TEXT BOOKS
1. Human Anatomy – by Snell
2. Anatomy by Chaurasia all 3 volumes
3. Neuro anatomy by Inderbir Singh
4. Human Anatomy by Kadasne (All three volumes)

**REFERENCE BOOKS**
1. Gray’s Anatomy
2. Extremities by Quining Wasb
3. Atlas of Histology by Mariano De Fiore
4. Anatomy & Physiology by Smout and McDowell
5. Kinesiology by Katherine Wells
6. Neuroanatomy by Snell
7. Neuroanatomy by Vishram Singh

**SUBJECT: HUMAN PHYSIOLOGY** *(Subject Code BPT-102)*
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**Objectives:** At the end of the course, the candidate will –
1) Acquire the knowledge of the relative contribution of each organ system in maintenance of the milieu interior (Homeostasis)
2) be able to describe physiological functions of various systems, with special reference to Musculo-skeletal, Neuro-motor, Cardio-respiratory, Female urogenital function, & alterations in function with aging
3) Analyse physiological response & adaptation to environmental stresses-with special emphasis on physical activity, temperature
4) acquire the skill of basic clinical examination, with special emphasis to Peripheral & Central Nervous system, Cardiovascular & Respiratory system, & Exercise tolerance / Ergography.
Syllabus:

1) **GENERAL Physiology** [4Hours]
   - Cell: Morphology. Organelles: their structure and functions
   - Transport Mechanisms across the cell membrane

2) **BLOOD**

12hrs
   - Introduction: Composition and functions of blood, Plasma:

3) **NERVE** Neuron AHC

7hrs
   - i) Structure, classification & Properties; ii)- R.M.P. iii)- action potential;

4) **MUSCLE**

i) Structure- properties-classification-excitation/contraction coupling
ii) Motor unit- E.M.G.- factors affecting muscle transmission)
iii) Neuro-muscular transmission

5) **C.N.S.**

i) Receptor physiology-classification & properties ii) Synapse- structure, properties, & transmission; iii) Reflexes-classification & properties;
iv) Sensory & Motor Tracts-effect of transaction (complete & incomplete)
at various levels v) Physiology of Touch, Pain, Temperature & Proprioception;
vii) Vestibular Appralus mainly otolith organ Anatomy vii) Connection & function of Basal ganglia, Thalamus, Hypo-Thalamus, lobes of the brain, Cerebellum, Peripheral Nervous System ix) Sensory / motor cortex; x) Limbic system; xi) Learning, memory & condition reflex, xii) Physiology of Voluntary movement

6) **EXCRETARY** system

---- 7 hrs

7) TEMPERATURE REGULATION ----------------------------------------
----- 2hrs
Circulation of the skin- body fluid- electrolyte balance

8) ENDOCRINE ----------------------------------------
------- 10hrs

9) **REPRODUCTIVE** system


10) - **SPECIAL** Senses
Eye-Errors of refraction-accommodation-reflexes-dark & light adaptation photosensitivity

Ear, Skin-------------------------------------------------- 5hrs

11) **Gastrointestinal** system -----------------------------------------------

--- 9 hrs


12)- **RESPIRATORY** system -----------------------------------------------

------- 20hrs

Composition, production, functions. RDS Spirometry: Lung volumes and capacities. Timed vital capacity and its clinical significance.


Hypercapnoea. Asphyxia. Cyanosis – types and features. Dysbarism

Disorders of Respiration: Dyspnoea. Orthopnoea. Hyperpnoea, hyperventilation, apnoea, tachypnoea. periodic breathing – types

Artificial respiration Respiratory changes during exercise.

13)- **CARDIO – VASCULAR**

--------- 20hrs

i) structure & properties of cardiac muscle;

ii) Cardiac cycle;

iii) Heart rate regulation-factors affecting;

vi) Peripheral resistance, venous return

vii) Regional circulation-coronary-muscular, cerebral

viii) normal ECG.


