MAHARASHTRA UNIVERSITY OF HEALTH SCIENCES, NASHIK

SYLLABUS FOR

BACHELOR OF PHYSIOTHERAPY (B.P.Th.)

DEGREE COURSE

This syllabus is applicable from the academic year 2012-2013

INDEX

PHYSIOTHERAPY

DEFINITION:

`**Physiotherapy**' is a branch of modern medical science which includes examination, assessment, interpretation, physical diagnosis, planning and execution of treatment and advice to any person for the purpose of preventing, correcting, alleviating and limiting dysfunction, acute and chronic bodily malfunction including life saving measures via chest physiotherapy in the intensive care unit, curing physical disorders or disability, promoting physical fitness, facilitating healing and pain relief and treatment of physical and psychological disorders through modulating psychological and physical response using physical agents, activities and devices including exercise, mobilization, manipulations, therapeutic ultrasound, electrical and thermal agents and electrotherapy for diagnosis, treatment and prevention.

(Definition as per the Maharashtra State Council for Occupational therapy & Physiotherapy, 2004)

`Physiotherapist' is a qualified professional who has acquired all the above mentioned knowledge and skills for entry into practice after being awarded a bachelor degree in the subject of " Physiotherapy" from a recognised institute affiliated to the University conducting a fulltime course not less than four years and six months of internship.

PREAMBLE

Physiotherapy or Physical Therapy (P.T.) is a **Movement Science** with an established theoretical and scientific base and widespread clinical applications in the **Prevention, Restoration & Rehabilitation, Maintenance and Promotion of optimal physical function.** Physiotherapists **diagnose and manage movement dysfunction** and enhance physical and functional abilities. This physical dysfunction may be the sequelae of involvement of any of the systems like Musculoskeletal, Neurological, Cardiovascular, Respiratory or other body systems.

These practitioners contribute to society and the profession through practice, teaching, administration, and the discovery and application of new knowledge about physiotherapy experiences of sufficient excellence and breadth by research to allow the acquisition and application of essential knowledge, skills, and behaviors as applied to the practice of physiotherapy.

Learning experiences are provided under the guidance and supervision of competent faculty, in both, classroom as well as in clinic. The designed curriculum will prepare the entry-to-practice physiotherapist (PT), to be an autonomous, effective, safe and compassionate professional, who practices collaboratively in a variety of healthcare set ups such as neonatal to geriatric, from critical care to community fitness to sports training and is responsive to the current and future needs of the health care system.

VISION: To create a best possible environment to prepare physiotherapist who shall lead to serve & heal in a variety of healthcare and social settings to provide best quality of life to an individual.

MISSION: To graduate **knowledgeable, service-oriented, self-assured, adaptable, reflective practitioners** who, by virtue of critical and integrative thinking along with clinical reasoning, lifelong learning, and ethical values, render independent judgments concerning patient /person needs those are supported by evidence; promote the health of the patient or person; and enhance the professional, contextual, and collaborative foundations for physiotherapy practice.

ESSENTIAL REQUIREMENTS

The following "essential requirements" specify those attributes that the faculty consider necessary for completing the professional education enabling each graduate to subsequently enter clinical practice. The purpose of this curriculum is to delineate the cognitive, affective and psychomotor skills deemed essential for completion of this program and to perform as a competent physiotherapist who will be able to evaluate, plan & execute physiotherapy treatment independently.

COGNITIVE LEARNING SKILLS: The student must demonstrate the ability to receive, interpret, remember, reproduce and use information in the cognitive, psychomotor, and affective domains of learning to solve problems, evaluate work, and generate new ways of processing or categorizing similar information listed in course objectives.

PSYCHOMOTOR SKILLS: The student must demonstrate the following skills.

1. **Locomotion ability**:

Get to lecture, laboratory and clinical locations, and move within rooms as needed for changing groups, partners and work stations. Move quickly in an emergency situation to protect the patient (e.g. from falling).

2. **Manual tasks**:

a. Maneuver another person's body parts to effectively perform evaluation techniques. Manipulate common tools used for screening tests of the cranial nerves, sensation, range of motion, blood pressure, e.g., cotton balls, safety pins, goniometers, Q-tips, sphygmomanometer. Safely and effectively guide, facilitate, inhibit, and resist movement and motor patterns through physical facilitation and inhibition techniques (including ability to give timely urgent verbal feedback).

b. Manipulate another person's body in transfers, gait, positioning, exercise, and mobilization techniques. Manipulate evaluation and treatment equipment safely and accurately apply to patients. Manipulate bolsters, pillows, plinths, mats, gait assistive

devices, and other supports or chairs to aid in positioning, moving, or treating a patient effectively.

c. Competently perform and supervise cardiopulmonary resuscitation

3. Fine motor/hand skills:

a. Legibly record thoughts for written assignments (including diagrams) and tests. Document evaluations, patient care notes, referrals, etc. in standard medical charts in hospital/clinical settings in a timely manner and consistent with the acceptable norms of clinical settings.

b. Safely apply and adjust the dials or controls of therapeutic modalities.

c. Safely and effectively position hands and apply mobilization and therapeutic techniques.

4. **Visual acuity** to:

a. Read written and illustrated material in the English language, in the form of lecture handouts, textbooks, literature and patient's chart.

b. Observe active demonstrations in the classroom.

c. Visualize training videos, projected slides/overheads, X-ray pictures, and notes written on a blackboard/whiteboard.

d. Receive visual information from patients, e.g., movement, posture, body mechanics, and gait necessary for comparison to normal standards for purposes of evaluation of movement dysfunctions.

e. Receive visual information from treatment environment, e.g., dials on modalities and monitors, assistive devices, furniture, flooring, structures, etc.

f. Receive visual clues as to the patient's tolerance of the intervention procedures. These may include facial grimaces, muscle twitching, withdrawal etc.

5**. Auditory acuity** to:

a. Hear lectures and discussion in an academic and clinical setting.

b. Distinguish between normal and abnormal breathing, lung and heart sounds using a stethoscope.

6. **Communication**:

a. Effectively communicate information and safety concerns with other students, teachers, patients, peers, staff and personnel by asking questions, giving information, explaining conditions and procedures, or teaching home programs. These all need to be done in a timely manner and within the acceptable norms of academic and clinical settings.

b. Receive and interpret written communication in both academic and clinical settings in a timely manner.

c. Receive and send verbal communication in life threatening situations in a timely manner within the acceptable norms of clinical settings.

d. Physiotherapy education presents exceptional challenges in the volume and breadth of required reading and the necessity to impart information to others. Students must be able to communicate quickly, effectively and efficiently in oral and written English with all members of the health care team.

7. **Self care**:

Maintain general good health and self care in order not to jeopardize the health and safety of self and individuals with whom one interacts in the academic and clinical settings.

AFFECTIVE LEARNING SKILLS: The student must be able to:

1. Demonstrate respect to all people, including students, teachers, patients and medical personnel, without showing bias or preference on the grounds of age, race, gender, sexual preference, disease, mental status, lifestyle, opinions or personal values.
2. Demonstrate appropriate affective behaviors and mental attitudes in order not to jeopardize the emotional, physical, mental, and behavioral safety of patients and other individuals with whom one interacts in the academic and clinical settings and to be in compliance with the ethical standards of the profession.

3. Acknowledge and respect individual values and opinions in order to foster harmonious working relationships with colleagues, peers, and patients.

PROFESSIONAL DRESS CODE STANDARDS:

It is important to portray a professional image. A clinician with inappropriate dress, grooming or conduct can damage the patient's confidence in the quality of their care, sometimes even resulting in a delay in the restoration of health.

