



**CURRICULUM**

**BACHELOR OF PHYSIOTHERAPY**

**(DURATION: 4.5 YEARS)**

**SESSION: 2021-22**

**GD GOENKA UNIVERSITY**  
**SOHNA ROAD, GURUGRAM-122103**

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## **PREAMBLE**

At the outset it must be mentioned that the present document should best be taken as a guiding framework. In preparing the same we are well aware that in some small pockets in the country, the teaching of Physiotherapy is thriving in creative directions. A few departments are grounded in clinical perspectives, some other in the experimental research and industrial-organizational areas. The Learning Outcome based curriculum framework (LOCF), it is to be better understood as a document to be studied in relation to other advances in the field of Physiotherapy. It intends to offer a broad guideline to reorient the organization of teaching learning processes at the UG and PG level to augment the quality of learning in the context of contemporary challenges of higher education in India. It explores the opportunities to improve class room transaction, teacher preparation and sense of relevance for the learners. In this endeavour it departs from the earlier scheme in a major way and explicitly states the learning outcomes and uses that to organize the diverse teaching-learning processes. In so doing it tries to address the needs of society, groups and the individual.

This scheme considers learning as an experiential and participatory activity with sufficient space for innovation and initiative, building the scientific spirit of objectivity and critical perspective. In this venture teachers and learners are assumed to jointly engage in a creative exercise of knowledge construction and skill building. In the last few decades, the discipline of Physiotherapy has also emerged as a new treatment measure. Its training can empower students assess diagnose and treat various disorders or diseases and mal alignments. Teaching program therefore must include the agenda/ courses which are meaningful to the surrounding society. Educational institutions must reach out to the society. This will give us opportunity to get validation of skill training, knowledge acquisition, research and demonstration of relevance of graduate attributes. In turn, this kind of experience will also help shaping the learning outcomes. The employability gap would also be addressed. Preparing teachers to teach through pedagogies suitable to promote the values given in the LOCF document is an essential condition for the attainment of LOCF. It is perhaps the most daunting challenge in order to fulfil the mandate of LOCF. The diversity maintenance and appreciation, along with standardization of teaching -learning across the nation requires accommodating local realities with an open mind.

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 and 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 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.

This holistic approach incorporates a broad range of physical and physiological therapeutic interventions and aids. The core skills used by Physiotherapy include manual therapy, therapeutic exercises and the application of electro-therapeutic modalities.

Specifically, physiotherapists improve the client's quality of life by:

- Promoting optimal mobility, physical activity, and overall health and wellness;
- Preventing disease, injury, and disability;
- Geriatric care and Rehabilitation;
- Managing acute and chronic conditions, activity limitations and participation restrictions;
- Improving and maintaining optimal functional independence and physical performance;
- Rehabilitating injury and the effects of disease or disability with therapeutic exercise programs and other interventions; and
- Educating and planning maintenance and support programs to prevent re-occurrence, re-injury or functional decline

## **BACHELOR OF PHYSIOTHERAPY (BPT)**

### **Introduction:**

The Bachelor of Physiotherapy program shall be under the Faculty of Medicine/Health Sciences (under Department/College/Institution of Physiotherapy). The name of the Degree program shall be Bachelor of Physiotherapy (or, Bachelor of Physical Therapy) – B.P.T

These REGULATIONS & CURRICULUM will be applicable from the academic year 2021-2022 and thereafter.

### **LEARNING OBJECTIVES OF THE COURSE**

#### ➤ **COMMUNICATION**

- Effective communication and interpersonal skill which are adapted to meet the needs of diverse individuals and groups.

#### ➤ **ETHICAL AND LEGAL STANDARDS**

- Adherence to safe, ethical and legal standards of current practice (as identified by professional organizations, federal and state law and accrediting bodies).

#### ➤ **DIAGNOSIS AND PLAN OF CARE**

- Development of physiotherapy diagnoses and an individualized plan of care for the management and prevention of movement dysfunction across the life span.
- Demonstrate effective physiotherapy screening of the following systems for keep-refer decisions: Musculoskeletal; Neuromuscular; Cardiovascular and Pulmonary; Integumentary.
- Demonstrate effective history taking, examination, evaluation, and re-evaluation that leads to an appropriate physiotherapy diagnosis and prognosis for patients with disorder of the following systems: Musculoskeletal; Neuromuscular; Cardiovascular and Pulmonary; Integumentary
- Develop an appropriate plan of care and intervention for patients with disorders of the following systems: Musculoskeletal; Neuromuscular; Cardiovascular and Pulmonary; Integumentary.
- Assess and address needs of individuals and communities for health promotion and prevention of movement dysfunction.

#### ➤ **TEAM MEMBER**

Effective participation as an intra- and inter-professional team member.

#### ➤ **PRACTICE MANAGEMENT**

Effective clinical practice management for delivery of physiotherapy services in diverse settings.

➤ **TEACHING AND LEARNING PRINCIPLES**

Application of teaching and learning principles in educational, practice, and community settings.

➤ **EVIDENCE-BASED PRACTICE**

Application of principles of critical thinking and clinical reasoning to evidence-based physiotherapist practice.

➤ **PROFESSIONAL RESPONSIBILITY AND COMMITMENT**

Responsibility and commitment to the profession and society through life-long learning and involvement in activities beyond the job responsibilities.

**LEARNING OUTCOMES OF THE COURSE**

On completion of this course, the students will be able to:

- ❖ Integrate concepts from the biological, physical, behavioral, and clinical sciences into physical therapy services
- ❖ Exhibit professional conduct and behaviors that are consistent with the legal and ethical practice of physical therapy
- ❖ Demonstrate compassion, caring, integrity, and respect for differences, values, and preferences in all interactions with patients/clients, family members, health care providers, students, other consumers, and payers
- ❖ Demonstrate culturally sensitive verbal, nonverbal, and written communications that are effective, accurate, and timely
- ❖ Collect and critically evaluate data and published literature to apply in the delivery of care, practice management, and to examine the theoretical and scientific basis for physical therapy
- ❖ Screen patients/clients to determine if they are candidates for physical therapy services or if a referral to, or consultation with, another health care professional or agency is warranted
- ❖ Complete a patient/client examination/ re-examination and evaluate and interpret the examination data to determine a physical therapy diagnosis and prognosis
- ❖ Employ critical thinking, self-reflection, and evidence-based practice to make clinical decisions about physical therapy services
- ❖ Collaborate with patients/clients, caregivers, and other health care providers to develop and implement an evidence-based plan of care that coordinates human and financial resources

- ❖ Provide services and information related to health promotion, fitness, wellness, health risks, and disease prevention within the scope of physical therapy practice.
- ❖ Advocate for patient/client and profession
- ❖ Provide consultative services and education to patients/clients, caregivers, health care workers, and the public using culturally sensitive methods that are adapted to the learning needs, content, and context
- ❖ Employ effective leadership skills in the context of supervising, delegating, and mentoring within the profession



### **CRITERIA OF ELIGIBILITY FOR ADMISSION**

- A candidate applying for the degree of B.P.T being eligible for admission to the Physiotherapy College affiliated to UGC recognized University must have passed the Higher Secondary (10+2) or equivalent examination recognized by any Indian University or a duly constituted Board and passed in Physics, Chemistry and Biology and English.

Or
- Candidates who have studied abroad and have passed the equivalent examination as per the guidelines of the Association of Indian Universities to determine the eligibility and must have passed in the subjects: Physics, Chemistry, Biology, and English up to 12th Standard level.
- Admission to Bachelor of Physiotherapy course shall be made on the basis of eligibility and an entrance test to be conducted for the purpose. No candidate will be admitted on any ground unless he/she has appeared in the admission test and interview.
  - a. Entrance test, to be conducted by the university as per the syllabus under 10 +2 scheme
  - b. Successful candidates on the basis of written test will be called for counseling(s) nominated by the university or the board
  - c. During subsequent counseling (s) the seat will be allotted as per the merit of the candidate depending on the availability of seats on that particular day.
  - d. Candidate who fails to attend the Medical Examination on the notified dates(s) will forfeit the claim for admission and placement in the waiting list except permitted by the competent authority under special circumstances.
  - e. The name of the student(s) who remain(s) absent from classes for more than 15 days at a stretch after joining the said course without giving any notice will be governed as per the respective University rules.
- He /She has attained the age of 17 years as on 31<sup>st</sup> December of concerned year.
- He/she should furnish at the time of submission of application form, a certificate of Physical fitness from a registered medical practitioner that the candidate is physically fit to undergo Physiotherapy course.
- A candidate fulfilling above requirements will be provisionally admitted in the First Year of B.P.T Degree Programme, as per the rules of Admission Committee for Professional Medical Educational Courses of Haryana and/or Government of Haryana.

### **DURATION OF COURSE:**

B.P.T is 4½ years regular & fulltime degree programme. The 4½ years includes **4 academic years for study and 6 months (minimum 1150 Hours)** of compulsory rotatory internship.

### **MEDIUM OF INSTRUCTION:**

English shall be the medium of instruction for all the subjects of study and for examination of the course.

### **ADMISSION TO THE PROGRAMME:**

Admission granted by the Central Admission Committee appointed by the State Government to any student shall be provisional till the Enrollment/ Registration/ Enlistment is made by the University, and in case of admission is granted on the basis of provisional eligibility certificate, the condition & instruction given by the University should be complied within the time limit fixed by the University, otherwise term kept and fees paid by such a student will be forfeited and fees

will not be refundable in any conditions.

**Registration:** Candidate admitted to the course in any of the affiliated college shall register with University by remitting the prescribed fees along with the application form for registration duly filled in and forwarded to University through Head of the Institute within stipulated date.

**RE-ADMISSION AFTER BREAK OF STUDY:**

All re-admissions of candidates are subject to the approval of the Vice Chancellor of concerned University.

**COMMENCEMENT OF THE COURSE -**

The course shall commence as per the notification of Central Admission Committee of Government of Haryana. No student can be admitted in college after \_\_\_\_\_.

Duration of first term – \_\_\_\_\_

Duration of second term – \_\_\_\_\_

**SCHEDULE OF EXAMINATION –**

The scheme of examination for the B.P.T course shall be divided into 4 professional examinations; each examination will be held at the end of each respective Academic year.

There will be 1 internal examination (optional) after completion of 4 months of onset of Academic year. There will be 1 Internal/Preliminary exam (compulsory) before University exam. Internal evaluation is based on continuous assessment, for 20% of the marks of the subject. There will be University examination through written paper and/or practical examination for 80% of the marks of the subject at the end of every Academic year.

University has to conduct supplementary exam for failed students after 4 months and before 6 months from previous exam.

**ELIGIBILITY CRITERIA TO APPEAR IN UNIVERSITY EXAMINATION**

**Attendance: A candidate must secure minimum 75% of attendance**

A candidate is required to attend at least 75% of the total classes conducted in a year in all subjects prescribed for that year (separately), in theory and practical / clinical to become eligible to appear for the University examination.

**No relaxation, whatsoever, will be permissible to this rule under any ground including indisposition etc.**

**Filling of University examination form:** Candidates desirous of appearing for University examination must forward their applications in the prescribed form to the registrar through the Principal of the Institutions on or before the date prescribed for the purpose.

**STUDENTS' ASSESSMENT:**

The performance of every student in each course will be evaluated as follows:

Internal evaluation based on continuous assessment, for 20% of the marks of the subject;  
University examination through written paper and/or practical examination for 80% of the marks of the subject

**SCHEME OF EXAMINATION: SUBJECTS AND DISTRIBUTION OF MARKS**

<b>First Year B. Physiotherapy</b>						
<b>Sr No</b>	<b>Subject</b>	<b>Theory Marks</b>		<b>Practical Marks</b>		<b>Total Marks</b>
		<b>External</b>	<b>Internal</b>	<b>External</b>	<b>Internal</b>	
1	Anatomy	80	20	80	20	200
2	Physiology	80	20	80	20	200
3	Biochemistry	80	20	-	-	100
4	Electrotherapy-I	80	20	80	20	200
5	Exercise therapy -I	80	20	80	20	200
6	ENVIROMENTAL STUDIES	Internal Exam (Grading System) (100 Marks)				
<b>Total</b>		<b>400</b>	<b>100</b>	<b>320</b>	<b>80</b>	<b>900</b>

<b>Second Year B. Physiotherapy</b>						
<b>Sr No</b>	<b>Subject</b>	<b>Theory Marks</b>		<b>Practical Marks</b>		<b>Total Marks</b>
		<b>External</b>	<b>Internal</b>	<b>External</b>	<b>Internal</b>	
1.	Pathology and Microbiology	80	20	-	-	100
2.	Pharmacology	80	20			100
3.	Electrotherapy-II	80	20	80	20	200
4.	Exercise therapy-II	80	20	80	20	200
5.	Biomechanics	80	20	80	20	200
6.	Sociology & Psychology	80	20			100
7.	Computer Application			80	20	100
<b>Total</b>		<b>480</b>	<b>120</b>	<b>320</b>	<b>80</b>	<b>1000</b>

<b>Third Year B. Physiotherapy</b>						
Sr No	Subject	Theory Marks		Practical Marks		Total Marks
		External	Internal	External	Internal	
1	General Medicine	80	20	80	20	200
2	General Surgery	80	20	80	20	200
3	Orthopedics	80	20	80	20	200
4	Physiotherapy in Cardio Respiratory Conditions	80	20	80	20	200
5	Physiotherapy in Orthopedic Conditions and Sports Conditions	80	20	80	20	200
<b>Total</b>		<b>400</b>	<b>100</b>	<b>400</b>	<b>100</b>	<b>1000</b>

<b>Final Year B. Physiotherapy</b>						
Sr No	Subject	Theory Marks		Practical Marks		Total Marks
		External	Internal	External	Internal	
1	Neurology	80	20	80	20	200
2	Pediatrics	40	10	-	-	50
3	Geriatrics	40	10	-	-	50
4	OBS & GYNE, ENT, Ophthalmology	25+20+20 (65)	15	-	-	80
5	Physiotherapy in Neurology	80	20	80	20	200
6	Physiotherapy in General Medical and Surgical Conditions	80	20	80	20	200
7	Rationale of Rehabilitation	80	20	80	20	200
8	Physiotherapy Ethics and Law	40	10			50
9	Research Methodology and Biostatistics	80	20			100
<b>Total</b>		<b>585</b>	<b>145</b>	<b>320</b>	<b>80</b>	<b>1130<sup>l</sup></b>

## **COMPULSORY ROTATORY INTERNSHIP**

All students of Bachelor of Physiotherapy must undergo a compulsory rotatory internship for a period of 6 months after passing 4<sup>th</sup> year BPT examination in all subjects. Candidate will have to join internship within 15 days of declaration of 4<sup>th</sup> year University examination result. Internship should be done in only Hospitals/Institutions recognized by the Council (List will be declared later). No candidate shall be awarded degree certificate without successfully completing six months of Internship.