Conducting system: Components. Impulse conduction Cardiac Cycle:

14) **Exercise Physiology**

--------  5 hrs
i) Effects of acute & chronic exercises; ii) oxygen / CO2 transport-O2 debt) effects of exercise on muscle strength, power, endurance, B.M.R., R.Q.-hormonal & metabolic effects-respiratory & cardiac conditioning IV) AGING v) Training-fatigue- & recovery; vi) Fitness-related to age, gender, & body type

15)- **A.N.S**

----------------  4 hrs
Sympathetic / parasympathetic system-adrenal medulla-functions-Neuro Transmitters-role in the function of pelvic floor-(micturation, defecation labour)

16) **Applied Physiology [10 Hours]**

PRACTICAL
1. Haematology[ 20 Hours]
To be done by the students
1. Study of Microscope and its uses
2. Determination of RBC count
3. Determination of WBC count
4. Differential leukocyte count
5. Estimation of hemoglobin
6. Calculation of blood indices
7. Determination of blood groups
8. Determination of bleeding time
9. Determination of clotting time

ii. Demonstrations only
1. Determination of ESR
2. Determination of PCV

iII. Clinical Examination [20 Hours]
1. Examination of Radial pulse.
2. Recording of blood pressure
3. Examination of CVS
4. Examination of Respiratory system
5. Examination of Sensory system
6. Examination of Motor System
7. Examination of reflexes
8. Examination of cranial nerves

III. Amphibian Experiments – Demonstration and Dry charts
Explanation. [10 Hours]
1. Instruments used for frog experiments. Kymograph, heart liver, Muscle trough, stimulator.
2. Simple muscle curve.
3. Effect of increasing the strength of the stimuli
4. Effect of temperature on muscle contraction.
5. Effect of two successive stimuli.
7. Effect of load on muscle contraction
8. Genesis of tetanus and clonus.
10. Normal cardiogram of amphibian heart.
11. Properties of Cardiac muscle
12. Effect of temperature on cardiogram.

IV. Recommended Demonstrations*
1. Spirometry
SCHEME OF UNIVERSITY EXAMINATION

THEORY-80MARKS + INT. ASSESSMENT-20MARKS=TOTAL - 100MARKS

Section-A-MCQ.
Q-1) based on single Best answer ------ (20 x 1) -------------------------
---- 20 marks
It must include MUST KNOWN questions

Section-B-SAQ.
Q-2) Answer any Five out of Six ----- (5 x 3) ---------------------------
----- 15 marks
Should include – i)- Blood, ii)- G.I. tract iii)- Endocrine
iv)- Uro-genital v)- Metabolism vi)- special senses (eye/ear/skin)
Q-3) Answer any Three out of four ----- (3 x 5) ------------------------
----- 15 marks
Should include i)- Cardio – vascular ii)- Respiratory iii)- Exercise
Physiology iv)- Electrolyte balance

Section-C-LAQ
Q-4) based on Musculo-skeletal system --------------------------- 15marks
(LAQ should give breakup of 15 marks)
Q-5) based on C.N.S./ spinal cord/Electro-Neuro-Physiology -------- 15 marks
OR
Q-6)- ----------------------------------- do-------------------------
-------- 15 marks

PRACTICAL – 80 Marks + Internal Assessment 20 Marks – total 100 marks
a) Spots-based on topics covered in syllabus ------------------------- 20 marks
b) Viva-based on 1 to 8 mentioned in practical syllabus --------- 20 marks
c) Demonstration – on Clinical Physiology ------------------------ 35 marks
d) Journal -------------------------------------------------------- 05 marks

INTERNAL ASSESSMENT
THEORY:
Two exams – Terminal and prelims of 80 marks each TOTAL 160 marks
Section-A-MCQ.Q-1]-based on single Best answer---- [20 x 1] -------- 20 marks
It must include MUST KNOW questions
Section-B- SAQ-Q-2] Answer any Five out of Six --- [5 X 3] ---------- 15 marks
Should include –
  i]-Blood, ii]-G.I. tract iii]-Endocrine iv] - Uro-genital v]- Metabolism
  vi]-special senses [eye/ear/ skin]
Q-3]-answer any Three out of four – [3 X 5] ----------------------- 15 marks
Should include
Section-C-LAQ-Q-4]-based on Musculo-skeletal system------------------
----- 15 marks
Q-5]-based on C.N.S./ Spinal Cord/Electro-Neuro-physiology- 15 marks
OR
Q-6] -------------------do------------------------------------------
15marks
[LAQ should give break up of 15 marks]
**I.A. to be calculated out of 20 marks**