Haircuts, hairstyling, and personal grooming need to be neat, conservative and inconspicuous. Grooming and style should be practical and allow one's duties to be performed without embarrassment or inconvenience

DRESS:

Modest casual wear is appropriate on campus and in class.

Clinical /Lab Dress: Aprons for all clinical assignments, any class that is held in a clinical facility and in any class where patients are present.

FRAMEWORK OF THE CURRICULUM

COURSE DURATION: Four years and Six months of Internship.

I B.P.Th.

a. Deals with the basic foundation in medical as well as physiotherapy subjects. The foundation of human body structure & function & energy utilization is achieved by studying the subjects Human Anatomy, Physiology, and Biochemistry.
b. Students knowledge of Physics i.e. – Mechanics, Electricity, Water , Sound & Light is recalled to apply it on human body in understanding movements and the various physiotherapeutic modalities under the subject of Fundamentals of Electrotherapy & Fundamentals of Kinesiology & Kinesiotherapy.

II B.P.Th.

a. Deals with understanding of altered physiology by studying pathology & Microbiology.
b. The students get oriented to various Pharmacotherapeutic agents used along with their effects by studying Pharmacology.
c. The students will study about normal and altered human mind & behavior by studying Psychology & Psychiatry. They will also learn skills required for effective communication with the patients and care givers.
d. Students will acquire the knowledge of Biomechanics as applicable to human body in the context of Kinetics & kinematics of Joints, Movements & Daily activities under subject of Kinesiology and shall acquire knowledge and learn various physiotherapeutic skills on models in subject of Kinesiotherapy.
e. In the subject of Electrotherapeutics, students will acquire knowledge and learn application & uses of various electrotherapeutic modalities on models.

III B.P.Th.

a. Students acquire knowledge of all the clinical subjects like Orthopaedics, General Surgery, Medicine, Neurology, Paediatrics, Dermatology & Gynecology & Obstetrics, Community Medicine and Sociology.
b. Students will acquire knowledge about the principles of International Classification of Functioning (I.C.F.) and its applicability in context to movement dysfunctions.
c. Students will learn the physiotherapeutic evaluation skills including electrodiagnosis on patients to arrive at a Functional/ Physical Diagnosis in Neuromuscular, Cardiovascular & Respiratory dysfunction. They will also acquire knowledge of various specialized manual therapy and neurodevelopmental techniques and practice these skills on models under the subject of functional diagnosis and physiotherapeutic skills.

IV B.P.Th.

a. Students will revise, recall and integrate the knowledge of previous years to evaluate, functionally diagnose, plan and execute short and long term management of various musculoskeletal, neurological & cardiovascular- respiratory dysfunctions in hospital and community settings.
b. Students also acquire knowledge pertaining to health promotion & disease prevention throughout lifespan in the community. They will also be able to analyse, prevent and treat problems associated with various industries in community physiotherapy.
c. Students will also acquire knowledge about biomechanical principles & application of variety of aids & appliances used for ambulation, protection & prevention by studying Bioengineering.
d. Professional Practice and ethics as a subject will be studied in continuum from first year, so students will acquire the knowledge of ethical code of professional practice, as well as its moral& legal aspects. The principles of Hospital Administration, Management & Marketing will be studied separately.
e. Students will also acquire knowledge of Research Methodology and Biostatistics and apply the knowledge in project work in community physiotherapy.

INTERNSHIP

a. A period of 6 months (26 weeks) of continuous clinical practice to enhance the clinical reasoning, judgment, programme planning, intervention, evaluation of intervention, follow up and referral skills of all the dysfunctions and impairments learnt throughout the curriculum of four years.
b. Those candidates declared to have passed the final year examination in all subjects shall be eligible for internship.
c. Internship shall be done in a teaching hospital recognized by the University. A degree certificate shall be awarded ONLY on successful completion of six months of internship.
d. The Internship will be rotatory and shall cover clinical branches concerned with Physiotherapy such as Orthopaedics, Cardiovascular & Respiratory including ICU, Neurology & Neurosurgery Paediatrics, General Medicine, Surgery, Obstetrics and Gynecology both inpatient and outpatient services.
e. Successful Completion: The student must maintain a logbook. On completion of each posting, the same will have to be certified by the faculty in charge of the posting for both attendance as well as work done. On completion of all the postings, the duly completed logbook will be submitted to the Principal/Head of program to be considered as having successfully completed the internship program.

SUBJECTS SCHEDULE

I B. P.Th.

TRANSCRIPT HOURS - 1400

Sr. No.	SUBJECTS	Teaching Hrs
	PROFESSIONAL PRACTICE	
1	Professional practice & Ethics	015
	BASIC MEDICAL SCIENCES	
2	Human Anatomy	210
3	Human Physiology	200
4	Biochemistry	050
	PHYSIOTHERAPY	
5	Fundamentals of Kinesiology & Kinesiotherapy	250
6	Fundamentals of Electrotherapy	200
7	Seminar	060
8	Observational clinical practice	415
TOTAL		**1400**

I B.P.Th.

SYLLABUS

Transcript Hrs-1400

Sr. No.	Subjects	Didactic Hours	Practical/Demonstration / Clinical Hours	Total Hours
	PROFESSIONAL PRACTICE			
1	Professional practice & Ethics *(College Examination in final year)*	015	-	015
	BASIC MEDICAL SCIENCES			
3	Human Anatomy	150	60	210
4	Human Physiology	150	50	200
5	Biochemistry	046	004	050
	PHYSIOTHERAPY			
6	Fundamentals of Kinesiology & Kinesiotherapy	100	150	250
7	Fundamentals of Electrotherapy	095	105	200
8	Seminar (including introduction to **terms** of I.C.F. definition of Structural and Functional impairments as applied to Anatomical structures and Physiological functions) (***not for examination***)	-	60	060
9	**Observational Clinical Practice** ➢ He /She shall observe and note technical aspects of fixation of electrotherapeutic modalities, basic movements and starting positions used, learn bedside manners and communication skills with the seniors, peers and patients	-	415	415

PROFESSIONAL PRACTICE AND ETHICS

(COLLEGE EXAMINATION IN FINAL YEAR)

TOTAL -15 HRS

COURSE DESCRIPTION:

This subject will be taught in continuum from first year to final year. An exam will be conducted only in final year. Professional and ethical practice curriculum content addresses the Knowledge, Skills and Behaviors required of the physiotherapist in a range of practice relationships and roles. The course will discuss the role, responsibility, ethics administration issues and accountability of the physical therapists. The course will also cover the history and change in the profession, responsibilities of the professional to the profession, the public and to the health care team. This includes the application of professional and ethical reasoning decision-making strategies and professional communication.

OBJECTIVES:

At the end of the course, the student will be compliant in following domains:

Cognitive: The student will

a) Be able to understand the moral values and meaning of ethics.
b) Acquire bedside manners and communication skills in relation with patients, peers, seniors and other professionals.

Psychomotor: The student will be able to:

Develop psychomotor skills for physiotherapist-patient relationship.