The Internship should be rotatory and cover clinical branches concerned with Physiotherapy such as Orthopedics, Cardiothoracic including ICU, Neurology, Pediatrics, General Medicine, General Surgery, Obstetrics, Geriatrics, Women's health, CBR and Gynecology both in-patient and out-patient services. On completion of all postings, the duly completed logbooks will be submitted to the Principal/Head of program to be considered as having successfully completed the internship program.

### **DRESS CODE:**

Professionalism with respect to dressing is encouraged throughout the course. It is each student's responsibility to have appropriate dressing during all class assignments and learning activities. Students are supposed to wear apron compulsorily during practical and clinical hours.

### **MIGRATION/TRANSFER OF CANDIDATES:**

The Vice Chancellor shall have the powers to place any migration/transfer he/she is fit for grant of permission for migration/transfer to candidates undergoing course of study in another University as prescribed by university.

**COURSE OF STUDY – SUBJECTS & HOURS DISTRIBUTION YEAR  
WISE DISTRIBUTION OF HOURS AND CREDITS**

**First Year**

<b>Subject</b>	<b>Theory + Practical Hours</b>
Anatomy	320
Physiology	280
Biochemistry	120
Electrotherapy-I	200
Exercise therapy -I	200
Environmental Sciences (EVS)	50
<b>Total</b>	<b>1170</b>

**Second Year**

<b>Subject</b>	<b>Theory + Practical Hours</b>
Pathology	60
Microbiology	60
Pharmacology	80
Exercise Therapy II	200
Electrotherapy II	200
Biomechanics	120
Sociology & Psychology	200
Computer Application	80
Clinical Training	10 Hours per week for 32 weeks
<b>Total</b>	<b>1320</b>

**Third Year**

<b>Subject</b>	<b>Theory + Practical Hours</b>
General Medicine	200
General Surgery	200
Orthopedics	200
Physiotherapy in Cardio Respiratory Conditions	200
Physiotherapy in Orthopedic Conditions	300
Clinical Training	10 Hours per week for 32 weeks
<b>Total</b>	<b>1420</b>

**Final Year**

<b>Subject</b>	<b>Theory + Practical Hours</b>
Neurology	120
Pediatrics	40
Geriatrics	40
OBS & GYNE, ENT, Ophthalmology	40
Physiotherapy in Neurology	300
Physiotherapy in General Medical and Surgical Conditions	240
Rationale of Rehabilitation	120
Physiotherapy Ethics and Law	80
Research Methodology and Biostatistics	120
Clinical Training	10 Hours per week for 32 weeks
<b>Total</b>	<b>1420</b>

➤ **6-month compulsory rotatory internship (1150 Hours)**

## **COURSE CONTENTS**

### **FIRST YEAR B. PHYSIOTHERAPY**

#### **1. ANATOMY**

##### **OBJECTIVES:**

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

- 1) Acquire the knowledge of structure of human body in general.
- 2) Understand the regional anatomy in detail
- 3) Anatomical changes right from embryonic period till old age
- 4) Understand histological features of various organs
- 5) Understand its application in medical science

##### **SYLLABUS:-**

##### ***COURSE DESCRIPTION***

The study of anatomy will include identification of all gross anatomical structures. Particulars emphasis will be placed on description of bones, joints, muscles, the brain, cardio pulmonary and nervous system, as these are related to the application of physiotherapy and occupational therapy in patients.

##### ***Course objectives***

The objective of this course is that after 320 hrs. of lectures, demonstrations, and practical, the student will be able to demonstrate knowledge in human anatomy' as needed for the study and practice of physiotherapy and occupational therapy. In addition the student will be able to fulfill with 75% accuracy (as measured written & oral internal evaluation) the following objectives of the course.

##### **A. *INTRODUCTION***

1. Define anatomy and mention its subdivisions.
2. Name regions, cavities and systems of the body.
3. Define anatomical positions and anatomical terms.

##### **B. *CELL***

1. Define a cell.
2. Mention the shape, size and parts of a cell.
3. Name and functions of cell organs. Names of cell bodies.
4. Define chromosomes, genes.
5. Review mitosis and meiosis, mention the main events, but stages are not necessary.

##### **C. *TISSUES,***

1. Classify tissues.
2. Classify and mention the microscopic structure, types of tissues such as epithelial, connective,



muscular and nervous tissues. Give examples for each type of tissue.

**D. *CARDIO-VASCULAR SYSTEM.***

1.
  - a. Comprehend the external and internal features of heart and their implications.
  - b. Mention position of heart.
  - c. Identify and name the chamber of the heart, surface and border of the heart.
  - d. Identify the venae cavae, pulmonary trunk and aorta.
  - e. Mention the internal features of the chambers of the heart.
  
2.
  - a. State the basic features of the blood supply & nerve supply of the heart.
  - b. State the basic arrangement of the pericardium.
  - c. Identify the coronary artery and coronary sinus.
  - d. Name the parts of the conductive system of heart.
  
3.
  - a. Mention the position and general distribution of major arteries and major veins, and name their main branches.
  - b. Name the types of arteries and veins; give examples and indicate a basic microscopic structure of type of blood vessels.

**E. *LYMPHATIC SYSTEM***

1. Comprehend the general and regional arrangements of the lymphatic system.
2. Name the lymphatic organ and mention their location.
3. Illustrate the basic structural features of lymphatic vessels, lymph nodes, thymus, spleen and tonsils.
4. Assign functional role to the lymphatic system.
5. State the position and immediate relations of spleen.

**F. *RESPIRATORY SYSTEM.***

- a) List the parts of the respiratory system.
- b) Comprehend the functional anatomy of the parts of the respiratory system.
- c) Mention the basic features of innervation of bronchi and lungs.
- d) State the position, extent, and gross and microscopic structure of the parietal pleura.
- e) Comprehend the arrangement of pleura, mention the parts, and position of the parietal pleura.
- f) Name the recesses of pleura.
- g) Identify the trachea and bronchi.
- h) Identify the right lung and left lung.
- i) Name the components of the hilum of lung.
- j) Name the broncho pulmonary segments.
- k) Illustrate the main features of the microscopic structure of lung.
- l) Identify the borders and surfaces of the lung on the specimen.

**G. *DIGESTIVE SYSTEM* (NB: details are not required)**

1.
  - a. List the parts of the digestive system.
  - b. Mention the boundaries and features of the mouth.
  - c. Classify teeth.
  - d. Mention, position, extent, subdivision, communications, internal features and muscles of pharynx.
  - e. Name the tonsils and define fauces.

f: Identify internal features of the mouth and pharynx of the specimen.

2.
  - a. State the position, course and extent of esophagus.
  - b. Identify esophagus of the specimen.
  - c. State the basic nerve supply.
3.
  - a. Mention the position and gross structure of the stomach.
  - b. Identify the stomach and its borders, surfaces and subdivisions.
  - c. Enumerate the immediate relations of the stomach.
  - d. State the basic nerve supply of the stomach.
4.
  - a. Name the subdivision of the intestine and mention their positions.
  - b. Mention the difference between small and large intestine.
5.
  - a. Name the arteries arising from the abdominal aorta. Name the organs supplied by these branches.
  - b. Awareness of the name and position of the principal autonomic visceral nerve plexus in the abdomen and pelvis and the organs supplied by them.
6. Mention the position and gross features of the liver and biliary system.
7.
  - a. Name the position and subdivision of the pancreas.
  - b. Name the major salivary gland.
  - c. Indicate their positions.
  - d. Mention the site of opening of their ducts.

**H. GENITO-URINARYSYSTEM (Details are not required)**

1.
  - a. Comprehend the basic functional implication and the basic structure of the kidney and ureter.
  - b. Mention the position, size and shape of kidney,
  - c. Name the immediate relations of the kidney.
  - d. Indicate the cortex, medulla, pyramids, sinus, calyces, and pelvis of ureter in a macro section of the kidney.
  - e. Illustrate the structure of a nephron.
  - f. Identify the ureter and indicate the position of the ureter.
2.
  - a. State the anatomy of the bladder and urethra.
  - b. Mention the position, shape and size and surface of the bladder.
  - c. Indicate the immediate relations of the bladder and position,
  - d. Mention the basic innervation of the bladder.
  - e. Name and identify the subdivisions of the male urethra.
  - f. Mention the position, extent and immediate relations of male urethra.
  - g. Locate and identify the female urethra.
  - h. Mention extent and immediate relations of the female urethra.
  - I. Name the sphincters of the urethra.
3.
  - a. List and locate the parts of the male reproductive system, state the anatomy and functional considerations of the testis, male accessory organs of reproduction and external organs.

- b.** Name the constitute structures of the spermatic cord.
  - c.** Mention the position of the inguinal canal.
  - d.** Name the component structures and parts of the penis.
- 4.**
  - a.** List and locate the parts of female reproductive system, state the anatomy and functional considerations of ovary, uterine tubes, uterus, vagina and female external genitalia.
  - b.** Mention the basic feature of parts of the female external genitalia.
  - c.** Enumerate the factors responsible for the maintenance of the position of the uterus and anatomy of its prolepses.
  - d.** Mention the position, extent and gross structure of the female breast.
- 5.** Name the common, internal and external iliac arteries.

### **I NERVOUS SYSTEM:**

- 1.**
  - a.** Define the subdivisions of the nervous system, define central, peripheral and autonomic nervous systems and name their subdivisions:- Comprehend the position and form of the spinal cord, its structure and function interims of neuronal connections.
  - b.** Indicate the position and extent of the spinal cord.
  - c.** Illustrate the principal features shown in a transverse section of the spinal cord.
  - d.** Specify the basic features of mono and multi synaptic spinal reflex pathway.
  - e.** Illustrate the white and gray matter, and anterior, lateral and posterior columns of the spinal cord.
  - f.** Mention the origin, termination and position of important ascending and descending tracts, site of crossing of fiber of these tracts and functions of each tract.
  - g.** State the main consequences of spinal cord transaction and hemi section, and explain the rationale of cordotomy.
  - h.** Indicate the blood supply and meninges of spinal cord.
- 2.**
  - a.** Name the subdivisions of the brain, identify and mention the external features of parts of the brain.
  - b.** Mention the internal structure and basic features of parts of the brainstem, and name the nuclei and fiber tract with special emphasis of cranial nerve nuclei,
  - c.** Identify and mention parts of the cerebellum.
  - d.** Mention the external features and internal structure of the cerebellum and name its various afferent and efferent tracts and their termination.
  - e.** Mention the features of the gross component of the cerebrum.
  - f.** Mention & identify the location of gyri, sulci and cortical area.
  - g.** State and identify – association, commissural and projection fibers.
  - h.** Define and identify component of forebrain, including cerebral cortex, insula, olfactory bulb, olfactory tract, uncus, fornix, basal ganglia, thalamus, hypothalamus, internal capsule, corpus callosum etc.
  - i.** Predict the result of damage to internal capsule.
  - j.** Outline sensory and motor pathway and be able to trace these pathways
  - k.** Name sensory and motor nerve endings with function.
  - l.** Define pyramidal motor system and name its tracts
  - m.** Define upper and lower motor neurons,
  - n.** Name the parts and tracts of the extra pyramidal system and indicate the functions.

3. Outline the basic of structure of sensory organs: - Nose, tongue, eye, ear and skin.
4. Briefly outline the nature and basis of muscle tone.
5. Mention the anatomical pathway involved in the production and maintenance of muscle tone.
  - a. State the formation, circulation and drainage of CSF.
  - b. Locate & identify the ventricles.
  - c. Identify and name the meninges and space around and locate the cistern. .
  - d. Define lumbar puncture and cisternal puncture.
  - e. State the features of the meninges.
  - f. Recognize the difference between extra dural, sub dural, subarachnoid hemorrhage.
6.
  - a. Outline the arrangement of major blood vessels around the brain a spinal cord.
  - b. Mention the arteries forming the circle of Willis.
  - c. Name the branches of major arteries supplying the brain and spinal cord and mention the parts of brain they supply.
  - d. Predict the result of blockage or rupture of central deep branches.
  - e. Predict. the result of occlusion of cerebral arteries.
  - f. Predict the result of occlusion of vertebral or basilar arteries.
  - g. Identify and mention the connection of dural venous sinuses.
  - h. Name and identify the parts of the limbic system and mention their function in emotion and behavior.
7.
  - a. Mention the position and structure of the autonomic nervous system.
  - b. Mention the site of origin and termination of the preganglionic and postganglionic sympathetic and parasympathetic fibers.
  - c. Name and locate the sympathetic and parasympathetic ganglia.
  - d. Summarize the functional difference between the sympathetic and parasympathetic system.
8.
  - a. Enumerate the cranial nerves in serial order.
  - b. Mention the nuclei of origin & termination and indicate the site of attachment to brain and brain stem.
  - c. Explain the general distribution of the cranial nerves and the course of the VIIth nerve.
  - d. Predict the result of injury to cranial nerves.
9.
  - a. Anatomy of spinal cord review.
  - b. Name the group of spinal nerves.
  - c. Explain the formation and branches of the spinal nerves and distribution of anterior and posterior rami.
  - d. Locate & name the plexuses of nerves.
  - e. Indicate the course and distribution of branches of the plexuses & nerves.

**J. ENDOCRINE SYSTEM**

1. List the endocrine organs and mention their position.
2. Mention the hormones produced by each endocrine organ.

**K. INTRODUCTION TO BONE**

1. a) Define the skeleton.

- b) Mention the subdivision of skeleton. Name the bones in each subdivision. Know the number of bone in each subdivision and total number of bones.
  - c) Classify the bones and give examples.
  - d) Enumerate the common surface feature of bones.
  - e) Define ossification. Explain the type of ossification and give examples.
  - f) Define ossification center. Explain the growth of long bone in length and width.
2. a) When regional anatomy is taught.
- b) Identify the name and correctly orientate the bone.
  - c) Identify the surface, border and all other surface features.
  - d) Mark and indicate the muscular and ligamentous attachment on the bones.