**PRACTICAL:**
Two exams – Terminal and prelims of 80 marks each TOTAL 160 marks
1. Spots: - Based on Topics covered in syllabus----------------------
20 marks
2. Viva: - Based on 1-8 mentioned in practical syllabus -------------
20 marks
3. Demonstration on clinical Physiology --------------------------
   --- 35 marks
4. Journal --------------------------------------------------------
   ------ 05 marks
**I.A. to be calculated out of 20 marks**

**Recommended text books:**
1) Essentials of Medical physiology – K. Semubulingam
SUBJECT: BIOCHEMISTRY (Subject Code: BPT – 103)

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SYLLABUS

1) Cell biology -----------------------------------------------2hr
   i) – Cell Membrane, structure, & function;
2) - Carbohydrates

-- 8 hrs
  i) - Chemistry-definition, classification with examples ;
  ii) - functions of carbohydrates with mucopolysaccharides (in details) :
  iii) - Reducing properties of sugars of clinical & diagnostic importance (e.g. Benedict’s test, Banfood’s test etc
  iv) - Metabolism-Digestion & absorption of carbohydrates – Glycolysis – aerobic, anaerobic, Energetics & regulation;
  v) - Kreb’s cycle-its energetic & regulation-role of T.C.A. cycle;
  vi) Glycogenesis, glycogenolysis & their regulation-role of liver in muscle glycogen
  vii) - glyconeogenesis-significance of H.M.P. shunt
  viii) - hormonal regulation of blood sugar levels-Important metabolic disorders of glycogen, lactose intolerance, and Diabetes mellitus.

3) Proteins

---- 6 hrs
  i) - Chemistry-definition-function-classification of Amino acids-protein structure effect of temperature on proteins – denaturation-coagulation; isoelectric pH & its importance;
  ii) - Metabolism-Digestion & absorption-Decarboxylation – Deamination- Transmethylation- transamination & their importance – Detoxification of ammonia including urea cycle ;
  iii) - special products of amino acid e.g. tryptophan, phenylalnine, glycine, methionine
iv) - Neuro-transmitters. Those produced from amino acids eg:
    Serotonin, GABA,  Dopamine, Epinephrine(Functions)

4) Lipids - ----------------------------------------------------------------------
   -- 5 hrs
   i) - Chemistry-definition classification (including fatty acids with examples) – function

5) – Nucleic Acids ----------------------------------------------------------------------
   1 hr
   
   i) – D.N.A. / R.N.A.- definition-structure & function-types-Genetic code-catabolism of purine-  gout

6)–Enzymes -----------------------------------------------------------------------------
   - 3 hrs
   i) – definition-Co- Enzymes-classification-factors affecting -;
   ii) – general Mechanism of action (in brief);
   iii) Inhibition & types of inhibitors;
   iv) –Iso- Enzymes ;
   v) – clinical & therapeutic use of enzymes

7) – Vitamins ---------------------------------------------------------------------------
   --- 6 hrs
   i) – water & Fat soluble-definition- classification;
ii) – individual vitamins-sources- Co- Enzymes forms- function-
reaction related to metabolism covered;
iii) – RDA, absorption - & transport-deficiency & toxicity

8) – Biological Oxidation ---------------------------------------------
-------1 hr
- Oxidative phosphorylation

9)– Minerals -----------------------------------------------------------
------- 2 hrs
i) –Phosphate, calcium, & iron (in details);
ii) magnesium, fluoride, Zink, Copper, Selenium Molybdenum,
Iodine-sources, RDA, absorption, transport-excretion function & disorder

10) – Acid – Base Balance, Water & Electrolyte -------------------
-- 2 hrs
i) – Body water, pH-osmolarity Extra & Intra cellular fluid;
ii) – Buffers – pH, buffer system in blood –
iii) – Role of kidneys & lungs in acid-base balance :
iv) – water-electrolyte balance im-balance-dehydration

11) – Hormones----------------------------------------------------------
-------- 4 hrs
i) –Definition-classification-mechanism & action –
ii) – second messenger (Ca, cAMP, inositol phosphate,
iii) – metabolic effects of a) – Insulin, b) Glucagon, c)
Catecholamines,
d) – Thyroxine e) – Mineralo-corticoids, f) – gluco corticoids
12) – Muscle Contraction