SYLLABUS

Sr. No.	Topics	Didactic Hrs	Visits/ Supervision Hours	Total Hrs
1.	Introduction to the history of Physiotherapy	02	05	
2.	Orientation to the curriculum, clinical areas and geographical location	03		
3.	Concept of morality and ethics	03		
4.	Concept of professionalism and Professional dress code	02		
TOTAL		**10**	**05**	**15**

HUMAN ANATOMY

(Didactic –150hrs + Practical / Laboratory –60hrs) **TOTAL -210 HRS**

COURSE DESCRIPTION:

The focus of this course is an in-depth study and analysis of the regional and systemic organization of the body. Emphasis is placed upon structure and function of human movement. A comprehensive study of human anatomy with emphasis on the nervous, musculoskeletal and circulatory systems is incorporated. Introduction to general anatomy lays the foundation of the course. Dissection and identification of structures in the cadaver supplemented with the study of charts, models, prosected material and radiographs are utilized to identify anatomical landmarks and configurations of the:

- Upper limb and thoracic region
- Lower limb, abdomen and pelvis
- Head and Neck
- Nervous system

Sr. No.	Regions	Didactic Hours	Practical Hours	Total Hours
1	**GENERAL ANATOMY AND HISTOLOGY**	17	03	**20**
2	**MUSCULOSKELETAL SYSTEM**	57	33	**90**
3	**NEURO ANATOMY**	32	12	**44**
4	**SYSTEMIC ANATOMY**	09	03	**12**
5	**CARDIO VASCULAR & RESPIRATORY ANATOMY**	13	05	**18**
6	**ABDOMEN**	04	02	**06**
7	**SENSORY ORGANS**	04	02	**06**
8	**ENDOCRINE & EXOCRINE SYSTEM**	04	-	**04**
9	**RADIOLOGY**	10	-	**10**
TOTAL		**150**	**60**	**210**

OBJECTIVES:

1] MUSCULOSKELETAL ANATOMY

i. The student should be able to identify & describe Anatomical aspects of muscles, bones, joints, their attachments & to understand and analyze movements.
ii. Application of knowledge of anatomy on the living (living anatomy).
iii. To understand the Anatomical basis of various clinical conditions.

2] NEURO ANATOMY

i. To identify & describe various parts of nervous system.
ii. To describe blood circulation of C.N.S. & spinal cord.
iii. Be able to identify the Structures of various C.N.S Trans-sections.
iv. To identify and describe the course of peripheral nerves.
v. To understand anatomical basis of clinical conditions of nervous system.

3] CARDIOVASCULAR & RESPIRATORY ANATOMY

i. To identify & describe various structures of the Cardio Vascular &Respiratory system and the course of blood vessels
ii. Identify and describe various structures of Thoracic cage and mechanisms of Respiration
iii. Be able to apply knowledge of Living anatomy with respect to Cardio Vascular &Respiratory system.
iv. To understand anatomical basis of clinical conditions of cardiovascular &Respiratory system

4] To Obtain Knowledge of **OTHER SYSTEMS & SENSORY ORGANS**

SYLLABUS

Sr. No.	Regions	Didactic Hours	Practical Hours	Total Hours
1	**GENERAL ANATOMY AND HISTOLOGY**	**17**	**03**	**20**
	a. General Anatomy:	10		10
	i. Fascia ii. Muscles iii. Bones iv. Joints v. Nerve vi. Vessels	1 2 2 2 2 1		
Sr. No.	**Regions**	**Didactic Hours**	**Practical Hours**	**Total Hours**

	a. General Histology:	7	3	10
	i. Epithelial ii. Connective tissue iii. Muscle iv. Bone and cartilage v. Nerve and vessels vi. Embryology	1 1 1 1 1 2		
2	**MUSCULOSKELETAL SYSTEM**	**57**	**33**	**90**
	a. Superior extremity	15	10	25
	b. Inferior extremity	15	10	25
	c. Back & Thoracic Cage -	10	05	15
	d. Head Neck &Face	13	06	19
	i. Skull and Mandible ii. Facial Muscles, blood supply, nerve supply iii. Triangles of neck, Glands, Tongue & Palate iv. Larynx & Pharynx v. Muscles of mastication & T.M. joint vi. Extra ocular muscles with nerve supply vii. Nose & Para nasal sinuses	2 3 3 1 2 1 1	1 1 1 1 1 1 -	
	e. Living Anatomy:	4	2	6
	i. Upper extremity ii. Lower extremity iii. Head Neck & Face iv. Trunk	1 1 1 1	- - - -	
3	**NEURO ANATOMY**	**32**	**12**	**44**
	a. General organization of Nervous System	5		5
	b. Central Nervous System	15	8	23
	c. Cranial nerves	10	4	14
	d. Peripheral Nerves (should be done with respective parts) i. Autonomic Nervous System: ii. Sympathetic iii. Parasympathetic	2		2

Sr. No.	Regions	Didactic Hours	Practical Hours	Total Hours
4	**SYSTEMIC ANATOMY**	**09**	**03**	**12**
	a. Alimentary system	2	-	2
	b. Urinary System	2	-	2
	c. Genital system: i. Male organs ii. Female organs (Pelvic cavity and Pelvic floor)	5	3	8
5	**CARDIO VASCULAR & RESPIRATORY ANATOMY**	**13**	**05**	**18**
	a. Thoracic wall	2	-	2
	b. Mediastinum	1	-	1
	c. Heart and major blood vessels	4	2	6
	d. Lungs	2	1	3
	e. Diaphragm & Intercostals	2	1	3
	f. Ribs and sternum	2	1	3
6	**ABDOMEN**	**04**	**02**	**06**
	Muscles of abdomen	2	1	3
	Muscles of pelvis	2	1	3
7	**SENSORY ORGANS**	**04**	**02**	**06**
	a. Ear	2	1	3
	b. Eye	1	1	2
	c. Skin	1	-	1
8	**ENDOCRINE & EXOCRINE SYSTEM**	**04**	**-**	**04**
9	**RADIOLOGY**	**10**	**-**	**10**

RECOMMEMDED TEXT BOOKS

1. Human Anatomy – Snell
2. Anatomy- Chaurasia, Volume- I,II & III
3. Neuro anatomy -- Inderbir Singh
4. Human Anatomy – Kadasne, Volume- I,II & III
5. Neuroanatomy -- Vishrsam Singh
6. Human Anatomy – Datta

RECOMMEMDED REFERENCE BOOKS

1. Gray's Anatomy
2. Extremities -- Quining Wasb
3. Atlas of Histology -- Mariano De Fiore
4. Anatomy & Physiology -- Smout and McDowell
5. Kinesiology -- Katherine Wells
6. Neuroanatomy -- Snell
7. Neuroanatomy -- Vishrsam Singh
8. Cunnigham`s- Practical Anatomy

SCHEME OF UNIVERSITY EXAMINATION

<table>
<tr><td colspan="2">THEORY
80 MARKS + I.A. – 20 MARKS

* The question paper will give appropriate weightage to all the topics in the syllabus.</td><td>Marks

100</td></tr>
<tr><td>Section A-MCQs</td><td>Q-1 -MCQs – based on MUST KNOW area [1 x 20]</td><td>20</td></tr>
<tr><td rowspan="2">Section B- S.A.Q.</td><td>Q-2 - Answer any FIVE out of SIX [5 x 3 = 15]

This question should include:
Digestive/ Uro-genital / Reproductive system / Special senses – Eye / Ear/ Skin / Circulatory system / General Anatomy/ General Histology</td><td rowspan="2">30</td></tr>
<tr><td>Q-3- answer any THREE out of FOUR [3 x 5 =15]

Should be based on:
Thorax / Soft parts Upper Limb / Soft part Lower Limb/ Soft parts Thorax / Spine / Neck.</td></tr>
<tr><td>Section C -L.A.Q.</td><td>Q-4] L.A.Q
(should be based on Musculoskeletal anatomy)
- 15 marks</td><td>30</td></tr>
</table>

	Q-5] A -15 marks OR Q-5] B -15 marks (Should be based on Neuro-Anatomy -including cranial nerves with emphasis to III to XII nerves) LAQ should give break up of 15 marks e.g.[3 +5+7]	
Total Marks		**80**

PRACTICAL 80 MARKS + I.A. – 20 MARKS		**Marks** **100**
Spots	Based on: i. Musculoskeletal (7x3) = 21 marks ii. Systemic (5x3) = 15 marks iii. Neuroanatomy (3x3) = 09 marks	**45**
Radiology		**05**
Living anatomy		**05**
Viva	i. Hard parts ii. Soft parts	**20**
Journal	Year work on practicals performed	**05**
Total Marks		**80**

INTERNAL ASSESSMENT:

1. **Two exams – Terminal and prelims of 80 marks each (Theory & Practical) TOTAL - 160 marks**
2. **I.A. to be calculated out of 20 marks** (Theory & Practical)
3. **Internal assessment as per University pattern.**

HUMAN PHYSIOLOGY

(Theory -150 hrs, Practical / Laboratory -50 hrs) **TOTAL 200 hrs**

COURSE DESCRIPTION:

The course is designed to study the function of the human body at the molecular, cellular, tissue and systems levels. The major underlying themes are; the mechanisms for promoting homeostasis, cellular processes of the metabolism, membrane function and cellular signaling; the mechanisms that match supply of nutrients to tissue demands at different activity levels; the mechanisms that match the rate of excretion of waste products to their rate of production; the mechanisms that defend the body against injury and promote healing.