### **L. INTRODUCTION TO JOINTS (Anthology)**

- ❖ Define a joint or articulation.
  - ❖ Classify the joints and give example for each type of joint. Define each type of joint.
  - ❖ Mention the basic feature of a synovial joint.
  - ❖ Define the axis & movements possible in a synovial joint.
  - ❖ Define the range of movement and limiting factor.
  - ❖ Indicate the blood supply and nerve supply in general.
  - ❖ Define the stability of a joint.
  - ❖ Demonstrate common movements.
2. When regional anatomy is taught: -
- ❖ Mention the type, the articular surface, ligament, movement, axis of movement, chief muscles producing. The movement, limiting factors and nerve supply and blood supply of all individual joints.
  - ❖ Mention the factors for stability.
  - ❖ Articulate the bones correctly.
  - ❖ Indicate applied anatomy for all joints.

### **M. INTRODUCTION TO MUSCLES (SKELETAL MUSCLE)**

1. a. Define a skeletal muscle.
- b. Define fasciae, tendon aponeurosis.
  - c. Classify the skeletal muscles by shapes etc. and give examples.
  - d. Define origin, insertion, muscle work (contraction), types of muscle work, range of muscle work, group action- agonist, antagonist, synergist and fixator, shunt and spurt muscle, type of levers with examples.
2. When the regional anatomy is taught:
- a. Mention the position, origin, insertion, nerve supply and action of the skeletal muscles. (for the skeletal muscles of soft palate, pharynx and larynx: Position, action & nerve supply may be sufficient).
  - b. Indicate group of muscles by position and action, group action and nerve supply of group of muscles.
  - c. Indicate segment innervation of muscles.
  - d. Predict the result of paralysis of individual and group of muscles.

### **N. UPPER EXTREMITY**

#### **1. Pectoral region:**

- a. Outline the features of the pectoral region.

- b. Name, identify and correctly orientate the sternum , clavicle, scapula and humerus.
- c. Outline the main features of the bones of shoulder girdle.
- d. Identify the parts, borders and surfaces of sternum mention its other features.
- e. Identify the ends, surfaces, curvatures and other features of clavicle.
- f. Identify the borders, angles, surface, processe, fossa and other features of scapula.
- g. Identify the ends, head, greater and lesser tuberosities and anatomical and surgical necks of humerus: also the capitellum, trochlea and radial, coronoid and olecranon fossa and epicondyles.
- h. Locate and identify the muscles of pectoral region and mention their origin, insertion, nerve supply and action.

## 2. Scapular region:

- a. Comprehend the main features of the muscles in the scapula region.
- b. State the layer, arrangement, of the muscles of the back.
- c. Name and identify the muscles of the scapular region. Mention their origin, insertion nerve supply and action.
- d. Demonstrate the bony land mark of scapula, humerus and clavicle.

## 3. Axilla

- a. Mention, identify the boundaries and contents of axilla. Name the branches of axillary artery. Name and identify the cords and branches of brachial plexus and mention their root value.
- b. Illustrate the formation of brachial plexus.

## 4. Shoulder girdle:

- a. Comprehend and apply the function, the main features of joints of the shoulder girdle.
- b. Name the joints of shoulder girdle. Identify the articular surfaces and name ligaments and movements of sternoclavicular and acromioclavicular joints.
- c. Mention the type of the joints.
- d. Demonstrate and name the movement of scapula. Mention the chief muscles producing these movements.
- f. Correlate movements of scapula.
- g. Assign functional role of the articular disc and sterno clavicular joint and coraco-clavicular ligament.

## 5. Shoulder joint:

- a. Mention the type, articular surface and ligaments of the shoulder joint. .
- b. Define and demonstrate the movements of shoulder joint.
- c. Name and identify the chief muscles producing these movements. Analyze these movements and mention limiting factors.
- d. Mention the blood supply and nerve supply of this joint.
- e. Analyze the associate movement of scapula and movement of the shoulder joint.
- f. Mention the limiting factors and factors for its stability indicate applied anatomy.

## 6. Upper arm:

- a. Name and identify the muscles at the front and back of upper arm.
- b. Name and identify the ends, borders, surfaces and features of the humerus.
- c. Identify the head anatomical neck, tuberosities, surgical neck, bicipital groove, condyle, capitulum, trochlea, epicondyles, radial, coronoid and olecranon fossa.

- d. Mention the origin, insertion, nerve supply and action of muscles of the front and back of upper arm.
- e. Indicate the course, relation and distribution of radial and musculo- cutaneous nerves.

### **7. Elbow joint:**

- a. Mention the type, articular surface and ligaments of elbow joint.
- b. Define and demonstrate the movement possible and name the chief muscles producing this movement.
- c. Mention the factors for stability and limiting factors.
- d. Indicate the applied anatomy.
- e. Mention the applied anatomy.
- f. Explain the carrying angle

### **8. Forearm, wrist and hand:**

- a. Mention the bones of forearm, identify the ends, borders, surfaces and features of radius and ulna.
- b. Identify the head, neck, tuberosity and styloid process of radius. Identify the coronoid process, olecranon process, trochlear notch, tuberosity, head and styloid process of ulna. Also about the radial notch of ulna and ulnar notch of radius.
- c. Name and identify the carpal bones, metacarpal bones and phalanges in an articulated hand.
- d. Identify the muscles of front and back of the forearm.
- e. Mention the position, insertion, nerve supply and action of these muscles.
- f. Indicate the course, relations and distribution of median, ulnar and radial nerves.
  
- g. Mention the type, articular surface and ligaments of radio ulnar joints. Define the movement of supination and pronation. Mention the axis and muscles producing these movements. Analyze these movements and apply its functional role in routine day to day actions.
- h. Mention the position and distribution of ulnar and radial arteries and ulnar, median and radial nerves.
- i. Name and locate the carpal bones. Mention the type, articular surface and ligaments of wrist joint.
- j. Define and demonstrate the movements and mention the muscles producing them.
- k. Mention the blood supply and nerve supply.
- l. Mention the visible tendons around the wrist and their synovial sheaths.
- m. Predict the result of paralysis of muscles of the forearm.
- n. Mention the functional implication of prehension in the structure of hand.
- o. Indicate the arrangement of tendons of the digits, retinacula, fibrous flexor sheaths, and synovial sheaths.
- p. Evaluate the hinge type of interphalangeal joints, ellipsoid type of metacarpophalangeal joints and saddle type of carpometacarpal joint. Name and identify the small muscles of the hand. Mention their position, origin, insertion, nerve supply and action.
- q. Mention the types of bones forming and ligaments of the joints of the hand. Define the movements and the muscles producing these movements. Predict the results of paralysis of the small muscles of hand.
- r. Demonstrate the type of grip.

### **9. Nerves of upper limb.**

- a) Comprehend and apply the knowledge of the position and distribution of blood vessels and lymph nodes.
- b) Mention the root value of the nerves.
- c) Identify the nerves and mentions the position, course, relations and distribution of nerves of upper limb.

- d) Predict the result of injury to these nerves.

**10. Blood vessels of upper limb:**

- a. Comprehend and apply the knowledge of the position and distribution of blood vessels and lymph nodes.
- b. Trace the main arteries and veins.
- c. Indicate their position and name the main branches of tributaries.
- d. Name and locate the lymph nodes.

**11. Cutaneous nerves of upper limb:**

- a. Name the cutaneous nerves and illustrate the areas of their distribution.
- b. Illustrate the dermatome.

**O. LOWER EXTREMITY**

1.
  - a. Name, identification and orientation of hip bone, femur, tibia, fibula and patella.
  - b. Identify the component and features of hip bones identify the ends, borders, surfaces, head, neck, trochanters, condyles and epicondyles of femur and the features of the tibia and fibula.
  - c. Identify and mention the origin, insertion, nerve supply and action of the muscles in the front of thigh.
  - d. Mention the boundaries and contents of femoral triangle and subsartorial canal.
  - e. Indicate the position, course and distribution of femoral nerve.
  - f. Indicate the course and main branches of femoral artery and mention the blood supply of neck of femur.
  - g. Indicate the position of femoral vein.

**2. Medial side of thigh:**

- a. Name and identify the muscles of the medial side of thigh. Mention their origin, insertion, nerve supply and action.
- b. Indicate the course, relations and distribution of obturator nerve.

**3. Back of thigh:**

- a. Identify and mention the position, origin, insertion, nerve supply and action of the hamstring muscles.
- b. Indicate the position, course, relation and distribution of sciatic nerve.

**4. Gluteal region:**

- a. Identify and mention the position, origin, insertion, nerve supply and action of the muscles.
- b. Name and mention the position and course of the nerves found there and name the arteries there.

**5. Hip joint:**

- a. Mention the type, articular surface and ligaments.
- b. Define the movements and name the chief muscles producing the movements.
- c. Mention the blood supply, nerve supply, factor for stability and limiting factors.
- d. Applied anatomy.

**6. Knee joint:**

- a. Mention the type, articular, surfaces and ligaments.
- b. Define the movements and name the chief muscles for the movements.



- c. Analyze the movements.
- d. Know the blood supply and nerve supply.
- e. Indicate applied anatomy.
- f. Define locking and unlocking of the joint.

**7. Popliteal fossa:**

- a. Indicate the boundaries and contents.
- b. Mention the position and branches of tibial and common peroneal nerves.

**8. Front of leg and dorsum of foot:**

- a. Name and identify the tarsal bones, metatarsal bones and phalanges in an articulated foot.
- b. Name and identify the muscles.
- c. Mention the positions, origin, insertion, nerve supply and action of the muscles.
- d. Position and distribution of deep peroneal nerve.
- e. Indicate the position and attachment of extensor retinacula.
- f. Mention and identify the feature of the tibia and fibula.

**9. Lateral side of leg**

- a. Name and identify the muscles.
- b. Mention the position, origin, insertion, nerve supply and action of muscles.
- c. State the position, course and distribution of superficial peroneal nerve.
- d. State the position and attachment of peroneal retinacula.

**10. Back of leg and sole of foot.**

- a. Name and identify the features of the bones of the foot.
- b. Name and identify the muscles of back of leg.
- c. Mention the position, arrangement, origin, insertion, nerve supply and action of the muscles.
- d. State the position course and distribution of tibial artery.
- e. State the position course and distribution of posterior tibial artery.
- f. Mention the position, and attachment of flexor retinaculum.
- g. Mention the arrangement, origin, insertion, nerve supply and action of muscles of the foot.
- h. Indicate the type of formation and factors for the maintenance of the arch of foot.
- i. Mention the type, articular surface, ligaments, movements chief muscles for the movement. Axis of movements and applied anatomy of tibiofibular joints, ankle joints, subtalarjoints, M.P. joints, I.P. joints. .
- j. Palpate and identify the tendons around the ankle and dorsum of foot.

**P. Nerves:**

- A. indicate the position, formation and branches of lumbar and sacral plexuses.
- B. Mention the root value of the nerves.
- C. Mention the position, course, relation and distribution of nerves.
- D. Predict the result of injury to the nerves.
- F. Illustrate cutaneous innervation of dermatomes.

**Q. Blood vessels:**

- A. Indicate the position of arteries and their main branches.
- B. Indicate the position of veins and their main tributaries.
- C. Indicate the position of lymph nodes.

**R. TRUNK- THORAX-ABDOMEN.**

**Vertebral column:**

1. State the basic osteology of vertebral column.
2. Identify the parts of typical vertebra, identify and state the main features of typical vertebra of each group of vertebra Identify a typical vertebrae.
3. State the form, structure and movements of joints of vertebrae column. Mention the movements and the muscles producing them.
4. Identify the inter vertebral disc and mention its parts.
5. State the formation and ligaments of the inter vertebral joints
6. Name and identify the curvatures of the vertebral column and indicate deformities.
7. State the contents of vertebral canal.

**THORAX:**

- a. State the main features of the bones and joints of thoracic cage. Mention the boundaries.
  - b. State the parts and features of sternum.
  - c. Define true, false and floating ribs. Mention the parts of features of typical ribs. Know the main features of typical ribs.
  - d. Mention the type and formation the joint between rib and vertebra, between costal cartilage and sternum and between costal cartilages.
  - e. Mention the type and formation of the joint between parts of sternum. Indicate the importance of sternal angle.
  - f. Analyze pump-handle and bucket handle movement of ribs.
  - g. Palpate bony land marks such as jugular notch, sternal angle, xiphisternum and spine of thoracic vertebral.
1.
    - a. Define intercostal space and list the contents. Mention the course and branches of typical inter costal nerve. Name the muscles of thorax. Mention the origin insertion, nerve supply and action of inter costal muscles and diaphragm.
    - b. Name the structures passing through the diaphragm and mention the orifices in the diaphragm.
  2.
    - a. Define the boundaries, and subdivisions of the mediastinum and list the contents. Identify the contents.
    - b. State the features of thoracic parts of sympathetic trunk.

**Abdomen:**

1.
  - a. Mention the main features of lumbar vertebra, sacrum and coccyx.
  - b. Mention the formation and subdivisions of bony pelvis list the features of the female bony pelvis and their role.
  - c. Mention the type, articular surface, ligaments and movements of the joints of pelvis.

2. a. Define abdominal cavity.
- b. List the layers of anterior abdominal wall. Name and mention the origin, insertion, nerve supply and action of the muscles and the features of these muscles.
- c. Explain the formation of rectus sheath and list its contents.
- d. Define inguinal canal and know its position, extent, formation and contents. Indicate its clinical importance. Define inguinal hernia.
- e. Name and identify the muscles of posterior abdominal wall. Give their origin, insertion, and action. List the organ on the posterior abdominal wall. Name the blood vessels on the posterior wall.
- f. Mention the position and formation of lumbar plexus. Name its branches.
- g. State the anatomy of lumbar region. Understand the disposition of muscles of the layers. Mention the arrangement of lumbar fascia, identify the muscles in lumbar region. Understand the lumbar routes to abdomen. Identify and mention the attachment and action of the large muscles of back. (At least ones ending capitals)
- h. Distinguish abdominal cavity and peritoneal cavity.
- i. Mention the features of lumbar part of sympathetic trunk and other sympathetic ganglia.
- j. Mention the branches and distribution of the abdominal aorta and iliac arteries.
- k. State the inferior vena cava and iliac veins and mention their tributaries.

#### **S. PELVIS**

1. State the main features of subdivision, boundaries, walls and floor of pelvis
2. Mention the features of the pubic symphysis and sacroiliac joints.
3. Distinguish and mention and major difference between the male and female pelvis.
4. Identify the muscles of the pelvic floor and mention their attachments, actions and nerve supply.
5. Mention the structure of the urogenital diaphragm.

