



**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

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 <i>(College Examination in final year)</i>	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) <i>(not for examination)</i>	-	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	1		
	ii. Muscles	2		
	iii. Bones	2		
	iv. Joints	2		
	v. Nerve	2		
	vi. Vessels	1		
Sr. No.	Regions	Didactic Hours	Practical Hours	Total Hours

	a. General Histology:	7	3	10
	<ul style="list-style-type: none"> i. Epithelial ii. Connective tissue iii. Muscle iv. Bone and cartilage v. Nerve and vessels vi. Embryology 	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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 	<ul style="list-style-type: none"> 2 3 3 1 2 1 1 	<ul style="list-style-type: none"> 1 1 1 1 1 1 - 	
	e. Living Anatomy:	4	2	6
	<ul style="list-style-type: none"> i. Upper extremity ii. Lower extremity iii. Head Neck & Face iv. Trunk 	<ul style="list-style-type: none"> 1 1 1 1 	<ul style="list-style-type: none"> - - - - 	
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)	2		2
	<ul style="list-style-type: none"> i. Autonomic Nervous System: ii. Sympathetic iii. Parasympathetic 			

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

RECOMMENDED 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 -- Vishram Singh
6. Human Anatomy – Datta

RECOMMENDED 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 -- Vishram Singh
8. Cunningham's- Practical Anatomy

SCHEME OF UNIVERSITY EXAMINATION

THEORY 80 MARKS + I.A. – 20 MARKS		Marks
* The question paper will give appropriate weightage to all the topics in the syllabus.		100
Section A-MCQs	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] This question should include: Digestive/ Uro-genital / Reproductive system / Special senses – Eye / Ear/ Skin / Circulatory system / General Anatomy/ General Histology	30
	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.	
Section C -L.A.Q.	Q-4] L.A.Q (should be based on Musculoskeletal anatomy) - 15 marks	30

	Q-5] A OR Q-5] B (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]	-15 marks -15 marks	
Total Marks			80

PRACTICAL		Marks
80 MARKS + I.A. – 20 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: <ul style="list-style-type: none"> i. Structure of cell membrane ii. Transport across cell membrane iii. Homeostasis 	4
	b. Blood: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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	<p>NERVOUS SYSTEM:</p> <ul style="list-style-type: none"> 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 	35
3	<p>EXCRETORY SYSTEM:</p> <ul style="list-style-type: none"> a. Kidneys-structure & function; b. Urine formation;(to exclude concentration and dilution) c. Juxtglomerular apparatus d. Fluid and electrolyte balance – Na, K, H₂O e. Neural control of Micturation f. Applied physiology: Types of bladder 	6
4	TEMPERATURE REGULATION	2
5	<p>ENDOCRINE SYSTEM:</p> <ul style="list-style-type: none"> a. Secretion- regulation & function of Pituitary-Thyroid-Adrenal-Parathyroid-Pancreas b. Applied physiology (abnormalities) of the above mentioned glands 	6
6	<p>REPRODUCTIVE SYSTEM:</p> <ul style="list-style-type: none"> 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 	8

Sr. No.	Topics	Didactic Hours
7	SPECIAL SENSES:	5
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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

THEORY 80 MARKS + I.A. – 20 MARKS * The question paper will give appropriate weightage to all the topics in the syllabus.		Marks
Section A-MCQs	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] Based on: Blood/G.I. tract / Electrolyte balance / Endocrine / Uro-genital System / General physiology /Special Senses (Eye/Ear/Skin)	30
	Q-3- Answer any THREE out of FOUR [3 x 5 =15] Based on: Cardio-vascular system / Respiratory system / Exercise Physiology/ Nerve	
Section C -L.A.Q.	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]	30
Total Marks		80

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, tryptophan, 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
	<ul style="list-style-type: none"> 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

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.		Marks
Section -A-Q-1	MCQs – based on MUST KNOW area [1x10]	10
Section-B- Q-2 & Q-3	SAQ-to answer any FIVE out of SIX [5x3]	15
	SAQ – to answer any THREE out of FOUR [3x5]	15
Total Marks		40

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
	MECHANICS & BASIC BIOMECHANICS	25	--	25
1.	a. Mechanics & Application to human body <ol style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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
4	c. Goniometry <ul style="list-style-type: none"> 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
6	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			
	RELAXATION	05	10	15
7	a. Principles, b. Techniques along with their effects & uses <ul style="list-style-type: none"> i. General - Jacobson's, Shavasana & Reciprocal (Laura Mitchell) ii. Local - Heat, Massage, Gentle/Rhythmic passive movements 			
	AEROBIC CONDITIONING AND BASIC PRINCIPLES OF GENERAL FITNESS (as applied to self and group)	5	5	10
7	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
	<ul style="list-style-type: none"> a. Definition b. Principles of Yoga c. Yogasana- Technique, Benefits, Contraindications & cautions for each Asanas: <ul style="list-style-type: none"> i. Asanas in supine <ul style="list-style-type: none"> a) Pawanamuktasana b) Ardha Halasana c) Halasana d) Setubandhasana e) Naukasana f) Matsyasana g) Shavasana h) Sarvangasana ii. Asanas in prone <ul style="list-style-type: none"> a) Bhujangasana b) Ardha-Shalabhasana c) Dhanurasana d) Makarasana iii. Asanas in sitting <ul style="list-style-type: none"> a) Padmasana, Siddhasana, Sukhasana b) Yogamudrasana c) Virasana d) Vajrasana e) Gomukhasana f) Pashchimottanasana iv. Asanas in standing <ul style="list-style-type: none"> a) Padhastasana, Padangusthasana, Uttanasana b) Utkatasana c) Tadasana d) Trikonasana v. Pranayama <ul style="list-style-type: none"> 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		Marks
80 MARKS + I.A. – 20 MARKS * The question paper will give appropriate weightage to all the topics in the syllabus.		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		Marks
80 MARKS + I.A. – 20 MARKS		100
LONG CASE	Based on Massage / Goniometry / Movements (passive) <ul style="list-style-type: none"> • Cognitive – Bio-physics, Biomechanical principles, indications, contraindication • <i>Documentation of findings etc - 20 Marks</i> • <i>Psychomotor + Affective skills - 15 Marks</i> 	35
SHORT CASE	Two Short case based on <ul style="list-style-type: none"> • 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) • <i>Cognitive – 05 Marks</i> • <i>Psychomotor -15 Marks</i> 	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:

- Recall the physics principles & Laws of Electricity, Electro magnetic spectrum, & ultra sound
- Describe effects of environmental & man made electromagnetic field at the cellular level & risk factors on prolonged exposure.
- Describe the Main electrical supply, Electric shock, precautions
- 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 –

- Test the working of the various electrotherapeutic-equipments
- 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.
- 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	-
	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	-
	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	-
	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
	c. Electro Magnetic Spectrum	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
	d. Cellular Bio-physics	3	-
			Total Hours

	<ul style="list-style-type: none"> 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
	<ul style="list-style-type: none"> 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
	<p>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:</p> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none">• <i>Cognitive – Medical Electronic, Physiological, Biophysical principles, Therapeutic effects, indications-contraindications</i> - 20 Marks• <i>Psychomotor + Affective skills</i> - 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) <ul style="list-style-type: none">• <i>Cognitive – 05 Marks</i>• <i>Psychomotor -15 Marks</i>	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