These topics address the consideration of nervous and endocrine regulation of the cardiovascular, hematopoietic, pulmonary, renal, gastro-intestinal and musculoskeletal systems including the control of cellular metabolism. The course stresses on the integrative nature of physiological responses in normal function and disease.

This course will serve as a pre-requisite/foundation for the further courses i.e. Exercise physiology or Pathology

Sr. No.	Topics	Didactic hrs	Practical hrs	Total hrs
1.	**GENERAL PHYSIOLOGY**	25	42	**172**
2.	**NERVOUS SYSTEM**	35		
3.	**EXCRETORY SYSTEM**	06		
4.	**TEMPERATURE REGULATION**	02		
5.	**ENDOCRINE SYSTEM**	06		
6.	**REPRODUCTIVE SYSTEM**	08		
7.	**SPECIAL SENSES**	05		
8.	**RESPIRATORY SYSTEM**	20		
9.	**CARDIOVASCULAR SYSTEM**	20		
10.	**GASTRO INTESTINAL SYSTEM**	03		
11.	**EXERCISE PHYSIOLOGY**	015	08	**023**
12.	**PHYSIOLOGY OF AGEING**	005	-	**005**
Total		**150**	**50**	**200**

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, Endocrine, Uro-genital function, & alterations in function with aging
3. Analyze physiological response & adaptation to environmental stresses-with special emphasis on physical activity, altitude, temperature

4. Acquire the skill of basic clinical examination, with special emphasis to Peripheral & Central Nervous system, Cardiovascular & Respiratory system, & Exercise tolerance / Ergography

SYLLABUS

Sr. No.	Topics	Didactic Hrs
1	**GENERAL PHYSIOLOGY**	**25**
	a. Cell: i. Structure of cell membrane ii. Transport across cell membrane iii. Homeostasis	4
	b. Blood: i. Rh- ABO system & mismatch-transfusion ii. WBC iii. Plasma protein iv. Platelets v. Hemoglobin vi. Normal values of blood (composition & function) vii. Bleeding time & clotting time	7
	c. Nerve: i. Structure, classification & Properties ii. R.M.P& action potential iii. Propagation of nerve impulse iv. Nerve injuries –degeneration, regeneration and reaction of degeneration	6
	d. Muscle: i. Structure- properties- classification- smooth, skeletal, cardiac, excitation/ contraction coupling ii. Factors affecting development of muscle tension, fatigue, load. iii. Neuro-muscular transmission; applied physiology: Myasthenia gravis, Eaton Lambert Syndrome.	8

Sr. No.	Topics	Didactic Hours
2	**NERVOUS SYSTEM:**	**35**
	a. Introduction of nervous system, classification – C.N.S., P.N.S. & A.N.S. b. Synapse-structure, properties, & transmission; c. Reflexes-classification & properties; d. Receptor physiology: classification, properties. e. Physiology of Touch, Pain, Temperature & Proprioception; f. Sensory and motor tracts: effect of transaction (complete and incomplete) at various levels g. Physiology of Muscle Tone (muscle spindle); Stretch reflex h. Connection & function of Basal ganglia, Thalamus, Hypothalamus, Sensory and Motor cortex, Cerebellum, Limbic system, Vestibular Apparatus i. Autonomic nervous system: Structure and functions of the sympathetic and the parasympathetic nervous system. j. Learning, memory & conditioned reflex k. Physiology of Voluntary movement	
3	**EXCRETORY SYSTEM:**	6
	a. Kidneys-structure & function; b. Urine formation;(to exclude concentration and dilution) c. Juxtaglomerular apparatus d. Fluid and electrolyte balance – Na, K, H_2O e. Neural control of Micturation f. Applied physiology: Types of bladder	
4	**TEMPERATURE REGULATION**	**2**
5	**ENDOCRINE SYSTEM:**	**6**
	a. Secretion- regulation & function of Pituitary-Thyroid-Adrenal-Parathyroid-Pancreas b. Applied physiology (abnormalities) of the above mentioned glands	
6	**REPRODUCTIVE SYSTEM:**	**8**
	a. Physiology of ovary and testis b. Physiology of menstrual cycle and spermatogenesis c. Functions of progesterone, estrogen and testosterone d. Puberty & menopause e. Physiological changes during pregnancy	

Sr. No.	Topics	Didactic Hours
7	**SPECIAL SENSES:**	**5**
	a. Structure and function of the eye b. Applied physiology: errors of refraction, accommodation, reflexes – dark and light adaptation, photosensitivity. c. Structure and function of the ear d. Applied physiology- types of deafness	
8	**RESPIRATORY SYSTEM:**	**20**
	a. Introduction, structure and function of the RS b. Mechanics of respiration; c. Pulmonary Volumes & capacities; d. Anatomical & Physiological Dead space-ventilation/perfusion ratio, alveolar ventilation e. Transport of respiratory gases f. Nervous & Chemical control of respiration g. Pulmonary function tests-Direct & indirect method of measurement h. Physiological changes with altitude & acclimatization	
9	**CARDIOVASCULAR SYSTEM:**	**20**
	a. Structure & properties of cardiac muscle b. Cardiac impulse- initiation and conduction c. Cardiac cycle d. Heart rate regulation e. Blood pressure- definition-regulation- Cardiac output-regulation & function affecting; Peripheral resistance, venous return f. Regional circulation-coronary-muscular, cerebral g. Normal ECG.	
10	**GASTRO INTESTINAL SYSTEM:**	**3**
	a. Absorption and digestion in brief b. Liver function	

Sr. No.	Topics	Didactic Hours
11	**EXERCISE PHYSIOLOGY**	**15**
	a. Basal Metabolic Rate and Respiratory Quotient b. Energy metabolism c. Fatigue d. Oxygen debt e. Acute cardio vascular changes during exercise, difference between mild, moderate and severe exercise, concept of endurance f. Acute respiratory changes during exercise g. Concept of training/conditioning, effects of chronic exercise/effect of training on the cardiovascular & respiratory system h. Body temperature regulation during exercise i. Hormonal and metabolic effects during exercise j. Effects of exercise on muscle strength,power,endurance k. Physical fitness and its components	
12	**PHYSIOLOGY OF AGEING** (With respect to all systems)	**05**