#### **T. HEAD AND NECK.**

Musculo skeletal and neurovascular features:

1. Identify the anterior and posterior triangles of neck. Name the subdivision. List the contents.
  - a. State the main features of the skull and facial skeleton.
  - b. Identify the large skull bones and their parts.
  - c. Identify the cranial fossae and hypophyseal fossa.
  - d. Identify the internal and external auditory meatus, foramen magnum and stylomastoid foramen and name the main structures passing through them.
  - e. Identify the name the main muscles of the face. Mention their nerve supply and action.
  - f. Predict the result of paralysis to the facial muscles and sequel of injury to the facial nerve.
  - g. Map the cutaneous distribution of the three divisions of the trigeminal nerve on the face.
2. Identify the general feature of a typical cervical vertebra, atlas, axis and seventh cervical vertebra.
  - a. Identify the erector spinae, sternomastoid and scalene muscles, geniohyoid. Mention their attachments, actions and nerve supply.
  - b. Identify the phrenic, accessory and vagus nerves. Mention their distribution.
  - c. Identify the state the position distribution and root value of the nerves, of cervical and brachial plexuses.
  - d. Demonstrate the action of sternomastoid.
  - e. Mention the type, articular surfaces, ligaments, movements and muscles producing these

movements, at the atlantooccipital and atlanto-axial joints. Demonstrate these movements and the movements of the cervical part of vertebral column.

3.
  - a. Identify the subclavian, vertebral and carotid arteries. Mention the position and extent of these arteries.
  - b. Identify the components of the circle of Willis. Mention the distribution of internal and external carotid and vertebral arteries. Predict the sequence of occlusion of these arteries.
  - c. Identify the internal jugular and subclavian veins. Mention their position, formation and termination.
4.
  - a. State the basic organization of the autonomic nervous system.
  - b. State the sites of craniosacral and thoracolumbar outflow
  - c. Define the mode of the distribution of pre and postganglionic efferent neurons in sympathetic and parasympathetic nervous system.
  - d. Name the cranial nerves containing parasympathetic system in relation to their function.
  - e. Distinguish between sympathetic & parasympathetic system in relation to their function.

#### **U. EYE/EYE/NOSE:**

##### **EYE**

1. State the position of the lacrimal apparatus, the function, implication of structure of the eye and the lacrimal apparatus.
2. Name and illustrate the coats, their subdivisions, the refractive media, the chambers of the eye and the optic nerve.
3. Mention the structure of retina and optic pathway.
4. Has a basic understanding of the light and accommodation reflex (omitting pathway)
5. Mention the distribution of the three divisions of trigeminal nerve.
6. Name and state the nerve supply and simple actions of the extraocular muscles.
7. Predict the result of lesions of 3rd, 4th and 6<sup>th</sup> cranial nerves.

##### **NOSE:**

1. Name the bony component of the nose.
2. Mention the parts and boundaries of the nose.
3. State the main features of the nasal cavity.
4. Name and identify the paranasal sinuses and locate their opening.

##### **EAR:**

1. State the basic structure of the organs of hearing and equilibrium.
2. Mention the three subdivisions of the ear.
3. Mention the nerve ending for hearing and equilibrium.

#### **V. TEMPOROMANDIBULAR JOINT.**

1. State the type, articular surface, ligaments, possible movements, muscles performing the movements and nerve supply of the Temporomandibular joint.
2. Palpate and identify the joint and its articular surfaces.

- 3 Identify and name the muscles of mastication. Mention their action and nerve supply.

#### **W.MOUTH**

1. State the main features of the mouth cavity tongue, palate salivary glands, teeth and gums.
2. Mention the sensory and motor innervation of the tongue.
3. Identify the salivary glands.
4. Demonstrate movements of the tongue and palate.
5. Test and produce the swallowing (gag) reflex.
6. Predict the sequence of lesions of the VIIth and XIIth cranial nerves.

#### **X.PHARYNX:**

1. State the position and extent of the pharynx.
2. State the three subdivisions and the features of each subdivision.
3. Name the muscles of pharynx and their action.
4. Mention the sensory and motor innervation of the pharynx.

#### **Y.LARYNX AND TRACHEA:**

1. Identify the hyoid and state its parts
2. Identify the larynx and name the laryngeal cartilages.
3. State the boundaries of laryngeal inlet and glottis.
4. Identify the vocal and vestibular folds.
5. State the movements of the laryngeal cartilages. Name the laryngeal muscles and mention their attachments, action and nerve supply.
6. Define the position, extent and gross structure of the trachea
7. State the mechanics of phonation and speech, production of voice and speech.

#### **Z.CRANIAL NERVES:**

1. Enumerate the cranial nerves in serial order.
2. Relate interpret the number to the name.
3. Indicate the nuclei of origin and of termination.
4. Mention the attachments of the cranial nerves in and at cranial exit.
5. State the sensory and motor distribution.
6. State the position and course of VII nerve.
7. Predict the sequel of lesion

## 2. PHYSIOLOGY

### **Course Description:**

The course is designed to assist the students to acquire knowledge of the normal human Physiology of various body systems and understand the alteration in physiology in disease and practice of Physiotherapy as applicable for each systemic disorder.

### **Course Objectives**

The objective of this course is that after 280 hours of lectures, demonstrations, practicals and clinics the student will be able to demonstrate an understanding of elementary human physiology.

### UNIT-I

#### ***Learning objectives***

Describe the physiology of cell, tissues, Membranes and glands.

#### **Content:**

Cell Physiology,  
Cell structures, functions. and homeostasis.  
Cell membrane permeability and transport mechanisms.  
Bio electric potentials.

#### **Teaching Learning activities**

Lecture discussion

#### **Assessment methods**

Short answer Question,  
Objective type Question.

### UNIT-II

#### **Learning objectives**

Describe the contraction and tone various chemical & mechanical activities taking place in muscles & Nerves with special reference to injuries should be able to demonstrate fatigue and then phenomena related to muscles.

#### **Content:**

#### ***Muscle &Nerve***

- General introduction types of responses by living organism, essentials of a system to produce movements, structure of neuron neuromuscular junction and synapse.
- Electrophysiology of nerve and muscle, generation, conduction and transmission of nerve impulse.
- Classification of nerve fibers.
- Properties of nerve fibers, strength duration curve, accommodation.
- Structure and properties of different types of muscle.

- Physiology of neuromuscular transmission, site and mode of action of blocking substances of neuromuscular transmission, excitation- contraction coupling and molecular basis of muscle contraction, mechanisms of muscle contraction, twitch summation, length tension relationships- isotonic and isometric contraction, factor affecting muscle tension, energetic of muscle contraction.
- Degeneration and regeneration of nerves, lower motor neuron and its lesions, nutrition of muscle and effect of training, electromyography, path physiology paralysis, paresis, peripheral neuritis, defects of neuromuscular transmission.

***Teaching Learning activities.***

- Lecture discussion.
- Explain using charts, models and films.
- Demonstration of joint movements.

***Assessment methods***

- Short question answer.
- Objective type.

**UNIT-III**

***Learning objectives***

- Describe the physiology of blood as applicable to various component of blood and should be able to carryout various hematological examination.

**Content**

**Blood:**

- Composition and functions of blood plasma proteins.
- Red blood cell-site of production, function.
- Erythropoiesis and regulation, physiological and pathological variations.
- Hemoglobin function, abnormal hemoglobin, hemolysis and jaundice. Leucocytes, functions and leucopoiesis Platelets -role in haemostasis, coagulation of blood, anticoagulants and fibrinolytic system, bleeding disorders, thrombosis.
- Inflammation, Lymphocytes and cellular immunity.
- Blood groups and blood transfusion, Blood volume & methods of measurement.

***Teaching Learning activities***

- Lecture discussion, Explain using charts, models slides, specimen and films. Demonstrate the blood cell count Estimation of Hemoglobin determination of BT & CT, Blood grouping & ESR. W.B.C. count, RBC count & indices of Blood & DLC.

***Assessment methods***

- Short Question Answers.
- Objective Type.

**UNIT-IV**

***Learning objectives***

- Describe the physiology of sympathetic & parasympathetic action & reflexes

### **Content**

- Autonomic nervous system.
- Sympathetic and parasympathetic
- transmission at ganglia and postganglionic terminals and autonomic reflexes.

### **Teaching learning activities**

- Lecture discussion, Explain using charts, models and films. Demonstrate nerve stimulus, reflex action reflexes.

### **Assessment methods.**

- Short question answer,
- Objective type.

## **UNIT-V**

### ***Learning objectives***

- Describe the physiology and mechanism of respiration and control of respiration should-be able to do clinical examination of Respiratory system & should be able to resuscitate in emergencies.

### **Content**

#### **Respiratory system.**

- Introduction functional anatomy, functions respiratory and non respiratory.
- Mechanics of respiration inspiration, expiration, intra alveolar and intra pleural pressures, pneumo thorax, pulmonary ventilation, airways resistance, compliance, work of breathing,
- Lung volumes and capacities, gas law, partial pressures, gas tension, alveolar ventilation, composition of inspired alveolar and expired gases.
- Dead space of Anatomical and physiological perfusion-ventilation relationship and diffusion capacities, oxygen Transport and oxygen dissociation curve, Carbon dioxide transport and factors affecting, control of respiration, organization of respiratory centers, neural regulation.
- Control of respiration chemical apnoea, hypoxia, asphyxia, hyperpnoea, cheyne stokes breathing, hypercapnia, hypocapnia, respiratory failure, dyspnoea and cyanosis.

### **Teaching learning activities.**

- Lecture discussion.
- Explain using.
- Charts films.
- Determination of vital capacity
- Determination of lung, volume & capacities by spirometry.
- Auscultation of breath sounds.

### **Assessment methods:**

- Short question answer.



- Objective type.

## **UNIT-VI**

### ***Learning objectives***

- Describe the physiology and functions of Heart and BP regulation & should be able to examine the CVS & record ECG.

### **Content:**

#### **Cardiovascular system,**

- Properties of cardiac muscle, functional tissues, effects of ions on cardiac muscle, origin and spread of cardiac impulse, resting membrane potential, pace maker potential and action potential.
- Electrocardiography
- Cardiac cycle & pressure, volume changes, heart sounds, pulse arterial and venous relationship with cardiac cycle. Cardiac output determination, regulation, heart rate, its regulation
- Hemodynamics.
- Blood pressure, measurement, regulation short term, intermediate and long term, regulatory mechanisms, venous circulation flow, pressure and factors affecting venous circulation, central venous mechanism, venous circulation flow, pressure, factor affecting, central venous pressure, microcirculation, coronary circulation and pathophysiological considerations, regional circulation-pulmonary, cerebral, fetal, placental, shock, syncope, heart failure, hypertension and hypotension.
- Physiology of exercise, the lymphatic system, interstitial fluid dynamics and edema.

### ***Teaching learning activities.***

- Lecture discussion.
- Explain using, charts films.
- Measurement of BP, Pulse, to note effect of exercise.
- Circulatory efficiency test.
- Auscultation of heart sounds.

### **Assessment methods:**

- Short question answer.
- Objective type.

## **UNIT-VII**

### ***Learning objectives***

- Describe the physiology of digestive system.

### **Content.**

#### **Gastro intestinal system.**

- Introduction, functional anatomy, mastication and swallowing, physiology of gastro-intestinal secretions in general, Functions and regulation of gastric, Pancreatic, intestinal and bile secretions, movement of alimentary canal, gastric emptying and intestinal movements.
- Defecation, assessment of functions, gastric, pancreatic and intestinal juice, vomiting, peptic ulcer, dumping syndrome, diarrhea and constipation.

### ***Teaching learning activities***

- Lecture discussion,
- Explain using, charts films.

**Assessment methods:**

- Short question answer,
- Objective type.

## **UNIT-VIII**

### ***Learning objectives***

- Describe the physiology of nervous system, describe physiology of nerve stimulus, reflexes, brain, cranial and spinal nerves. Demonstrate reflex action and stimulus.

### **Content:**

#### **Nervous system.**

#### **I) . General**

Functional organization of nervous system, encephalization and role in homeostasis.

C.S.F.-Site and mechanism of formation, circulation, functions and blood brain barriers-clinical significance.

Synapse-properties, neurotransmitters, pre and post synaptic events.

#### **II). Sensory**

Receptors: definition, classification, transducer action, generator potentials, properties, stimulus and strength relationship, modality of sensations and classification of sensations.

Specific sensations, sensory and other ascending pathways, somesthetic sensations, proprioceptions and kinesthesia, path physiology of pain and headache.

Thalamus- organization, connections, role in sensory functions, motor co-ordinations, autonomic and emotional behavior, sleep consciousness and thalamic syndrome.

Cerebral cortex-sensory and motor organization, somatotopic representation, tactile localization and discrimination, stereognosis.

#### **III). Motor**

- Functional organization of motor system. Reflex action, properties and their significance, stretch reflex, muscle spindle, role of gamma motor neuron, static and dynamic responses, polysynaptic reflexes. Reciprocal innervations, crossed extensor reflex, positive and negative supporting reaction, cortical motor areas, pyramidal and extra pyramidal systems.
- Reticular formation, organization ascending and descending components.
- Basal ganglia organization, circuits function and disorders, role of bioamines.
- Regulation of tone and posture -postural reflexes spinal decerebrate, thalamic and decorticate preparations.
- Cerebellum - Functional anatomy, functions and pathology of sensory-motor mechanisms spinal cord lesions transaction, hemi-section, upper motor neuron lesion, posterior column defects.
- Hypothalamus -Functional anatomy, connection and functions, role in homeostasis, limbic system - Components role in visceral, somatic and endocrinal activities, preservation of self and species, and psychosomatic implications.

#### **IV). Higher Nervous Function**

- Condition reflex, properties, neural basis, relation to learning memory and habit formations, Learning and memory higher intellectual functions, Communication and speech and disorders.
- Electroencephalogram- neurophysiologic basis, relation to sleep and wakefulness *and* clinical applications.
- Eye-functional anatomy, intra-ocular fluid pressure and clinical significance of vision, schematic eye, accommodation, errors of refraction and aberrations. Photoreceptor mechanisms, theories of vision, dark and light adaptations and color vision, visual pathways, central mechanism of vision & visual reflexes, field of vision, lesions of optic pathways.
- Ear- Central functional anatomy, sound wave characteristics, transmission of sound attenuation reflex, physiology of internal ear, organ of corti, analysis of pitch and loudness, cochlear micro phonics, auditory pathways, central mechanisms of hearing, auditory cortex, hearing defects, vestibular apparatus, clinical significance nystagmus, motion sickness, physiology- taste and smell.

#### ***Teaching learning activities***

- Lecture discussion.
- Explain using charts films.
- Reflexes superficial & deep demonstration.
- Examination of sensory system.
- Examination of motor system.
- Examination of cranial nerve.
- Rinne's test & Weber's test for hearing.