----- 1 hr
   i) Contractile elements;
   ii) Biochemical events during contraction;
   iii) Energy metabolism in skeletal & muscle

13) – Connective Tissue

1 hr
   Biochemistry of connective tissue-collagen-Glyco-protein-
   proteoglycans

14) – Nutrition

--- 5 hrs
   i) Importance of nutrition-Calorimetry-energy value-calorimeter-
      respiratory quotient & its significance;
   ii) Basal metabolic rate-definition-normal values-factors affecting
      BMR;
   iii) Energy requirement-with-age/sex/themogenesis/-specific
      dynamic action of food,-energy expenditure for various activities
   iv) Composition of food, balanced Diet dietary recommendations
      nutritional supplementation nutritional value of
      carbohydrates/proteins/fats & Fibers,
   v) Nitrogen balance & its significance – Protein energy malnutrition-
      Kwashiorkor & Marasmus

15) – Clinical Biochemistry

3 hrs
   i) Liver function test & Renal function test;
   ii) Relevance of blood levels of glucose, urea, and Ca-Phosphate - &
      uric acid;
iv) – Lipid profile-Tri-glyceride, cholesterol/HDL/LDL/ALDL etc;
v) – Protein & Aggression

SCHEME OF EXAMINATION

Section A - MCQ

A- Q1) MCQ – Single best answer [10 x 1] """" """" """" 10 marks
Section B- Q2) SAQ – To attempt any FIVE out of Six answers [5x3] """" """" """" 15 marks
Section C- Q3) LAQ To attempt any THREE out of Four answers [3 x5] """" """" """" 15 marks

INTERNAL ASSESEMENT 10 marks

Two exams – Terminal and prelim examination of 40 marks each

TOTAL 80 marks

Section-A- Q 1) MCQ - Single best answer - [10 x 1] """" """" 10 marks
Section-B- Q 2) SAQ-To attempt any FIVE out of Six answers-[5 x 3] - """" """" 15 marks
Section-C-Q3) SAQ - To attempt any THREE out of Four answers-[3 x 5] """" """" 15 marks

I.A. to be calculated out of 10 marks

TEXT BOOKS

1) Biochemistry – by Dr. Deb Jyoti Das,
2) Biochemistry – by Dr. Satyanarayan
3) Text book of Biochemistry for Medical students by – Dr. Vasudevan / Shri Kumar

REFERENCE BOOKS

Review of Biochemistry (24th edition) by Harpar
SUBJECT: FUNDAMENTALS OF EXERCISE THERAPY

(Subject Code BPT- 104)

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Objective: At the end of the course, the candidate will be able –
1] To define the various terms used in mechanics, Biomechanics & Kinesiology
2] Recall the basic principles of Physics related to mechanics of movement / motion & will be able to understand the application of such principles to the simple equipment designs, & their efficacy in therapeutic gymnasium, & various starting position used in therapeutics.
3] to describe & also acquire the skill of use of various tools of the Therapeutic
gymnasium
4] to demonstrate passive movements in terms of various Anatomical planes
5] to demonstrate various starting & derived positions
6] Acquire the skill of application of various massage manipulations & describe the Physiological effects, therapeutic use, merits / demerits of the same.
7] acquire a skill of assessment of sensations, superficial & deep reflexes, pulse rate/ Blood pressure, Chest expansion / respiratory rate, & limb length / girth measurement on Models
8] to demonstrate & also acquire the skill of relaxation.
9] to describe the skill & usefulness of group & recreational activities & will be able to demonstrate general fitness exercises used in Physical Training.
10] be able to define Yoga & its types, its physiological & Psychosomatic effects & will be able to demonstrate standard yoga postures used by the beginners.
11] be able to describe Physiological principles of aerobic exercise conditioning related to general fitness & demonstrate skill of General Fitness exercises & shall gain fitness for self.

**Syllabus:**

1] Bio-mechanics i) Axes / planes, laws of inertia & motion, mechanics of Forces,
levers, pendulum, equilibrium, Torque ii) Types of muscle work angle of pull –
Mechanical advantage – applied mechanics in the Therapeutic Gymnasium.