PRACTICALS

Sr. No.	Topics	Practical Hours
1.	Haematology – (demonstration only)	6hrs
2.	GRAPHS:	5hrs
	a. Skeletal muscle and its properties	
	b. Cardiac muscle-properties-effect of Ach & Adrenaline	
3.	Blood pressure- effects of change in posture & exercise	4hrs
4.	Examination of pulse	2hrs
5.	Spirometry	4hrs
	a. Lung volumes and capacities	
	b. Timed vital capacity	
6.	Perimetry	1hr
7.	Physical fitness:	8hrs
	a. Breath holding	
	b. Mercury column test;	
	c. Cardiac efficiency test- Harvard step test- Master step test	
8.	Clinical examination: History taking and general examination /Respiratory system / cardio vascular system / Higher functions /Cranial nerves /Reflexes / Motor & Sensory system	20hrs
TOTAL		**50 hrs**

RECOMMENDED TEXT BOOKS

1. Text book on Medical Physiology – Guyton
2. Textbook of Physiology – A K Jain (for MBBS students)

RECOMMENDED REFERENCE BOOKS

1. Review of Medical Physiology – Ganong
2. Samson & Wright's Applied Physiology
3. Textbook of Medical Physiology – Bern and Levy

SCHEME OF UNIVERSITY EXAMINATION

<table>
<tr><td colspan="2">THEORY
80 MARKS + I.A. – 20 MARKS
* The question paper will give appropriate weightage to all the topics in the syllabus.</td><td>Marks
100</td></tr>
<tr><td>Section A-MCQs</td><td>Q-1 -MCQs – based on MUST KNOW area [1 x 20]</td><td>20</td></tr>
<tr><td rowspan="2">Section B- S.A.Q.</td><td>Q-2 - Answer any FIVE out of SIX [5 x 3 = 15]

Based on: Blood/G.I. tract / Electrolyte balance / Endocrine / Uro-genital System / General physiology /Special Senses (Eye/Ear/Skin)</td><td rowspan="2">30</td></tr>
<tr><td>Q-3- Answer any THREE out of FOUR [3 x 5 =15]

Based on:
Cardio-vascular system / Respiratory system / Exercise Physiology/ Nerve</td></tr>
<tr><td>Section C -L.A.Q.</td><td>Q-4] L.A.Q
(Compulsory from Musculoskeletal) -15 marks

Q-5] A - 15 marks
OR
Q-5] B -15 marks
Based on: C.N.S./ Spinal Cord/ Electro-Neuro-Physiology /C.V.S. /R.S.

LAQ should give break up of 15 marks – e.g. [3 +5+7]</td><td>30</td></tr>
<tr><td colspan="2">Total Marks</td><td>80</td></tr>
</table>

PRACTICAL 80 MARKS + I.A. – 20 MARKS		**Marks** **100**
Spots	Based on: Topic 1,2,3,6,7,8,9,11&12 (10 X 2 Marks)	**20**
Viva	Based on theory	**20**
Demonstration	On Clinical Physiology C.V.S. 10 Marks R.S. 10 Marks C.N.S. Cranial Nerves and Special Senses } 15 Marks	**35**
Journal	Year work on practicals performed	**05**
Total Marks		**80**

INTERNAL ASSESSMENT:

1. **Two exams – Terminal and prelims of 80 marks each (**Theory & Practical**) TOTAL - 160 marks**

2. **I.A. to be calculated out of 20 marks** (Theory & Practical)

3. **Internal assessment as per University pattern.**

BIOCHEMISTRY

(Didactic 46hrs+Demonstrations 4hrs) **TOTAL 50 HRS**

COURSE DESCRIPTION:

This course provides the knowledge and skills in fundamental organic chemistry and introductory biochemistry that are essential for further studies It covers basic biochemical, cellular, biological and microbiological processes, basic chemical reactions in the prokaryotic and eukaryotic cells, the structure of biological molecules, introduction to the nutrients i.e. carbohydrates, fats, enzymes, nucleic acids and amino acids.

Sr. No.	Topics	Didactic Hours	Demonstrations Hours	Total Hours
1	**CARBOHYDRATES**	9		**9**
2	**PROTEINS**	6		**6**
3	**ENZYMES**	4		**4**
4	**VITAMINS**	4		**4**
5	**MINERALS**	5		**5**
6	**HORMONES**	1		**1**
7	**NUTRITION**	3		**3**
8	**CLINICAL BIOCHEMISTRY**	6	4	**10**
9	**LIPID**	4		**4**
10	**MUSCLE CONTRACTION**	4		**4**
	TOTAL	**46**	**4**	**50**

OBJECTIVES:

The student would know:

1. Various biomolecules which are present in the body and functions
2. The formation and fate of these biomolecules
3. Their normal levels in body fluids required for functioning and their abnormal levels to understand the disease process.

SYLLABUS

Sr. No.	Topics	Didactic Hours	Demonstrations Hours	Total Hours
1	**CARBOHYDRATES**	**9**		**9**
	a. Chemistry, Definition, Classification with examples, Functions			
	b. Digestion and Absorption, Glycogenesis, Gluconeogenesis, Glycogenolysis and HMP pathway, Glycolysis, Electron transport chain for ATP synthesis, TCA cycle. Hormonal regulation of blood c. Glucose, Glycogen storage disorders, Diabetes mellitus, Glycosuria, changes in Carbohydrate, Protein & Lipid metabolism.			
	d. All the metabolisms should be taught based on the following points such as starting and ending products, tissues of occurrence and the conditions when the pathway is activated, deactivated and significance of the pathway.			
2	**PROTEINS**	**6**		**6**
	a. Definition, Importance, Functional Classification, Digestion & Absorption, decarboxylation, deamination, transamination, transmethylation, Urea cycle, clinical significance of serum urea, function of glycine, Phenylalanine, trytophan, methionine tyrosine.			
	b. There should be an emphasis on understanding the structure of protein, the essential and non-essential amino acids.			
3	**ENZYMES**	**4**		**4**
	Definition, Modern Classification, Factors affecting enzymes Action, diagnostic & therapeutics uses & enzymes, Isoenzymes, Competitive & Non competitive inhibition.			
4	**VITAMINS**	**4**		**4**
	Definition, Classification, Fat & water soluble vitamins, functions, Deficiency manifestations sources & RDA			
Sr. No.	**Topics**	**Didactic**	**Demonstrations**	**Total**

		Hours	Hours	Hours
5	**MINERALS**	**5**		**5**
	Ca, P, Fe, I, Zinc, Selenium, Fluorine, Magnesium include Na and K. Function sources, Deficiency manifestations			
6	**HORMONES**	**1**		**1**
	Definition with mechanism of action, classification.			
7	**NUTRITION**	**3**		**3**
	Composition of food, balanced diet, Kwashiorkor, Marasmus, Nitrogen balance, major Dietary constituent & their importance. Include energy requirements, factors affecting B.M.R., S.D.A. (Specific Dynamic Action) and R.Q. (Respiratory Quotient)			
8	**CLINICAL BIOCHEMISTRY**	**6**	**4**	**10**
	a. Liver Function Test, Renal Function Test, Lipid profile in serum b. Starvation metabolism, Hemoglobin chemistry and metabolism c. **Demonstrations:** Demonstration of estimation of various biomolecules and their interpretation Interpret reports of various conditions (including Diabetic profile, Cardiac profile, Uric acid and Gout)			
9	**LIPID**	**4**		**4**
	Definition, classification with examples biomedical importance, Phospholipids & lipoproteins functions. Digestion & absorption of lipid, β oxidation of fatty acid with Energetics, Ketone bodies and their metabolism, Prostaglandins and essential fatty acids, Cholesterol, importance of cholesterol, obesity			
10	**MUSCLE CONTRACTION**	**4**		**4**
	Mechanism & Biochemical events Connective Tissue- Biochemistry of connective tissue Collagen-Glyco-protein proteoglycans			
	TOTAL	**46**	**4**	**50**