#### **Assessment methods:**

- Short question answer.
- Objective type.

### **UNIT-IX**

#### ***Learning objectives***

- Describe the physiology of excretory system.

#### **Content**

##### **Kidney and Body Fluids**

- Introduction, functional anatomy and functions in general including non excretory function
- Glomerular functions, filtration and its regulation, function of renal tubule, reabsorption, secretions, renal clearance, transport mechanism, role of kidney in fluid balance electrolytes and non electrolytes pH and osmolarity, physiology of micturition, renal function tests, body fluid distribution, volume and regulation, path physiology of kidney-renal failure, artificial kidney diuretics.

#### ***Teaching learning activities***

- Lecture discussion.
- Explain using charts films.

#### **Assessment methods:**

- Short question answer.
- Objective type.

## **UNIT-X**

### ***Learning objectives***

- Describe the physiology of endocrine glands.

### **Content**

#### **Endocrinology**

- Introduction, Hormone-definition.
- Method of study.
- Role of endocrine system in homeostasis, hypothalamic hypophyseal axis, target tissue-negative and positive feed -back control system, Influence of external environmental on the endocrine system. physiology of pituitary gland, adenohypophysis, neurohypophysis, physiology of thyroid gland, thyroid function tests, physiology of adrenal gland, adrenal cortex function and function, tests, Adrenal medullary hormone, functions parathyroid, regulation, Hypo and, Hyperactive parathyroid states, Pancreas-insulin, glycogen, somatostatin (physiological aspects) pineal gland, Thymus, local hormones prostaglandin.

#### ***Teaching learning activities***

- Lecture discussion.
- Explain using charts films.
- Demonstration of BMR.

#### **Assessment methods:**

- Short question answer.
- Objective type.

## **UNIT-XI**

### ***Learning objectives***

- Describe the physiology male and female reproductive system.

### **Content**

#### **Reproduction**

- Introduction, an overview of preservation of species as against preservation of self, puberty, sex drive, menopause, cyclic activities in females, spermatogenesis, ovulation, fertilization, implantation, pregnancy, lactation, parental behavior.
- Reproduction in males, testes structure, spermatogenesis, seminal fluid, ejaculation. Testicular hormones- functions and regulation, hyper and hypoactive states of male gonad.
- Ovarian function-structure, oogenesis follicular growth, ovulation, function of corpus luteum, Female sex hormone, function and regulation, menstrual cycle, neurohormonal basis, hypothalamic hypophyseal, gonadal axis, changes accessory organs, effect on behavior.
- Fertilization, implantation, functions of placenta. Physiology of pregnancy and parturition, changes in reproductive organs and different systems of the body.
- Physiology of lactation, mammatogenesis, galactopoietic, secretion and ejection of milk, lactation, amenorrhea, fetal and placental circulation.

#### ***Teaching learning activities***

- Lecture discussion,

- Explain using charts, films, models, specimens.

**Assessment methods:**

- Short answer, question, Objective type

**UNIT-XII**

***Learning objectives***

- Describe the physiology of Skin and Sweating.

**Content**

**Skin:** Structure, blood circulation, functions, temperature regulation-physical.

***Teaching learning activities***

- lecture discussion,
- Explain using, charts films. .

**Assessment methods:**

- Short question answer,
- Objective type

**UNIT-XIII**

***Learning objectives***

- Describe the effect of Environment on normal physiology.

**Content**

**Environmental Physiology:**

Altitude, space and underwater physiology.

***Teaching learning activities***

- Lecture discussion,
- Explain using, charts films.

**Assessment methods:**

- Short question answer,
- Objective type

**UNIT-XIV**

**Learning objective**

- Describe the effect of physical stimuli and exercise and muscle & nerve.

**Content**

**Applied physiology**

- Effects of heat and cold (localized and generalized)
- Effects of electrical stimulation on skin, muscle and nerves, effect of mechanical pressure.
- Effect of local and general exercise, compensation and training in nervous system.
- Effects of various sensory proprioceptive stimuli etc.

***Teaching learning activities***

- Lecture discussion.
- Explain using charts films.

**Assessment methods:**

- Short answer, question, Objective type

### 3. BIO-CHEMISTRY

Sr. No.	UNIT	CONTENTS
1	BIOPHYSICS:	Concepts of pH and Buffers, Acid -base equilibrium, Osmotic pressure and its physiological applications.
2	CELL & SUB CELLULAR ORGANELLES	Structure & function of Cell & Sub-cellular organelles Biochemical characteristics of living matter, Physiochemical Phenomena & their significance (Osmosis Diffusion, Donnan Membrane equilibrium), Structure organization of plasma membrane & transport system.
3	CARBOHYDRATES:	Definition, Functions, Sources, Classifications, Monosaccharides, Disaccharides, Polysaccharides, Mucopoly saccharides and its importance.
4	LIPIDS:	Definition Functions, Sources, Classifications, Simple lipids, Compound lipids, Derived lipids, Saturated and unsaturated fatty acids. Essential fatty acids & their importance, Blood lipids and their implications, Cholesterol and its importance.
5	PROTEINS:	Definition, Sources, Functions, Classification, Simple protein, Conjugated proteins and derived proteins, Properties and reactions of proteins.
6	NUCLEIC. ACIDS:	Structure and functions of DNA, RNA, Nucleosides, Nucleotide, Genetic code Biologically important Nucleotides.
7	ENZYMES	Classification & Mechanism of action, factors affecting enzyme activity, Enzyme kinetic, Enzyme inhibition, Coenzymes, Allosteric enzymes, Diagnostic significance of enzymes & isoenzymes.
8	VITAMINS:	Classification, Fat soluble vitamins 'A' 'D' 'E' 'K " Water soluble vitamins -B Complex and Vitamin 'C'. Daily requirement, Physiological functions, and diseases of vitamins deficiency.
9	BIOLOGICAL OXIDATION & BIOENERGETICS.	Concepts of free energy change, Exergonic & Endergonic reactions, Biological oxidation, Electron Transport chain, Oxidative phosphorylation, inhibitors & uncouplers of electron transport chain & Oxidative phosphorylation.
10	CARBOHYDRATES METABOLISM	Carbohydrate metabolic pathways such as Glycolysis, Gluconeogenesis, TCA cycle, HMP shunt pathway, Glucuronic acid pathway & Glycogen metabolism with their physiological importance, Interconversion of different sugars, Metabolic integration, Regulation of blood Glucose level, DM.

11	METABOLISM OF LIPIDS & LIPOPROTEINS	Fatty acid oxidation, Fatty acid synthesis, Metabolism of cholesterol~ Ketone bodies, Atherosclerosis and Obesity. liver & lipo tropic factors.
12	PROTEIN METABOLISM	Transamination, Transmethylation, Deamination, Fate of ammonia, Urea synthesis and synthesis of creatinine, Inborn errors of metabolism.
13	WATER AND ELECTROLYTES	Fluid compartments, Daily intake and output, Dehydration, Sodium and Potassium Metabolism.
14	MINERAL METABOLISM	Iron, Calcium, Phosphorous, Trace elements
15	NUTRITION	Nutritional aspects of carbohydrate, fat and protein, Balance diet, Metabolism in exercise and injury, Diet of chronically ill and terminally ill patients.
16	CONNECTIVE TISSUE	Mucopolysaccharides, Connective tissue proteins, formation of collagen, Glycoproteins, Chemistry and Metabolism of bone and teeth, Metabolism of skin.
17	NERVE TISSUE	Composition, Metabolism, Chemical mediators of nerve activities
18	MUSCLE TISSUE	Structure Metabolism of muscles, Muscle contraction
19	ISOTOPES:	Isotopes and their role in diagnosis and treatment of diseases.
20	INVESTIGATIONS	Interpretation of common clinical biochemical investigations. Sugar, Urea, Creatinine, Protein, Bilirubin, Uric acid, Cholesterol.

## **4. Electrotherapy-I**

### **COURSE DESCRIPTION**

In this course the student will learn the principles, technique, and effects of electrotherapy as a therapeutic modality in the restoration of physical function.

### **COURSE OBJECTIVES**

The objective of this course is that after 200 hours of lectures, demonstrations and practical's the student will be able to list the indications and contra indications of various types of electrotherapy, demonstrate the different techniques, and describe their effects.

### **SECTION-I**

#### ***INTRODUCTORY PHYSICS***

**1. Electromagnetic Spectrum:** production and its properties, dual nature, Laws governing radiation, depth of penetration, mode of heat & energy transfer.

#### **2. Electric energy**

- Electricity and its Units.
- Electron theory.
- Static and current electricity.
- Conduction of electricity, Conductors, Insulators, Potential difference & factors affecting it.
- Resistance & Intensity.
- Ohm's Law- Its application to AC & DC currents and uses of Ohm's law in Physiotherapy.
- Polar and Chemical effects of electric currents examples in Physiotherapy.
- Ionization: theory of Ionization, techniques of medical ionization and surgical ionization, uses of ionization in Physiotherapy.
- EMF: Production of an E.M.F. by chemical actions, examples and uses in physiotherapy.
- Joule law & production of heat by Joule's law its implication in Physiotherapy.
- Electrical supply in Physiotherapy Department:
  - a) Brief outline of main supply of electric current.
  - b) Precautions - safety devices, earthing, fuses etc.
- Dangers of DC/AC:
  - a) Short circuits, electric shocks. safety, precautions and First aid & initial management of electric shocks.
  - b) Electrical and chemical burns their prevention & management.

#### **3. Magnetism:**

- Definition.
- Properties of Magnates.
- Magnetic effects.
- Molecular theory of Magnetism.



- Magnetic fields & magnetic forces.
- Magnetic effects of an electric field.
- Electromagnetic induction and its uses in Physiotherapy department.

## **SECTION-II**

### **Devices**

#### **1. Condensers:**

- Types
- Construction and working principles.
- Uses in Physiotherapy department.

#### **2. Milliammeter:**

- Construction.
- Working.
- Uses in physiotherapy.

#### **3. Voltmeter:**

- Construction.
- Working and uses in physiotherapy.

#### **4. Transformer**

- Definition.
- Types.
- Principle.
- Construction.
- Eddy current.
- Working.
- Uses in Physiotherapy.

#### **5. Chokes:**

- Principle.
- Construction and working.
- Uses in Physiotherapy.

#### **6. Electric valves or thermionic valves:**

- Types: Diode, Triode, Double anode diode.
- Principle of thermionic valves.
- Construction and working of different valves and their uses in Physiotherapy.

#### **7. Metal oxide rectifier:**

- Definition.
- Construction.
- Working.
- Uses in physiotherapy.

**8. Display devices & indicators used in Physiotherapy- analogue & digital.**

**9. Potentiometer:** Construction and working principles.

**10. Fuse:** Construction, working and application in Physiotherapy department.

**Section -III**

1. Review of neuro muscular physiology including effects of the body.
2. Physiological responses to heat gain or loss on various tissues of the body
3. Physical principles of electro - magnetic radiation.
4. Physics of sound including characteristics and propagation.

**SECTION –IV**

**Superficial heat**

1. Define heat and temperature (in brief).
2. Physical effects of heat- (in brief).
3. Sources of therapeutic heating and its physiological effects.
4. Paraffin wax bath: composition, Physiological & therapeutical effects, methods of applications, mode of heat transfer, depth of penetration, indications, Contraindications, precautions, operational skills of equipment & patient preparation.
5. Moist heat: types of moist heat therapy, Physiological & therapeutical effects, methods of applications, mode of heat transfer, depth of penetration, indications, Contraindications, precautions, operational skills of equipment & patient preparation.
6. Electrical heating pads & Fluidotherapy: components, application methods, Physiological & therapeutical effects, precautions, operational skills of equipment & patient preparation.

**SECTION -V**

1. Therapeutic cold (cryotherapy) source, biophysical effects types therapeutic effects, indications contraindications precaution application techniques and patient preparation.
2. Therapeutic mechanical pressure (Intermittent compression therapy)-principal, biophysical Effects, types therapeutic effects indications contraindication precautions operational Skill and patient preparation.

**Electrotherapy -I (Practical)**

1. To study the basic operation of electric supply to the equipment & safety devices.
2. To experience sensory and motor stimulation of nerves and muscles by various types of low frequency current on self.
3. To locate and stimulate different motor points region wise, including the upper & lower limbs and face.

4. Therapeutic application of different low frequency currents faradic foot bath, faradism under pressure, faradism under tension, iontophoresis.
5. To study the reactions of degeneration of nerves, to plot strength duration curves.
6. To find chronaxie and Rheobase.
7. To study a hydro collator unit, its operating and therapeutic application of Hot packs region wise.
8. To study a paraffin wax bath unit, its operation and different methods of application - region wise
9. To study a TENS Stimulator, its operation and application -region wise.
10. To study various forms of therapeutic cold application region wise include ice cold pack Vapor coolant sprays, etc.
11. To study intermittent pneumatic therapy unit, its operation and different methods of Application-region wise.

## 5. EXERCISE THERAPY-I

### **COURSE DESCRIPTION:**

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

### **COURSE OBJECTIVES**

The objective of this course is that after 200 Hrs. of lectures, demonstrations, practical's and clinics the student will be able to list the Indications and contraindications of various types of exercise therapy, demonstrate the different techniques and describe their effects.

### SECTION –I

#### **A. Basic MECHANICS**

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

- a. Force: Composition of force, parallelogram of forces.
- b. Equilibrium: Stable, unstable, neutral.
- c. Gravity: Center of gravity, line of gravity.
- d. Levers: 1<sup>st</sup> order, 2<sup>nd</sup> order, 3<sup>rd</sup> order, their examples in the human body and their practical applications in physiotherapy, forces applied to the body levers.
- e. Pulleys: Fixes, movable.
- f. Springs: Series, parallel.
- g. Tension.
- h. Elasticity: Hook's law.
- i. Axis: sagittal, frontal, transverse, vertical.
- j. Planes: Sagittal, frontal, horizontal.
- k. Definition of speed, velocity, work, energy, power, acceleration, momentum, friction and Inertia.

#### **B. Introduction**

1. Introduction to exercise therapy, principles, technique and general areas of its application, assessment & its importance.
2. Description of fundamental starting position and derived position including joint positions, muscle work, stability, effects and uses.
3. Introduction to movements including analysis of joint motion, muscle work and Neuro muscular co-ordination.
4. Classification of movements - Describe the types, technique of application, indication, contraindications,

effects and uses of the following:

- a) Active movement.
- b) Passive movement.
- c) Active assisted movement.
- d) Resisted movement.

### **C. Suspension Therapy**

To study the principles, techniques of application, indication, contraindication, precaution, effects and uses of suspension therapy.