1. Basic Concepts in Biomechanics: Kinematics and Kinetics [10 Hours]
a) Types of Motion, b) Location of Motion, c) Direction of Motion, d) Magnitude of Motion, e) Definition of Forces, f) Force of Gravity, g) Reaction forces, h) Equilibrium, i) Objects in Motion, j) Force of friction, k) Concurrent force systems, l) Parallel force systems, m) Work, n) Moment arm of force, o) Force components, p) Equilibrium of levers

2. Joint structure and Function [ 6 Hours]
a) Joint design, b) Materials used in human joints, c) General properties of connective tissues, d) Human joint design, e) Joint function, f) Joint motion
   g) General effects of disease, injury and immobilization.

3. Muscle structure and function [ 6 Hours]
a) Mobility and stability functions of muscles, b) Elements of muscle structure, c) Muscle function, d) Effects of immobilization, injury and aging

2] Starting & derived positions, stability, base of support …..(8 hrs)
3] Classification of movements, (active, passive, assisted, resisted) / (8 hrs)
4] Limb length (only lower limb – apparent, true, Supratrochantric) & girth
   Measurements………(5 hrs)
5] Assessment of Sensations / Reflex testing....(5hrs)
6] Assessment of Blood pressure / pulse rate / chest expansion & Respiratory rate.... 6 hrs
7] Relaxation – all methods.... 3 hrs
8] Massage manipulations – principles effects / merits / demerits – skills on extremities / scalp/ spine / abdomen / face...... 12 hrs

9] Therapeutic Gymnasium suspension therapy, use of accessories such as pulleys, springs, shoulder wheel, axillary crutches, finger ladder, therapeutic balls parallel, bars etc applied Biomechanical principles..... 6 hrs
10] Physiological & Biophysical principles of Stretching, Strengthening and aerobic conditioning for general fitness exercise, Group & recreational activities – Warm up – stretching mobility strengthening – cool down..... 12 hrs
12] Basic principles of General fitness – warming up exercises, aerobics – cooling down exercises.... 3 hrs
13] Hydrotherapy – physics – application – effects – merits / demerits... 5 hrs
14. Active Movements
Types of active movements,Free exercise: Classification, principles, techniques, indications, contraindications, effects and uses
Active Assisted Exercise: principles, techniques, indications, contraindications, effects and uses

16. Passive Movements [4 Hours]
Causes of immobility, Classification of Passive movements, Specific
definitions related to passive movements, Principles of giving passive
movements, Indications, contraindications, effects of uses,
Techniques of giving passive movements.

PRACTICAL (150 Hrs)
Skills included in all topics listed in sr. no. 2 to 13 above to be
practiced on self & models

SCHEME OF EXAMINATION
THEORY – UNI. EXAM – 80 MARKS + INT. ASSESSMENT – 20 MARKS
Section -A-MCQ
Q1] based on Single best answer [20 x 1] -------------------------------
20 marks (20Min)
[to cover the must KNOW area of the subject]
Section B-SAQ
Q2] Answer any FIVE out of Six – [5 x 3] ------------------------------ 15
marks
Q3] Answer any THREE out of Four [3 x 5] --------------------------- 15
marks
Section C- LAQ
Q4] [compulsory] based on Bio-mechanics ---------------------------- 15
marks
#Q5] based on any other topic ------------------------------------- 15 marks
OR
# Q6] based on any other topic -----------------------------------------------
- 15 marks

PRACTICAL—80 MARKS + INT.ASSESSMENT—20 MARKS = TOTAL — 100 MARKS
1 Long case – based on Massage / Goniometry -------------------------- 35 marks
i] Cognitive – Bio-physics / Biomechanical principles / indications – contra indication
Documentation of findings etc ----------------------------------------------- 20 marks
II] Psychomotor & affective – skills -------------------------------------- 15 marks

2 a) Short Case :- any one of the following -------------------------------
- 20 marks
Short case Based on passive movts / Relaxation / Limb / Ength – girth /
Sensation / Reflex testing / / Aerobics / group exercise / warm ups /
BP/ & Pulse / Chest Expansion / Respirate / Starting / Derived position etc.
b) Spots – Four spots based on therapeutics gymnasium etc. 5 minute per spots
(4x5) = 20 marks