RECOMMENDED TEXT BOOKS

1. Biochemistry – Dr. Satyanarayan
2. Text book of Biochemistry for Medical students – Dr. Vasudevan / Shri Kumar
3. Biochemistry – Dr. Pankaja Naik

RECOMMENDED REFERENCE BOOK

1. Review of Biochemistry (24th edition) - Harpar

SCHEME OF UNIVERSITY EXAMINATION

<table>
<tr><td colspan="2">THEORY ONLY
40 marks + I.A. – 10 Marks
[There shall be no LAQ in this paper]
* The question paper will give appropriate weightage to all the topics in the syllabus.</td><td>Marks

50</td></tr>
<tr><td>Section -A-Q-1</td><td>MCQs – based on MUST KNOW area [1x10]</td><td>10</td></tr>
<tr><td rowspan="2">Section-B-
Q-2 & Q-3</td><td>SAQ-to answer any FIVE out of SIX [5x3]</td><td>15</td></tr>
<tr><td>SAQ – to answer any THREE out of FOUR [3x5]</td><td>15</td></tr>
<tr><td colspan="2">Total Marks</td><td>40</td></tr>
</table>

INTERNAL ASSESEMENT

1. **Two exams – Terminal and prelims of 40 marks each TOTAL - 80 marks**

2. **I.A. to be calculated out of 10 marks** (Theory only)

3. **Internal assessment as per University pattern.**

FUNDAMENTALS OF KINESIOLOGY & KINESIOTHERAPY

(Didactic – 100 Hrs &Practical / Laboratory – 150 Hrs) **TOTAL 250 HRS**

COURSE DESCRIPTION:

This course covers the definition of various terms used in mechanics, biomechanics kinesiology as well as its importance in physical therapy. It applies the mechanical principles to simple equipments of therapeutic gymnasium and familiarizes the candidate to its use. It covers the types of human motions as well as planes and relative axes of motion. It also explains the inter-relationship among kinematic variables and utilizes this knowledge to describe and analyze motion. It covers the classification of the joints and muscles along their distinguishing characteristics and skill of measurement of its ranges in various planes and axes. This course additionally covers therapeutic principles and skills of application of massage, yoga, aerobic exercise and use of suspension therapy. It also enhances the skill of evaluation of vital parameters & sensory system.

Sr. No.	Topics	Didactic Hours	Practical/ Laboratory Hours	Total Hours
1	**MECHANICS & BASIC BIOMECHANICS**	25	---	**25**
2	**BIO-PHYSICS RELATED TO KINESIOTHERAPY**	20	25	**45**
3	**CLASSIFICATION OF MOVEMENTS**	10	15	**25**
4	**BASIC EVALUATION**	15	35	**50**
5	**MASSAGE**	05	20	**25**
6	**RELAXATION**	05	10	**15**
7	**AEROBIC EXERCISE**	05	05	**10**
8	**YOGA**	15	40	**55**
TOTAL		**100**	**150**	**250**

OBJECTIVE:

Cognitive:

At the end of the course, the candidate will be able to:

a) Define the various terms used in relation to Mechanics, Biomechanics & Kinesiology
b) Recall the basic principles of Biophysics related to mechanics of movement / motion & understand the application of these principles to the simple equipment designs along with their efficacy in Therapeutic Gymnasium & various starting positions used in therapeutics.

Psychomotor:

At the end of the course, the candidate will be able to:

a) Describe & also acquire the skills of use of various tools of the Therapeutic Gymnasium
b) Demonstrate the movements in terms of various anatomical planes and axes.
c) Demonstrate various starting & derived positions used in therapeutics.
d) Describe physiological principles & acquire the skills of application of therapeutic massage
e) Acquire the skills of assessment of basic evaluation like sensations, reflexes &vital parameters
f) Acquire the skill of objective assessment of Range of Motion of the joints by Goniometry
g) Describe physiological basis and principle of relaxation and acquire the skills of relaxation methods
h) Describe physiological responses and principles of aerobic exercises for general fitness & demonstrate fitness skills on self & group.
i) Describe physiological principles and acquire the skill of performing Pranayama & Yogasanas

SYLLABUS

Sr. No.	Topic	Didactic Hours	Practical/ Laboratory Hours	Total Hours
1.	**MECHANICS & BASIC BIOMECHANICS**	**25**	**--**	**25**
	a. Mechanics & Application to human body i. Definition and terminologies: Mechanics (Statics & Dynamics), Biomechanics, Kinetics, Kinematics (Osteokinematics, Arthrokinematics, Open Chain & Closed Chain kinematics) ii. Axes / planes, iii. Laws of inertia & motion, iv. Gravity, C.O.G., L.O.G. and B.O.S. v. Equilibrium – Types and affecting factors vi. Mechanics of Forces Work, Energy, Power, Friction, Momentum, Parallelogram of Forces vii. Torque viii. Pendulum ix. Mechanical and Anatomical pulleys x. Levers xi. Fluid mechanics related to Hydrotherapy (physics, statics & dynamics)	20		20

Sr. No.	Topic	Didactic Hours	Practical/ Laboratory Hours	Total Hours
	b. Muscle Mechanics i. Types of Muscles- Anatomical & Physiological ii. Types of muscle work / Contraction iii. Muscle Action: Roles as Agonist, Antagonist, Fixators, Synergist iv. Active & Passive insufficiency v. Range of muscle work ,Angle of pull – with importance to efficiency of muscle work and stability of joint	5	--	5
2	**BIO-PHYSICS RELATED TO KINESIOTHERAPY**	**20**	**25**	**45**
	a. Starting Positions & Derived Positions i. Application of stability ii. BOS, Gravity and muscle work in relation to various positions	10	5	15
	b. Therapeutic Gymnasium i. Use of accessories such as Pulleys Springs, Shoulder wheel, Walking aids, ii. Finger ladder, Therapeutic balls, Weights, Resistance bands, tubes, & wands iii. Applied mechanics of all above accessories	5	5	10
	c. Suspension Therapy i. Principles ii. Suspension Apparatus iii. Types of Suspension iv. Effects and uses v. Techniques for individual joints	5	15	20
3	**CLASSIFICATION OF MOVEMENTS**	**10**	**15**	**25**
	a. Definition and classification b. Principles of movements c. Effects, uses and Techniques (active: assisted, free, assisted- resisted, resisted & passive)			

Sr. No.	Topic	Didactic Hours	Practical/ Laboratory Hours	Total Hours
4	**BASIC EVALUATION**	**15**	**35**	**50**
	a. Assessment of Vital Parameters i. Temperature ii. Blood Pressure iii. Heart Rate/ Pulse rate iv. Respiratory Rate v. Chest expansion	5	5	10
	b. Assessment of Sensations and Reflex testing	5	5	10
	c. Goniometry i. Definition and Types of Goniometers ii. Principles iii. Techniques for individual joints with biomechanical principles iv. Uses	5	25	30
5	**MASSAGE**	**05**	**20**	**25**
	a. Definition b. Classification c. Principles d. Effects & uses e. Indications and contra indications f. Techniques- Upper limb, Lower Limb, Neck, Back, Abdomen, Face & Scalp			
6	**RELAXATION**	**05**	**10**	**15**
	a. Principles, b. Techniques along with their effects & uses i. General - Jacobson's, Shavasana & Reciprocal (Laura Mitchell) ii. Local - Heat, Massage, Gentle/Rhythmic passive movements			
7	**AEROBIC CONDITIONING AND BASIC PRINCIPLES OF GENERAL FITNESS** (as applied to self and group)	**5**	**5**	**10**
	a. Physiology of aerobic and anaerobic exercise. b. Components of fitness (definition of terms only) c. Warm up d. Cool down exercises e. Group & Recreational activities			