### **D. PELVIC TILT**

Describe the following:

- a. Normal pelvic tilt, alteration from normal, anterior tilt (forward), posterior tilt (backward), lateral tilt.
- b. Muscles responsible for alteration and pelvic rotation.
- c. Identification of normal pelvic tilt, pelvic rotation and altered tilt and their corrective measures.

## **SECTION -II**

### **Manual Muscle Testing:**

- a) Principles and application techniques of manual muscle testing.
- b) Testing position, procedure and grading of muscles of the upper limb, lower limb and trunk etc.

### **SECTION -III**

#### **Goniometry and its types:**

- a) Principle techniques and application of Goniometry.
- b) Testing position, procedure and measurement of R.O.M. of the joints of upper limbs, lower limbs and trunk.

## **SECTION -IV**

### **Soft Tissue Manipulation (Therapeutic massage)**

- a) History, various types of soft tissue manipulation techniques.
- b) Physiological effects of soft tissue manipulation on the following systems of the body circulatory, Nervous, Musculoskeletal, Excretory, Respiratory & Integumentary system and metabolism.
- c) Classify, define and describe:-effleurage, stroking, kneading, Petrissage, deep friction, vibration and shaking etc.

d) Preparation of patient: effects, uses, indication and contraindications of the above manipulation.

## **SECTION - V**

### **A. Relaxation**

1. Describe relaxation, muscle fatigue, muscle spasm and tension (mental & physical).
2. Factors contributing to fatigue & tension.
3. Techniques of relaxation (local and general).
4. Effects, uses & clinical application.
5. Indication and contraindication.

### **B. Therapeutic Gymnasium**

- i) Setup of gymnasium & its importance.
- ii) Various equipment in the gymnasium.
- iii) Operation skills, effects & uses of each equipment.

#### **Practical:**

- 1) To practice all the soft tissue manipulative technique region wise - upper limb, lower limb, neck, back and face.
- 2) To practice to measurement of ROM of joints- upper limb, lower limb. and trunk. .
- 3) To practice the grading of muscle strength region wise- upper limb, lower limb and trunk
- 4) To study -the position of joints, muscle work and stability of various fundamental and derived positions.
- 5) To study the different types of muscle contraction, muscle work, group action of muscles and co-coordinated movements.
- 6) To practice the various type of suspension therapy and its application on various parts of body - region wise.
- 7) To study & practice local and general relaxation techniques.
- 8) To study the structure & function along with application of various equipment in gymnasium.

## 6. ENVIROMENTAL STUDIES

### Unit 1

#### Introduction to Environmental Studies

- Multidisciplinary nature of Environmental Studies;
- Scope and importance; Concept of sustainability and sustainable development. (2 lectures)

### Unit 2

#### Ecosystems

- What is ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems:
  - a) Forest ecosystem
  - b) Grassland ecosystem
  - c) Desert ecosystem
  - d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) (6 lectures)

### Unit 3

#### Natural Resources: Renewable and Non-renewable resources

- Land resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations.
- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international and inter-state).
- Energy Resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies. (8 lectures)

### Unit 4

#### Biodiversity and Conservation

- Levels of biological diversity: Genetic, species and ecosystem diversity, Biogeographical zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India.
- Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value. (8 lectures)

### Unit 5

#### Environmental Pollution

- Environmental Pollution: types, causes, effects and controls; Air, water, soil and noise pollution.
- Nuclear hazards and human health risks.
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies. **(8 lectures)**

### Unit 6

#### Environmental Policies and Practices

- Climate change, global warming, ozone layer depletion, and acid rain and impacts on human communities and agriculture.
- Environmental Laws, Environmental Protection Act, Air (prevention and Control of Pollution) Act; Water (prevention and Control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; International Agreements: Montreal and Kyoto protocols and Convention on Biological Diversity (CBD).
- Nature Reserves, tribal populations and rights, and human wildlife conflicts in Indian context. **(7 lectures)**

### Unit 7

#### Human Communities and the Environment

- Human population growth: Impacts on environment, human health and welfare.
- Resettlement and rehabilitation of project affected areas; case studies.
- Disaster management: floods, earthquake, cyclones and landslides.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental Ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

**(6 lectures)**

#### Unit 8: Field Work

- Visit to an area to document environmental assets: river/forest/flora/fauna, etc.
- Visit to a local polluted site- Urban/ rural/ Industrial/Agricultural.
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems- pond, river, Delhi Ridge, etc. **(Equal to 5 lectures)**

The Environment course of 50 lectures will be conducted in the second semester and the examination shall be conducted at the end of the second semester.

Credit System: The course will be awarded 4 credits.

Exam Pattern: In case of awarding the marks, the question paper should carry 100 marks. The structure of the question paper being:

Part-A, Short answer pattern - 25 marks

Part-B, Essay type with inbuilt choice - 50 marks

Part-C, Field Work - 25 marks



## **SECOND YEAR B.PHYSIOTHERAPY**

### **1.PATHOLOGY AND MIRC BIOLOGY**

#### **PATHOLOGY**

##### **Course Objective:**

At the end of the course, the student will be able to

- i. Acquire the knowledge of concepts of cell injury and changes Produced thereby in different tissues and organs; Capacity of the body in healing Process.
- ii. Recall the Etio-pathological effects and the Clinico-pathological Correlation of common infection and non-infectious diseases.
- iii. Acquire the knowledge of concepts of Neoplasia with reference to the Etiology, gross and microscopic features diagnosis and prognosis in different tissues and organs of the body.
- iv. Correlate normal and altered morphology of different organ systems in different diseases needed for understanding disease process and their clinical significance (with special emphasis on neuro-musculoskeletal and cardio-respiratory system).
- v. Acquire knowledge of common immunological disorders and their resultant effects on the human body.
- vi. Understand in brief, about the Hematological diseases and their resultant effects on the human body.

##### **COURSE DESCRIPTION**

This course follows the basic follows the basic courses in anatomy and physiology, and compliments the course in general medicine and surgery being taught concurrently. Particular effort is made in this course to avoid burdening the student with any detail pertaining to diagnosis which will not contribute to their understanding of the limitations imposed by pathology on the functioning of the individual.

##### **1. General Pathology:**

- a. Cell injury- causes, mechanisms with special reference to Physical, Chemical and toxic injury and ionizing radiation.
- b. Reversible cell injury (degenerations)-types, morphology-cellular swelling, fatty change.
- C. Intracellular accumulations -hyaline change and mucoid change.
- D. Irreversible cell injury, types of necrosis, apoptosis, Gangrene: types and etiopathogenesis,
- E. Pathological calcification-dystrophic and metastasis, pathogenesis and morphology
- F. Extra- cellular accumulation-amyloidosis.
- G. Pigments and pigmentations,

##### **2. Inflammation & Repair**

- a. Acute inflammations features; causes, vascular & cellular events, morphologic variations.
- b. Inflammatory cell & mediators,
- c. Chronic inflammation:- causes, types, non-specific & granulomatous with examples.
- d. Wound healing by primary & secondary intention factors promoting & delaying healing process, healing at various sites including bones, nerve & muscle.
- e. Regeneration & repair.

##### **3. Immuno-Pathology- (Basic concepts)**

- a) Immune system: - organization, cell- Antibodies- Regulations of immune responses.
- b) Hyper-sensitivity.
- c) Secondary immune deficiency including HIV.
- d) Organ transplantation.

#### 4. Circulatory disturbances

- a. Edema- pathogenesis, Types, transudate, exudates.
- b. Chronic venous congestion- lung, liver and spleen.
- c. Thrombosis- formation fate and effects.
- d. Embolism- types clinical effects
- e. Infarction- types, common sites.
- f. Shocks- Pathogenesis, Types, morphologic changes.

#### 5. Growth Disturbance

- a. Atrophy- malformation, agenesis, dysplasia.
- b. Neoplasia- classification, histogenesis, biologic behavior, differences between benign & malignant tumors.
- c. Malignant neoplasm- grades, stages, local invasion & distal spread.
- d. Carcinogenesis- environmental carcinogenesis
  - i) Chemical, viruses, radiations.
  - ii) Physical.
  - iii) occupational,
  - iv) Heredity and miscellaneous factors.
- e. Precancerous lesions & carcinoma in situ.
- f. Tumor & host interactions- systemic effects- metastasis or spread of tumors especially affecting bones, spinal cord leading to paraplegia etc.

#### 6. Diseases of Blood.

- a) Red cell disorders, anemia, polycythemia.
- b) Non-Neoplastic disorders and neoplastic proliferation of white cell.
- c) Bleeding Disorders: - DIC, Thrombocytopenia, coagulation Disorders.

#### 7. Topics in Special Pathology: -

- a. Cardio Vascular system:** - Atherosclerosis, Ischemic heart disease- (Myocardial infarctions) – Pathogenesis, pathology, hypertension, congestive cardiac Failure, Rheumatic heart diseases and Peripheral vascular diseases.
- b. Respiratory System:** - COPD, pneumonia (lobar, broncho & viral), Tuberculosis: - primary and secondary, morphologic types, pleuritis, Complications, lung collapses & atelectasis.
- c. Neuropathology:-** reaction of nervous tissue to injury infection- & Ischemia pyogenic tuberculous and viral meningitis, cerebro-vascular diseases, Atherosclerosis, thrombosis, embolism, aneurysm, hypoxia infarction & hemorrhage, effects of Hypotension on CNS, Coma, polio myelitis, leprosy, demyelination diseases, parkinsonism, Cerebral palsy, metachromatic, leucodystrophy, dementia, Hemiplegia and paraplegia, pathogenesis & pathology of Wilson's disease, space occupying lesions

(in brief), peripheral nerve injury.

**b. Muscle diseases:** - muscular dystrophy, hypertrophy, pseudo hypertrophy, atrophy, poliomyelitis, myositis, ossificans, necrosis , regeneration, myotonia.

**c. Neuro-muscular junction:** - myasthenia gravis, myasthenic syndromes.

**d. Bone & joints:-** Fracture healing, osteomyelitis, rickets, osteomalacia, bone tumors, osteoporosis, spondylosis, PID, hemarthrosis, gout, T.B. Arthritis, degenerative and inflammatory Arthritis, rheumatoid arthritis, Ankylosis spondylitis, tenosynovitis.

**e. Urinary:-** Commonly encountered in paralytic bladder, common urinary tract, infections (brief), urinary calculi.

**f. Gastrointestinal system:-** Gastric duodenal ulcer, enteric fever, tuberculosis enteritis, gastritis (related to consumption of NSAID)

**g. Endocrine:-** Hyperthyroidism, diabetes.

**h. Hepatic diseases:-** Cirrhosis and emphasis on systemic effects of portal hypertension.

**i. Skin:-** melanin pigment disorders, vitiligo, psoriasis, bacterial infection, fungal infections, cutaneous tuberculosis, scleroderma, SLE, leprosy, alopecia.

**8. Clinical pathology:-** (Including demonstrations)

Anemias, total leucocyte count, differential leucocyte count, eosinophilia, ESR, C P K, Muscle skin & nerve biopsy, Microscopic appearance of muscle necrosis & fatty infiltrations, Laboratory Investigation in liver &renal failure.

**9. Brief Medical Genetics**

**10. Deficiency disorders of Vitamin A, B, C and D.**

## **MICROBIOLOGY**

### **Objectives:**

Only brief descriptions of the following topics are necessary so that the student get a general idea of the fundamental aspects of the topics elaborate descriptions are to be avoided)

### **General Bacteriology**

<b>Sr. No. Topic of lecture</b>	<b>Contents</b>
1. Introductions and background	importance of medical microbiology in diagnosis & prevention of infectious diseases. Contributions of Antony van leeuwenhock, Louis Pasteur, Robert koch, Fleming, Jenner etc.
2. Definition	a) Medical microbiology which includes the Bacteriology, Virology, Mycology, Parasitology and Immunology, infection, pathogen, common salsymbiosis, Host vector, contagious disease, infections disease, Epidemic, endemic, pandemic & Zoonosis, normal flora of the human body. b) Source, mode of infection, route of infection and endogenous and exogenous infections, reservoirs of infection.
3. Morphology of Bacteria	Bacterial cell, morphological classifications, method of studying of bacteria, staining methods and their principles especially gram and ziehl nelson staining, their importance in presumptive diagnosis.
4. Physiology of bacteria	Nutritional requirements, growth curve, culture media:-definition, classifications and application.
5. Identification of bacteria	Specimen collection, transportation and processing of specimens for microbiology, diagnosis which include smear examination culture methods, biochemical reactions, serological tests and animal pathogenicity.
6. Sterilization and disinfection	Definition of sterilization disinfection asepsis antisepsis, discussion of physical methods of sterilization which includes principles and their application details On working and efficacy testing of autoclave hot air oven inspissator and koch' s steamer modes of action of chemical

### **Systemic bacteriology**

Sr. No. Topic of Lecture	Contents
1. Gram positive cocci	Staphylococcus / Streptococcus/ Pneumococcus: morphology, pathogenesis, laboratory diagnosis.
2. Gram negative cocci -	Neisseria-morphology, pathogenesis laboratory diagnosis
3. Gram positive bacilli	-C. diphtheria:- Morphology, pathogenesis, laboratory diagnosis, treatment, prevention and control. -Mycobacterium tuberculosis: Classification, morphology, growth on L.J medium, Pathogenesis, laboratory diagnosis, briefly mention National T.B control Programme. - Atypical mycobacterium: Pathogenesis, laboratory diagnosis of HIV and Mycobacterium. - M. Leprae: classification morphology pathogenesis, laboratory diagnosis.
4. C I. welchii, C.I. Tetani	Classification, morphology, pathogenesis, laboratory diagnosis, prevention and control
5. Entero bacteriaeae (briefly mention about E coli Klebsiella, proteus and shigella)	General characters classification,
6. Salmonella control.	Morphology, pathogenesis, laboratory diagnosis, prevention and
7. Vibrio	Morphology pathogenesis, laboratory diagnosis of V. cholera
8. Spirochaetes	Morphology, pathogenesis, laboratory diagnosis, T. pallidum, Bacteriology of Air, mention briefly Water, milk and food

### Mycology

Sr. No. Topic of lecture	Contents
1. General mycology	Characterization of fungi, morphological and clinical classification of fungi
2. Superficial mycosis	mention briefly.
3. Subcutaneous mycosis diagnosis.	Mycetoma- pathogenesis and lab
4. Systemic mycosis-	Candida Cryptococcus- morphology pathogenesis lab diagnosis with cultural characteristic

5. Opportunistic fungal Aspergillosis Infection

### **Virology**

<b>Sr. No. Topic of lecture</b>	<b>Contents</b>
1. General virology	morphology, multiplication, classification of viruses, bacteriophage. Laboratory diagnosis of viral infections collection of Samples Transport Cultivation and method of diagnosis:
2. Herpes virus	Morphology, classification & pathogenesis.
3. Hepatitis viruses	Hepatitis-B, C: Morphology, laboratory diagnosis, prophylaxis in detail, (Mention briefly about the other hepatitis viruses)
4. Picorna viruses (Polio virus)	morphology pathogenesis clinical feature Immuno prophylaxis (Polio virus)
5. Paramyxo viruses	Important feature of measles in relation to physiotherapy (SSPE)
6. HIV/AIDS,	Morphology, pathogenesis, lab diagnosis, universal precautions, specific precaution and Prophylaxis for Retroviruses

### **Parasitology**

<b>Sr. No. Topic of Lecture</b>	<b>Contents</b>
1. Introduction to parasitology	Parasite: - their nature, classification, explanation of Terminology, emerging parasitic infections.
2. Malaria	Malaria parasites:- Morphology, life cycle, pathogenesis, laboratory diagnosis.
3. Miscellaneous	mention briefly about toxoplasma, pathogenic protozoa
4. Cestodes	Taenia saginata and solium Echinococcus granulosus: life cycle, morphology, pathogenesis, laboratory diagnosis,
5. Tissue nematodes	morphology, life cycle, pathogenesis, laboratory diagnosis, briefly mention about T. Spiralis.