3 Journal -------------------------------------------------- 5 marks

INTERNAL ASSESSMENT
THEORY (20 marks)
Two exams – Terminal and prelim examination of 80 marks each
TOTAL -160 marks
Section-A-MCQ-Q-1]-based on -Single best answer [20 x 1] ----
20marks(20 Min.)
[to cover the must KNOW area of the subject ]
Section-B-SAQ- Q-2]-Answer any FIVE out of Six—[5 x 3] ----------
15 marks
Q-3]-Answer any THREE out of Four-[3 x 5] --------- 15 marks
Section-C-LAQ-Q-4]-[compulsory]—based on Biomechanics---------
15 marks
# Q-5]-based on any other topic------------------------------- 15 marks
OR
# Q-6]-based on any other topic------------------------------- 15 marks
**I.A. to be calculated out of 20 marks**

**PRACTICAL**
Two exams – Terminal and prelim examination of 80 marks each
TOTAL -160 marks
1. Long Case:-Massage/ Goniometry ------------------------------
35Marks
i) Cognitive – Biophysics / Biomechanical principles / indications /
contraindications.
Documentation of findings etc. ------------------------------- 20
marks
ii) Psychomotor and affective skills ------------------------------
- 15 marks
2. a) Short Case:- any one of the following.---------------------
-- 20 Marks
Short case Based on passive movts /Relaxation/Limb/ Length -girth/
Sensation/Reflex testing/ Yoga posture/Aerobics/group exercise/warm ups /BP & 
Pulse/Chest Expansion/Respiratory Rate/Starting & Derived position etc.
b) Spots - Four spots based on therapeutics gymnasium etc. 5 minute per spots 
------ (4X5 = 20 Marks)

3. Journal -------------------------------
------------- 5 Marks

I.A. to be calculated out of 20 marks

TEXT BOOKS
1] Principles of Exercise Therapy – Dena Gardiner 
2] Massage, manipulation & traction – Sydney Litch 
3] Therapeutic Exercise ---------------- do -----------------
4] Massage – Holly 
5] Suspension Therapy in Rehabilitation – Margaret Hollis 
6] Bio mechanics –Cynthia Norkin
1] Therapeutic Exercise – Carolyn Kisner

REFERENCE BOOKS
2] Physiotherapy in Orthopedic conditions – by Jayant Joshi
SUBJECT: FUNDAMENTALS OF ELECTRO THERAPY (Subject Code BPT-105)

<table>
<thead>
<tr>
<th>Subject Title &amp; Code</th>
<th>FUNDAMENTALS OF ELECTRO THERAPY (BPT-105)</th>
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<td>Duration</td>
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<tr>
<td>Method of Assessment</td>
<td>Theory and Practical</td>
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Objectives – At the end of the course the candidate will be able to –
1] Recall the physics principles & Laws of Electricity, Electro – magnetic spectrum, & ultra sound
2] Describe effects of environmental & man made electro magnetic field at the cellular level & risk factors on prolonged exposure.
3] Describe the main electrical supply, Electric shock – precautions :
4] Enumerate types & production of various Therapeutic electrical currents Describe the panel diagrams of the machines.
5] 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, ; & will be able to identify such components.

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

7] Acquire knowledge of various superficial thermal agents such as Paraffin wax bath, Cryotherapy, home made remedies, etc; their physiological & therapeutic effects, Merits / demerits; & also acquire the skill of application.

**Syllabus:**

1] Fundamentals of Low frequency currents ..... 16 hrs
   i] production of electricity, mains supply,
   ii] A.C. currents & Faradic type current
   iii] D.C. currents – Types – fundamentals of electrical charges, static electricity- physic of direct currents Ohm’s law Conductors-Capacitors-Rheostats-Potentiometers-ammeters-oscilloscopes,
   iv] types of electrodes galvanic skin resistance – electrode –gels- types significance
2] Fundamentals of High frequency currents ..... 16 hrs
i] Magnetism, E.M.F. Conduction – Lenz’s Law- transformers -types,  
ii] Thermonic valves, 
iii] Semi – conductors – types -Transistors 
iv] Electronic circuits –oscillators,, - pulse generators 
5] Environmental currents & fields risk factors on prolonged exposure to E.M. field...... 3 hrs 
6] Production, Physical principles, Panel diagram, Testing of apparatus – S.W.D.  
Ultra sound, U.V.R., I.F.T. / Beat frequency currents, I.R. LASER (no panel diagram)......... 18 hrs 
7] Therapeutic continuous / interrupted Direct currents & their various wave forms,A.C. current...... 14 hrs 
9) Medical Electricals / Physiology of Gen indication & contra indication Therapeutic effects pain relief, Neuro & muscle etc..... 6 hrs 
10) Basic Skills – in electro OPD & precaution....... 2 hrs