Sr. No.	Topic	Didactic Hours	Practical/ Laboratory Hours	Total Hours
8	**YOGA**	**15**	**40**	**55**
	a. Definition b. Principles of Yoga c. Yogasana- Technique, Benefits, Contraindications & cautions for each Asanas: i. **Asanas in supine** a) Pawanamuktasana b) Ardha Halasana c) Halasana d) Setubandhasana e) Naukasana f) Matsyasana g) Shavasana h) Sarvangasana ii. **Asanas in prone** a) Bhujangasana b) Ardha-Shalabhasana c) Dhanurasana d) Makarasana iii. **Asanas in sitting** a) Padmasana, Siddhasana, Sukhasana b) Yogamudrasana c) Virasana d) Vajrasana e) Gomukhasana f) Pashchimottanasana iv. **Asanas in standing** a) Padhastasana, Padangusthasana, Uttanasana b) Utkatasana c) Tadasana d) Trikonasana v. **Pranayama** a) Anulom-vilom b) Kapalbhati			

PRACTICAL: Practical demonstrations of:

Sr. No.	Topics
1	Various starting and derived positions
2	The techniques of active, passive, assisted and resisted movements
3	The techniques of various accessories and equipments used in therapeutic gymnasium its biomechanical principles and uses.
4	The techniques of use of suspension method for assisted and resisted movements
5	Relaxation procedures
6	Massage techniques
7	Yogasanas and Pranayama
8	Aerobic exercise for self and others
9	Assessment of vital parameters in different body position (supine, sitting and standing) and of sensory system and reflexes.
10	Measurement of joint R.O.M. through goniometry, method of fixation and measurement.

RECOMMENDED TEXT BOOKS

1. Principles of Exercise Therapy – Dena Gardiner
2. Massage, Manipulation & Traction – Sydney Litch
3. Therapeutic Exercise – Sydney Litch
4. Massage – M. Hollis
5. Practical Exercisetherapy– Margaret Hollis
6. Hydrotherapy – Kisner, Hollis
7. Measurement of Joint Motion – Cynthia Norkins.
8. Biomechanics – Cynthia Norkins
9. Clinical Kinesiology-Brunnstrom
10. Yogic Exercises-Physiologic and Psychic processes-- S. Datta Ray

RECOMMENDED REFERENCE BOOKS

1. Therapeutic Exercise – Carolyn Kisner
2. Asanas-Why & How – Omprakash Tiwari

SCHEME OF UNIVERSITY EXAMINATION

THEORY 80 MARKS + I.A. – 20 MARKS * The question paper will give appropriate weightage to all the topics in the syllabus.		**Marks** **100**
Section A- **M.C.Qs**.	Q-1 -MCQs – based on MUST KNOW area [1 x 20]	**20**
Section B- S.A.Q.	Q-2 - Answer any FIVE out of SIX [3x 5 =15] Q-3- Answer any THREE out of FOUR [5x 3 =15]	**30**
Section C-L.A.Q.	Q-4] - 15 marks Q-5] - 15 marks OR Q-5] -15 marks Based on Mechanics & application/ Starting positions & Derived positions/ Classification of Movements/ Goniometry/ Massage LAQ should give break up of 15 marks – e.g. [3 +5+7]	**30**
Total Marks		**80**

PRACTICAL 80 MARKS + I.A. – 20 MARKS		**Marks** **100**
LONG CASE	Based on Massage / Goniometry / Movements (passive) • Cognitive – Bio-physics, Biomechanical principles, indications, contraindication • *Documentation of findings etc - 20 Marks* • *Psychomotor + Affective skills - 15 Marks*	**35**
SHORT CASE	Two Short case based on • Basic evaluation (**any one**): Sensation / Reflex testing / B.P./ & Pulse Rate/ Chest Expansion / Respiratory Rate /Aerobic fitness for self • Skill performance (**any one**): Relaxation / Yoga posture / Starting / Derived position & Suspension Therapy (2 x 20 = 40 marks) • *Cognitive – 05 Marks* • *Psychomotor -15 Marks*	**40**
JOURNAL	Year work on practicals performed.	**5**
Total Marks		**80**

INTERNAL ASSESSMENT:

1. **Two exams – Terminal and preliminary examination (**Theory & Practical**) of 80 marks each TOTAL - 160 marks**
2. **Internal Assessment to be calculated out of 20 marks.**
3. **Internal assessment as per University pattern.**

FUNDAMENTALS OF ELECTROTHERAPY

Didactic 95 hrs+ Practical 105hrs [**TOTAL-200HRS**]

COURSE DESCRIPTION:

This course will cover the basic principles of Physics that are applicable in medical equipments used in Physiotherapy. It will also help to understand the fundamentals of currents, sound waves, Heat & its effects, electromedical radiations and their effects as well as their application in physical therapy. It covers the skill of application of superficial thermal agents and Cryotherapy.

Sr. No.	Topic	Didactic Hours	Practical/ Lab Hours	Total hours
1	**MEDICAL ELECTRONICS AND ELECTRICITY :**	**55**	**15**	**70**
	a) Fundamentals of Low frequency currents	32	09	41
	b) Fundamentals of High frequency currents	13	06	19
	c) Electro Magnetic Spectrum	5	-	5
	d) Cellular Bio-physics	3	-	3
	e) Environmental currents	2	-	2
2	**ELECTRICAL MODALITIES**	**25**	**40**	**065**
3	**SUPERFICIAL THERMAL AGENTS**	**15**	**50**	**065**
TOTAL		**95**	**105**	**200**

OBJECTIVES:

Cognitive:

At the end of the course, the candidate will be able to:

a) Recall the physics principles & Laws of Electricity, Electro magnetic spectrum, & ultra sound
b) Describe effects of environmental & man made electromagnetic field at the cellular level & risk factors on prolonged exposure.
c) Describe the Main electrical supply, Electric shock, precautions
d) Enumerate Types & Production of various Therapeutic electrical currents & describe the panel diagrams of the machines

Psychomotor:

At the end of the course the candidate will be able to –

a) Test the working of the various electrotherapeutic-equipments
b) 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 , multimeter] of the circuit ; & will be able to identify such components.
c) Describe & identify various types of electrodes used in therapeutics, describe electrical skin resistance & significance of various media used to reduce skin resistance.

d) Acquire knowledge of various superficial thermal agents such as Paraffin wax bath, Cryotherapy, Hydrocollator packs, Home remedies, their physiological & therapeutic effects, Merits / demerits & acquire the skill of application.

SYLLABUS

Sr. No.	Topic	Didactic Hours	Practical /Lab Hrs	Total Hours
1.	**MEDICAL ELECTRONICS AND ELECTRICITY**	**55**	**15**	**70**
	a. **Fundamentals of Low frequency currents**	32	09	41
	i. Basic Physics: Structure of atom, Isotopes, States of matter; Compound formation-(covalent formation), Properties of Electric lines of forces, Conductors, Non-conductors, Latent heat, Transmission of heat	3	-	3
	ii. Condenser a) Principles b) Capacity c) Types & construction d) Electric field e) Charging and discharging of the condenser f) Duration of Discharge g) Discharge through inductance h) Capacitive reactance & uses of condenser	3	-	3
	iii. Main supply: a) Production of Electricity b) Types: A.C./ D.C. c) Distribution/ Grid system wiring of the house, colour coding of electrical supply to the apparatus d) Earthing and its importance e) Types of Plugs & Switches	3	3	6
	iv. Shock a) Definition b) Types (Electric Shock & Earth shock) c) Severity Causes, Effects & Precaution	2	-	2