## **Immunology**

<b>Sr. No. Topic of lecture</b>	<b>Contents</b>
1. Introduction -	Definition of immunity, types of immunity, factors influencing mechanism of innate immunity, active and passive immunity, local immunity and herd immunity.
2. Antigens	Definition, types, antigen, determinants properties of antigen
3: Antibodies	Definition, nature, structure, classes, physical and biological properties of immunoglobulin.
4. Serological Reactions	Definition of titer sensitivity and specificity, mention about principles types and application of Precipitation gel, diffusion glutination, complement Fixation, ELISA, RIA, immune, fluorescence, neutralization And opsonization.
5.Lymph	Structure of primary and secondary lymphoid organs, Function of immune system, mention about cells of immune system, lymphocytes, T-cells, null cells, antigen presenting cells (APC).
6. Immune response	Humeral CMI
7. Complement.	Definition components biological functions.
8. Hypersensitivity	Definition, classification, difference between immediate and delayed reactions, mechanism and manifestation of anaphylaxis, types and tests for anaphylaxis.
9. Vaccination	National immunization programme. nature of vaccines rationale and dosage.

## **Applied Microbiology**

1. Upper respiratory tract infections (sore throat) and their laboratory diagnosis.
2. Lower respiratory tract infections and their laboratory diagnosis.
3. Infection of central nervous system and their laboratory diagnosis
4. Wound infection and pyogenic infections
5. Bone and joint infections and their laboratory diagnosis.
6. Hospital infections role of laboratory in cross infections control policies.

## 2. PHARMACOLOGY

### **GENERAL PHARMACOLOGY:**

1. Definition division of pharmacology, dosage, forms, drug nomenclature.
2. Routes of administration, advantages & disadvantages of commonly used routes of administration.
3. Factors affecting dose of a drug, bioavailability and other important pharmacokinetic parameters.
4. Various mechanism of action of a drug.
5. Adverse drug reaction include drug.
6. Adverse drug reaction including drug allergy idiosyncrasy.
7. Drug interactions synergism antagonism etc.

### **Autonomic Nervous system:**

1. Sympathomimetic drug, therapeutic uses of adrenaline etc.
2. Beta adrenergic blockers & alpha adrenergic blockers.
3. Parasympathomimetic drug, their therapeutic uses and uses and adverse effects and treatment of myasthenia gravis.
4. Atropine, Atropine substitute & *treatment* of organ phosphorus poisoning.

### **PERIPHERAL NERVOUS SYSTEM & AUTOCOCIDS:**

1. Skeletal muscle relaxants.
2. Centrally acting muscle relaxants.
3. Local anesthetics.
4. Anti histaminic (HI blockers).

### **Central nervous system:**

1. Pre Anesthetic medication & G.A. and steps of anesthesia.
2. Analgesics – NASID's Opioids.etc.
3. Anti - Parkinsonian drug & *Treatment of* neurodegenerative disorders.
4. Sedative & hypnotics & *Treatment of* Insomnia.
5. Antiepileptic drug & *Treatment of* epileptics.
6. Ethyl alcohol drug of addiction *treatment of* Methyl alcohol poisoning
7. Drug used in common psychiatric disorders.

### **ENDOCRINES:**

1. Antidiabetes drug *Treatment of* Diabetes mellitus & Diabetic ketoacidosis.
2. Glucocorticoids.
3. Anabolic steroids.
4. Ca++Metabolism, *Treatment of* osteoporosis etc.

### **GIT:**

1. Laxative & purgative and *treatment of* constipation.
2. Anti diarrhoeal drugs & *treatment of* diarrhoea.
3. Drug for gastric and peptic ulcer.
4. Antiemetics & misc. Drugs digestants etc.



**CHEMOTHERAPY:**

1. Penicillin's & Sulphonamides.
2. Broad spectrum Antibiotics.
3. Aminoglycosides & *Treatment of* urinary tract infection.
4. Macrolides & Misc. AMA.
5. Quinolones.
6. Anti TB, HIV, AIDS drugs & Treatment of AIDS.
7. Anti leprosy drug & *treatment of* anaerobic infections.
8. Anti cancer drugs.
9. *Treatment of* amoebiasis, helminthic infection.
10. Antifungal druges.
11. Anti septics & disinfectants.

**CVS & BLOOD:**

1. Anti hypertensive & *Treatment of* hypertension etc.
2. Antianginal druge & *Treatment of* MI.
3. Drugs used in shock, *Treatment of* anaphylactic shock and Hemorrhagic shock etc.
4. Iron - deficiency anaemia and other anaemias.

**MISC. TOPIC**

1. Drug acting on skin e.g. Lotions liniments ointments.
2. Vitamin deficiency.
3. Heavy metal antagonists & general principles of *treatment of* poisoning.
4. Immuno stimulants and Immunosuppressant.
5. Antitussives & Bronchial asthma drugs.
6. Drugs banned in sports & Athletes.
7. Vaccines & sera, Immunization schedule.

### **3. Electrotherapy-II**

#### **Section -I**

1. High frequency currents (SWD and MWD)-production, biophysical effects, types, Therapeutic effects, techniques of application, indication, contraindications, precautions, Operational skills and patient preparation, dosiometry, prescription writing of SWD & MWD.
2. Medium frequency currents (interferential therapy)- conceptual framework of medium frequency current therapy, production, biophysical effects, types, therapeutic effects, Techniques of application, indication, contraindication, precautions, operational skill and patient preparation, prescription writing for IFT.
3. High frequency sound waves (ultrasound)-production, biophysical effects, types, Therapeutic effects, techniques of application, indication, contraindications, precautions, operational skill and patient preparation, Dosiometry, prescription writing for therapeutical Ultra sound.

#### **Section -II**

1. Electro- diagnosis - Instrumentation, definition & basic techniques of E.M.G. and. NCV.
2. Bio- feedback - Instrumentation, principles, therapeutic effects, indications, contraindication, limitations, precautions, operational skill and patient preparation.

#### **Section -III**

#### **ACTINOTHERAPY**

##### **I) Infra red rays**

Wavelength, frequency, types & sources of IRR generation, techniques of irradiation, physiological and therapeutic effects, indications, contraindications, depth of penetration, precautions, operational skills of equipments and patient preparation.

##### **II) Ultra violet rays (UVR)**

Wavelength, frequency, types & sources of IRR generation, techniques of irradiation, depth Of penetration , physiological and therapeutic effects, indications, contraindications, precautions,

operational skills of equipments and patient preparation, dosimetry of UVR.

### **III) LASER**

Therapeutic Light physiotherapy (LASER), Definition, historical background, physical principles, biophysical effects, types, production, physiological Effects, therapeutic effects, techniques of application, Indications, contraindications, precautions, operational skill and patient preparation, dosimetry & prescription writing of LASER.

### **SECTION –IV**

#### **Direct currents &Low Frequency**

1. Introduction of direct, alternating & modified currents.
2. Production of direct current -: Physiological and therapeutic effects of constant current, anodal and cathodal, Galvanism, Ionization and their application in various conditions.
3. Iontophoresis –Physical principles, principles of clinical application, different ions and their physiological and therapeutical effects indication, contraindication, precaution, operational skill of equipment and patient preparation.
4. Modified direct current – types of modifications of direct current, Production of interrupted and surged current, various pulses, duration and frequency and their specific effects on nerve and muscle tissue.
5. Modified direct current - Physiological and therapeutic effects, of different variations of modified current principles of clinical application, indications, contra indications, precautions, operational skill of equipment & patient preparation. Stimulations of different muscles and nerves.
6. Faradic Current: wave form, production, physiological and therapeutical effects of classical faradic current.
7. Faradism under pressure.
8. Faradism under tension.

#### **9. Transcutaneous Electrical Nerve Stimulations (TENS):-**

- a. Type of low frequency, pulse widths, frequencies & intensities used as TENS application.
- b. Theories of pain relief by TENS.
- c. Types of TENS and respective physiological and therapeutical effects, indications.
- d. Principle of clinical application effects & uses, indications, contraindications, precautions, operational skills of equipment & patient preparation.

### **SECTION –V**

#### **Electrical Reactions and Electro - diagnostic tests: by Electric stimulator**

- a) Electrical stimuli and normal behavior of nerve and Muscle tissue.
- b) Type of lesion and development of reaction of degeneration.

- c) Difference between Faradic – long duration Intermittent direct current response
- d) S.D. Curve and its application.
- e) Chronaxie, Rheobase & Pulse ratio.

### **Electrotherapy-II (Practical)**

1. To study a short wave diathermy unit, its operation and different methods of application-region wise.
2. To study a microwave diathermy unit its operation and different methods of application region Wise.
3. To study an ultrasound unit its operational and different methods of application-region wise.
4. To study a Interferential therapy unit its operation and different methods of application region wise
5. To observe various electro- myography (EMG) procedures.
6. To observe various electro - neurography (ENG/ NCV) Procedures.
7. To study a bio feedback unit, its operation and different methods of application-region wise.
8. To study LASER unit its operation and different methods of application region wise.
9. To study the different types of Ultra violet units, their operation, and assessment of test dose and application of U.V.R. - region wise.
10. To study the various types of Infrared lamps and their application to body region wise.

## **4. Exercise therapy – II**

### **Section- I**

#### **Therapeutic exercises.**

1. Principal classification techniques physiological & therapeutic effects indications & contraindications of therapeutic exercises.
2. Assessment & evaluation of a patient (region wise) to plan a therapeutic exercise program.
3. Joint mobility etiogenesis of joint stiffness general techniques of mobilization, effects, indications, contraindication & precautions.
4. Muscle insufficiency -etiogenesis of muscle insufficiency (strength *tone* power, endurance & volume), general techniques of strengthening effects indication, contraindications & precautions.
5. Neuromuscular inco-ordination-review normal neuromuscular coordination, etiogenesis of neuromuscular in co-ordination & general therapeutic techniques effects indications, Contraindication & precautions.
6. Functional re-education- general therapeutic techniques *to* re-educate ADL function.

### **Section -II**

#### **Posture balance gait:**

1. Normal posture-overview of the mechanism of normal posture.
2. Abnormal posture -assessment types aetiogenesis management including therapeutic Exercise.
3. Static and dynamic balance- assessment & management including therapeutic exercise.
4. Gait-overview of normal gait & its components.
5. Gait-deviations-assessment, types, aetiogenesis, management including therapeutic exercise.
6. Types of walking aid indications effects & various training techniques.

### **Section -III**

#### **Hydrotherapy:**

1. Basic principles of fluid mechanic as they relate to hydrotherapy.
2. Physiological & therapeutic effects of hydrotherapy including joint mobility, muscle strengthening &

wound care etc

3. Types of hydrotherapy equipment, indications, contraindications, operations skill & patient preparation.

#### **SECTION- IV**

##### **Motor learning.**

- i) Introduction to motor learning
  - a) Classification of motor skills.
  - b) Measurement of motor performance.
- ii) Introduction of motor control
  - a) Theories of motor control.
  - b) Application.
- iii) Learning Environment
  - a) Learning of skill.
  - b) Instruction & augmented feedback.
  - c) Practice condition.

#### **Section-V**

##### **Special techniques:**

1. Introduction to special mobilization & manipulation techniques effects indication & contraindications.
2. Conceptual framework, principle of proprioceptive neuromuscular facilitation (PNF) techniques including indication therapeutic effects and precautions.
3. Principles of traction physiological & therapeutic effects classification types indications contraindications techniques of application operational skill & precautions.
4. Review normal breathing mechanism, types, techniques, indication, contraindications, Therapeutic effects & precautions of breathing exercise.
5. Group theory –types, advantages & disadvantages.
6. Exercise for the normal person -importance and effects of exercise to maintain optimal health & its role in the prevention of diseases Types advantages, disadvantages, indications, contraindications &

precautions for all age group.

7. Introduction to yoga - conceptual framework various asanas the body mind relationship effects & precautions.

### **Exercise therapy -II (practical)**

#### **Maximum Marks: 80**

1. To practice assessment & evaluative procedures including motor, sensory, neuromotor, co-ordination, vital capacity, limb length & higher functions.
2. To study & practice the various techniques of progressive strengthening exercise of muscles
3. To study & practice the various techniques of progressive strengthening exercise of muscles region wise.
4. To study & practice the use of various ambulation aids in gait training.
5. To assess & evaluate ADL's and practice various training techniques.
6. To study practice mat exercise.
7. To assess & evaluate normal & abnormal posture & practice various corrective techniques.
8. To assess & evaluate equilibrium balance & practice various techniques to improve balance.
9. To study the structure & functions of hydrotherapy equipment & their application.
10. To study & practice various traction techniques including manual mechanical & electrical procedures.
11. To study & practice various group exercise therapies.
12. To practice & experience effects of basic yoga asanas.
13. To study plan & practice exercise programs for normal person of various age group.

## 5. Biomechanics

### COURSE DESCRIPTION

This Course Supplements the Knowledge of anatomy and enables the student to have a better understanding of the principles of biomechanics and their application in musculoskeletal and dysfunction.