PRACTICALS (105 Hrs)
1] Panel diagrams – Identification of components – Testing the mains supply & Machines
2] Skills of application of thermal agents

**SCHEME OF EXAMINATION**

**Theory** – 80 marks. I.A. – 20 Marks;
Theory – model question paper – [80 marks]

**Section A-MCQ**
1] based on Single best answer [ 20 x 1] -------------------------------------
-- 20 marks

**Section B-SAQ**
Q-2] to answer any FIVE out of six --- [ 5 x 3] ---------------------------
----- 15 marks
Q-3] to answer any THREE out of Four [ 3 x 5] ---------------------------
-- 15 marks

**Section C-LAQ**
Q-4 ] based on superficial Thermal agents ---------------------------
----- 15 marks
* Q-5] ---------------------------------------------------------------
--------- 15 marks
OR
* Q-6] -----------------------------------------------------------------
--------- 15 marks
PRACTICAL - PRACTICAL – 80 MARKS +, I.A. – 20 MARKS TOTAL = 100 MARKS

1] Long case based on Superficial thermal agent --------------------------
-- 35 marks
[Cognitive – Medical electronic area/ Physiological –Biophysical principles /
therapeutic effects / Indications – contraindications] ---------------
--- [20 marks]
+ [Psychomotor + Affective skills] -------------------------------
------ [15 marks]

2] Spots
A] Identification of Electronic component & give one use with example
OR panel
Diagram ---FOUR spots [ 5 minutes per spot] (4 x 5 ) ---------------
------ [ 20 marks]
B] testing of equipment TWO spot (10 x2) [10 minutes] ---------------
------ [ 20 marks]
Journal ---------------------------------------------------------------
------ [05 marks]

INTERNAL ASSESSMENT ------------------------------------- 20 MARKS

THEORY (20 marks)
Two exams – Terminal and prelim examination of 80 marks each
TOTAL -160 marks
Section-A-MCQ-Q-1] - based on Single best answer –[20x 1]--------
------ 20 marks
Section-B-SAQ -Q-2] - to answer any FIVE out of six—[5 x3] ----------
------ 15 marks
Q-3] - to answer any THREE out of Four-[3 x 5] --------------15 marks
Section-C-LAQ- Q-4] - based on superficial Thermal agents------------
------- 15 marks
* Q-5] ------------------------------------------------------------- 15
marks
OR
* Q-6] ------------------------------------------------------------- 15
marks
**I.A. to be calculated out of 20 marks**

**PRACTICAL**
Two exams – Terminal and prelim examination of 80 marks each
TOTAL -160 marks
1. Long Case: - Superficial thermal agents---------------------- 35 Marks
   (Cognitive – medical electronic area / physiological – Biophysical
   principles/therapeutic effects /
   Indications / contraindications) -------------------------------------
   20 marks
   (Psychomotor + affective skills) ------------------------------------- 15
   marks
2. Spots -------------------------------------------------------------- 40 marks
   a) Identification of electronic component and give 1 use with example
      or panel
      diagram(4 spots, 5 min per spots) (4 x 5 = 20 marks)
   b) Testing of equipment – 2 spots (10 minutes) (2 x 10 = 20 marks)
3. Journal -------------------------------------------------------------- 5Marks
I.A. to be calculated out of 20 marks

INTERNAL ASSESSMENT IN PRACTICAL

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-------- 20 marks

TEXT BOOKS
1. Clayton 1st Electro therapy – 3rd & 10th ed,
2. Electro therapy explained – by Low & Read
3. Electro Therapy – by Kahn
4. Basics of Electrotherapy – Dr. Subhash Khatri

REFERENCE BOOK –