Sr. No.	Topic	Didactic Hours	Practical/ Lab Hrs	Total Hours
	v. Static Electricity: a) Theory of Electricity b) Production of Electric Charge c) Characteristics of charged electrical body and capacitor and inductance: types & uses d) Potential difference	3	-	3
	vi. Current electricity a) EMF b) Resistance: Combination of resistance in series and parallel c) Ohms Law d) D.C., A.C. e) Devices for regulating current: Identification, functioning & Uses- Rheostat, Potentiometer, Ammeters, Oscilloscopes, Voltmeter f) Voltage and Power g) Thermal effects of electric current- Joule's Law.	6	6	12
	vii. Electrical Skin Resistance: a) Skin Resistance b) Factors affecting Skin resistance: types of electrodes used, electrode gels, skin threshold, skin type, skin temperature, exercises c) Methods to reduce skin resistance	2	-	2
	viii. Faradic currents: Duration, frequency, wave forms & graphical representation, surging, faradic type current, pulse width modulation,	5	-	5
	ix. Galvanic currents/ Direct current**:** and interrupted galvanic current, duration, frequency, waveforms & graphical representation	5	-	5
	b. Fundamentals of High frequency currents	**13**	**06**	**19**
	i. Electro Magnetic Induction: a) Production b) Direction of induced EMF c) Strength of induced EMF d) Type – Self & Mutual induction e) Inductive Reactance f) Eddy currents	3	**-**	3
	Topic	**Didactic Hours**	**Practical/ Lab Hours**	**Total Hours**

	g. Principles and Laws – Faraday's , Lenz's h. Dynamo			
	ii. Apparatus for Modification of Currents: a) Interruption of current – Switch & Valve b) C- R timing circuit c) Multivibrator Circuit, Pulse Generator d) Current supplied to patient – Impulse type	2	-	2
	iii. Magnetism: a) Nature and Types b) Molecular theory of Magnetism c) Property of Magnet d) Magnetic effect of electric current – Electro Magnets e) Meters for measuring A.C.	2	-	2
	iv. Sound: a) Wave motion in sound b) Infrasonics c) Normal hearing band d) Characteristics of sound waves and their velocities e) Ultrasonics f) Reflection, Refraction and Attenuation of Sound waves g) Interference of sound waves	2	-	2
	v. D.C. and A.C.: a) Source – Cell and rectified AC b) Rectification of AC c) Thermionic valves – Diode and Triode d) Metal Rectifier e) Types of Rectification f) Transformers-Types & Functions g) Smoothing circuit h) Semiconductor and its types i) Diodes & Transistors j) Choke coil	4	6	10
	c. Electro Magnetic Spectrum	5	-	5
	i. Laws of transmission Reflection – Refraction – Absorption – Attenuation ii. Electro Magnetic Radiation iii. Laws Governing E.M.R. iv. Laws of Reflection, Refraction, Absorption, Attenuation, Cosine Law, Inverse Square Law, Grothus Law			
	Topic	**Didactic Hours**	**Practical/ Lab Hours**	**Total Hours**
	d. Cellular Bio-physics	3	-	3

	i. Action potential, ii. Resting membrane potential iii. Transmission of impulses: Saltatory conduction iv. Reception & emission of E.M.F. signals			
	e. Environmental currents	2	-	2
	Environmental currents & fields risk factors on prolonged exposure to E.M. field.			
2	**ELECTRICAL MODALITIES** **Production, Physical principles, Panel diagrams, Testing of apparatus of the following:**	**25**	**40**	**065**
	a. S.W.D. b. Ultrasound c. U.V.R. d. I.F.T. e. I.R. f. LASER (no panel diagram) g. Diagnostic Electrical Muscle Stimulator, h. T.E.N.S.			
3	**SUPERFICIAL THERMAL AGENTS**	**15**	**50**	**65**
	Construction/Design of the Modalities, Scales of temperature, Specific heat & modes of energy transfer, Physiological effects, Therapeutic effects/ Uses, Merits/demerits, Indications/contra-indications, Skills of application: a. Home remedies b. Paraffin wax bath c. whirl pool d. contrast bath e. Hydro-collator hot packs f. Cryotherapy			

PRACTICAL

Practical demonstrations of:

Sr. No.	Topic
1.	Various ELECTRICAL COMPONENTS like Diodes & Triodes, Rheostat, Capacitor, Potentiometer, Switches, Plugs and Pulse generator
2	The technique of testing of mains supply
3	The techniques of testing the following ALONG WITH PANEL DIAGRAM:
	i. Low Frequency currents- Diagnostic Muscle stimulator, Transcutaneous Nerve Stimulation
	ii. Medium Frequency currents-I.F.T.
	iii. High Frequency currents- Short Wave Diathermy, Ultrasound
	iv. I.R. (no panel diagram)
	v. U.V.R. (no panel diagram)
4	The skill of application of THERMAL AGENTS (on models) :
	i. Hot packs
	ii. P.W.B.
	iii. Whirlpool
	iv. Contrast bath
	v. Cryotherapy

RECOMMENDED TEXT BOOKS

1. Clayton 1s Electro therapy – 3rd & 10th edition
2. Electro therapy explained – Low & Reed
3. Electro Therapy – Kahn
4. Electrotherapy Evidence Based Practice-Sheila Kitchen 11th edition

RECOMMENDED REFERENCE BOOK

1. Clinical Electrotherapy -- Nelson & Currier

SCHEME OF UNIVERSITY EXAMINATION

THEORY 80 MARKS + I.A. – 20 MARKS * The question paper will give appropriate weightage to all the topics in the syllabus.		**Marks** **100**
Section A –M.C.Qs.	Q-1 **MCQs** – based on MUST KNOW area [1 x 20]	**20**
Section B- S.A.Q.	Q-2 - Answer any FIVE out of SIX [5 x 3 =15] Q-3- Answer any THREE out of FOUR [3 x 5 =15]	**30**
Section C -L.A.Q.	Q-4] L.A.Q -15 marks * Based on superficial Thermal agents Q-5] (Based on Production /Panel Diagram of high frequency current) -15 marks OR Q-5] (Based on Production / Panel Diagram of low/ Medium frequency current) -15 marks LAQ should give break up of 15 marks – e.g. [3 +5+7]	**30**
Total Marks		**80**

PRACTICAL 80 MARKS + I.A. – 20 MARKS		**Marks** **100**
LONG CASE	Based on Superficial thermal agent: • *Cognitive – Medical Electronic, Physiological, Biophysical principles, Therapeutic effects, indications-contraindications - 20 Marks* • *Psychomotor + Affective skills - 15 Marks*	**35**
SHORT CASE	Two Short case on Testing of equipments: 1. Low & Medium frequency 2. High frequency/Actinotherapy (2 x 20=40 marks) • *Cognitive – 05 Marks* • *Psychomotor -15 Marks*	**40**
JOURNAL	Year work on practical's performed.	**5**
Total Marks		**80**

INTERNAL ASSESSMENT:

1. **Two exams – Terminal and preliminary examination (**Theory & Practical**) of 80 marks each TOTAL - 160 marks**
2. **Internal Assessment to be calculated out of 20 marks.**
3. **Internal assessment as per University pattern.**

SCHEME OF UNIVERSITY EXAMINATIONS AT A GLANCE

I B.P.Th.

Subjects	Theory			Practical		
	University	I.A.	Total	University	I.A.	Total
Anatomy	80	20	100	80	20	100
Physiology	80	20	100	80	20	100
Biochemistry	40	10	50	-	-	-
Fundamentals of Kinesiology & Kinesiotherapy	80	20	100	80	20	100
Fundamentals of Electro Therapy	80	20	100	80	20	100
Total	**360**	**90**	**450**	**320**	**80**	**400**