#### Course objective

The objective of this course is that after 120 hours of lectures, demonstration practical and clinical the student will be able to demonstrate an understanding of the principles of biomechanics and kinesiology and their application in health and disease.

In addition, the student will be able to fulfill with 75% accuracy (as measured by written Oral & practical internal evaluation) the following objective of the course.

### COURSE OUTLINE:

#### A. MECHANICS

1. Describe Types of Motion planes of motion direction of motion and quantity of motion.
2. Define forces force vectors components of forces.
3. Describe gravity segmental centers of gravity centers of gravity line of gravity of the human body stability and centers of gravity relocation of the centers of gravity.
4. Describe reaction forces Newton law of reaction.
5. Describe equilibrium - law of inertia and establishing equilibrium of an object.
6. Describe objects in motion law of acceleration joint distraction in a linear *force* system and force of friction.
7. Describe concurrent *force* system: composition of forces muscle action lines total muscle force vector divergent muscle pulls anatomic pulleys.
8. Describe parallel force systems: First class levers second class levers- Third class levers - Torque-Mechanical Advantage.
9. Define moment arm. Moment arm of a muscle force. Moment arm of gravity and Anatomic pulleys.
10. Describe equilibrium of a lever.

### DESCRIBE THE FOLLOWING:

- a) Three types of motion.
- b) The plane in which a given joint motion occurs, and the axis around which the motion occurs.
- c) The location of the center of gravity of a solid object, the location of the center of gravity of the human body.
- d) The action line of single muscle.
- e) The name, point of application direction, and magnitude of any inter force, given its reaction force.
- f) A liner force system, a concurrent force system, a parallel force system.
- g) The relationship between torque, moment arm and rotator force component.



- h) The methods of determining torque for the same given set of forces.
- i) How anatomic pulleys may change action line, moment arm, and torque passing through them.
- j) In general terms, the point in the joint range of motion at which a muscle acting over the joint is bio mechanically most efficient.
- k) How external forces can be manipulated to maximize torque.
- l) Friction, its relationship to contacting surfaces and to the applied forces.

**DETERMINE THE FOLLOWING:**

- 1. The identity (name) of diagrammed forces on an object.
- 2. The new center of gravity of an object when segments are rearranged, give the original centers of gravity.
- 3. The resultant vector in a linear force system, concurrent force system, and Parallel force system.
- 4. If a given object is in linear and rotational equilibrium.
- 5. The magnitude and direction of acceleration of an object not in equilibrium.
- 6. Which forces are joint distraction force and which are joint compression forces what are the equilibrium force for each.
- 7. The magnitude and direction of friction in a given problem.
- 8. The class of term in a given problem.

**COMPARE THE FOLLOWING:**

- 1. Mechanical advantage in second and third class level.
- 2. Work done by muscle in a second and third class level.
- 3. Stability of an object in two given situations in which location of the center of gravity and the base of support of the object.

**DRAW THE FOLLOWING**

- 1. The action line of muscle.
- 2. The rotary force component, the translatory force component and the moment arm for a given force on a lever.

**B. JOINT STRUCTURE AND FUNCTION.**

- 1. Describe the basic principles of joint design and a human joint.
- 2. Describe the tissue present in human joints: including dense fibrous tissue, bone, cartilage and connective tissue.
- 3. Classify joints – synarthrosis, Amphiarthrosis, Diarthrosis, classification of synovial joints.
- 4. Describe joint function, kinematics chains, range of motion.
- 5. Describe the general effects of injury and disease.

**RECALL THE FOLLOWING.**

- 1. The elementary principles of joint design.

2. The three main classifications of joints.
3. The five features common to all diarthrodial joints.
4. Types of materials used in human joint construction.
5. Properties of connective tissue.

**IDENTIFY THE FOLLOWING.**

1. The axis of motion for any given motion at a specific joint (Knee, Hip, metacarpophalangeal).
2. The plane of motion for any given motion at a specific joint, shoulder, interphalangeal, wrist.
3. The degree of freedom at any given joint.
4. The distinguishing features of a diarthrodial joint.
5. The structure that contributes to joint stability.

**COMPARE THE FOLLOWING.**

1. A synarthrosis with a amphiarthrosis on the basis of methods, materials and function.
2. A synarthrosis with a diarthrosis on the basis of methods, materials and function.
3. Closed kinematics chain with an open kinematics chain
4. Dense fibrous tissue with bone.
5. Hyaline cartilage with fibrocartilage.

**C. MUSCLE STRUCTURE AND FUNCTION.**

1. Describe mobility and stability functions of muscles.
2. Describe elements of muscle structure Composition of a muscle fiber, the motor unit, types of muscle fibers, muscle fiber size, arrangement and number, Muscle tension, length- tendon relationship.
3. Describe types of muscle contraction, speed and angular velocity. Applied load, voluntary control, Torque & isokinetic exercise.
4. Summaries factors affecting muscle tension.
5. Classify muscles- spurt and shunt muscles, tonic and phasic Muscles.
6. Factors affecting muscle function: Type of joint and location of muscle attachment, number of joints, passive insufficiency, sensory receptors.

**DESCRIBE THE FOLLOWING:**

1. Ordering of the myofibrils in sarcomere.
2. An alpha motor neuron.
3. The connective tissue in a muscle.
4. How tension develops in muscle.
5. Isokinetic exercise.

**DEFINE THE FOLLOWING**

1. Active and passive insufficiency.
2. Active and passive tension.

3. Concentric, eccentric and isometric contractions.
4. Reserve action.
5. Agonists, antagonists and synergists.

**RECALL THE FOLLOWING:**

1. Factors affecting muscle tension.
2. Characteristics of different fiber types.
3. Characteristics of motor units.
4. Factor affecting angular velocity.

**DIFFERENTIATE THE FOLLOWING:**

1. A spurt from a shunt muscle.
2. A phase from a tonic muscle.
3. Agonists form an antagonist.
4. Active from passive insufficiency.
5. Concentric from eccentric contraction.

**COMPARE THE FOLLOWING:**

1. Tension development in eccentric versus concentric contractions.
2. The angular velocity of isometric versus concentric & isokinetic contractions.
3. Isokinetic exercise with concentric exercise.

**D. THE VERTEBRAL COLUMN:**

1. Articulations, Ligaments and muscles, typical vertebral intervertebral disc.
2. Describe factors affecting stability and mobility.
3. Regional structure and function of cervical, dorsal, lumbar and sacral vertebrae.
4. Describe the muscle of the vertebral column- Flexors, Extensors, Rotators and Lateral flexors.
5. Describe the effects of injury and development deficits.

**DESCRIBE THE FOLLOWING:**

1. The curves of the vertebral column using appropriate terminology.
2. The articulations of the vertebral column.
3. The major ligaments of the vertebral column.
4. The structural components of typical and atypical vertebrae.
5. The inter vertebral disc.
6. Regional characteristics of vertebral structure.
7. Motions of the vertebral column.
  - a. Lumbar - pelvic rhythm.
9. Rotation of the vertebrae in each region.
10. Movements of the ribs, during rotation.

**IDENTIFY THE FOLLOWING:**

1. Structure that provide stability for the column.
2. Muscles of the vertebral column and the specific functions of each.
3. Ligaments that limit specific motions (i.e. flexion, extension, lateral flexion, rotation).
4. Forces acting on the vertebral column during specific motions.

**EXPLAIN THE FOLLOWING:**

1. The relationship between the intervertebral and facet joints during motion of the vertebral column.
2. The role of the intervertebral disc in stability and mobility.
3. The effects of forces acting on the structural components during motion and at rest.

**ANALYSE THE FOLLOWING:**

1. The effect of disease process injury or other defects in the vertebrae.
2. The effects of an increased lumbo sacral angle on the pelvis and lumbar vertebral column.

**E. THE SHOULDER COMPLEX:**

1. Describe the structural components of the shoulder complex including the articulating surfaces, capsular attachments and ligaments and movements of the following joints:
  - i) Sternoclavicular.
  - ii) Acromioclavicular.
  - iii) Scapulothoracic.
  - iv) Gleno humeral.
2. Describe the function of shoulder complex including dynamic stability of the gleno humeral joint, gleno humeral Rhythm, scapulo thoracic and gleno humeral contributions.
3. Describe the muscles of elevation (Deltoid, Supraspinatus, Infraspinatus, Teres minor, Subscapularis, Upper Trapezius, lower Trapezius, Serratus anterior, and Middle Trapezius & Rhomboids).
4. Describe the muscles of depression, Lattissimus dorsi Pectoralis, Teres Major, rhomboids,

**DESCRIBE THE FOLLOWING:**

1. The articular surfaces of the joints of the complex.
2. The function of the ligaments of each joint.
3. Accessory joint structures and the function of each.
4. Motions and ranges available at each joint and movement articular surfaces within the joint.
5. The normal mechanism of dynamic stability of the gleno humeral joint, utilizing principles of biomechanics.
6. The normal mechanism of gleno humeral stability in the dependent arm.
7. Scapulo humeral rhythm, including contributions of each joint.
8. The extent of dependent of independent function of each joint in scapulo humeral rhythm.
9. How restriction in the range of elevation of the arm may occur.
10. One muscular force couple at a given joint and its function.
11. The effect of given muscular deficit may have on shoulder complex function.

**COMPARE THE FOLLOWING:**

1. The advantages and disadvantages of coracoacromial arch.
2. The structural stability of the three joints, including the tendency toward degenerative changes and derangement.
3. Draw the action lines of muscles of the shoulder complex and the moment arm for each, and resolve each into components.

**F. THE ELBOW COMPLEX.**

1. Describe the structure of the humeroulnar and humeroradial joints including articulating surfaces, joints capsule, ligaments & Muscles.
2. Describe the function of the humeroulnar and humeroradial, all joints including the axis of motion, range of motion, muscle action.
3. Describe the structure of the superior and inferior radioulnar joints.
4. Describe the function of the superior and inferior radioulnar joints.
5. Describe the mobility and stability of the elbow complex its relationship to hand and wrist.
6. Describe the effects of injury and the resistance to longitudinal compression forces, to distraction forces & to medial lateral forces.

**DESCRIBE THE FOLLOWING:**

1. All the articulating surfaces associated with each of the following joints, humeroulnar, humeroradial, superior and inferior radioulnar.
2. the ligaments, associated with all the joints of the elbow complex.

**IDENTIFY THE FOLLOWING:**

1. Axes of motion for supination & pronation and flexion & extension.
2. The degrees of freedom associated with each of the joints of the elbow complex.
3. Factors limiting the range of motion in flexion and extension.
4. Factors that create the carrying angle.
5. Factors limiting motion in supination and pronation.

**COMPARE THE FOLLOWING:**

1. The translatory and rotary components of the brachio radial is and brachialis at all points in the range of motion.
2. The moment arms of the flexors at any point in the range of motion.
3. Muscle activity of the extensions in a closed kinematic chain with activity in an open the role of pronater teres with the role of pronator quadratus.
4. The role of biceps with that of brachialis.
5. The resistance to compressive forces.

6. The features of a classic tennis elbow with the features of cubital tunnel syndrome.
7. The role of and structure of the annular ligament with the role and structure of the articular disc.

### **G. THE WRIST AND HAND COMPLEX.**

1. Describe the wrist complex including radiocarpal joint, metacarpal joint and the ligaments of the wrist complex.
2. Describe the function of the radiocarpal and midcarpal joints including the movements and muscles involved.
3. Describe the hand complex including: Structure of fingers (Carpometacarpal, Metacarpophalangeal and interphalangeal joints of fingers, ligaments, range of motion).
4. Describe the finger musculature including extrinsic & MCP, PIP and DIP joint function and intrinsic muscles.
5. Describe the structure of the Carpometacarpal, MCP and IP joints of thumb.
6. Describe the structure including the extrinsic & intrinsic thumb muscles.
7. Describe prehension, power, cylindrical, spherical & hook grips.
8. Describe precision handling, pad to pad, tip to tip and pad to side, prehension and functional position of wrist and hand.

### **DESCRIBE THE FOLLOWING:**

1. The articular surfaces of the joints of the wrist and hand complexes.
2. The ligaments of the joints of the wrist and hand, including the function of each.
3. Accessory joint structures found in the wrist and hand complex, including the function of each.
4. Type of movements and types of motion of the radiocarpal joint, the midcarpal joint, and the total complex.
5. The sequence of joint activity occurring from full wrist flexion to extension including the role of the scaphoid, the sequence of joint activity in radial and ulnar deviation from neutral.
6. The role of wrist musculature in producing wrist motion.
7. Motions and ranges available to joints of the hand complex.
8. The gliding mechanism of the extrinsic finger flexors.
9. The structure of the extensor mechanism, including the muscles and ligaments that compose it.
10. How M.C.P. extension occurs, including the muscles that produce and control it.
11. How flexion and extension of the PIP joint occur, including the muscular and ligamentous forces that produce and control these motions.
12. How flexion and extension of DIP joints occur, including the muscular and ligamentous forces that produce and control these motions.
13. The role of the wrist in optimizing length - tension in the extrinsic hand muscles.
14. The activity of reposition, including the muscles that perform it.
15. The functional position of the wrist and hand.

### **DIFFERENTIATE BETWEEN**

1. The role *of* the interossei and lumbrical muscles at the MCP and IP joints.
2. The muscles used in cylindrical grip to those active in spherical grip, hook grip, and lateral, prehension.
3. The muscles that are active in pad to pad tip to tip and pad to side prehension.

### **COMPARE**

1. The activity *of* muscles of the thumb (in opposition *of* the thumb to the index finger) with the activity *of* those active in opposition to the little finger.
2. The characteristics of power grip with those of precision handling.
3. The most easily disrupted form *of* precision handling that may be used some on without any active hand musculature: what are the prerequisites; *for* each.

### **H. THE HIP COMPLEX.**

1. Describe the general features *of* the hip joint including the articulating surfaces on the pelvis & the femur, angulations, angle *of* inclination, angle *of* torsion, Internal architecture *of* femur and pelvis, joint capsule, ligaments & muscles (Flexors, Extensors- one joint extensors, two extensors, Adductors, Medial Rotators and lateral Rotators).
2. Describe the function of hip- Rotation, between pelvis, lumbar spine and hip, Pelvis motion, anterior posterior pelvic tilting, lumbar pelvic rhythm, lateral pelvic tilting, pelvic rotation.
3. Summarize the pelvic motions in the static erect posture.
4. Describe femoral motion.
5. Describe hip stability in erect bilateral stance, sagittal plane equilibrium and unilateral stance.
6. Describe reduction *of* forces with weight shifting and using a cane and deviations *form* normal in muscular weakness & bony abnormalities.

### **DESCRIBE THE FOLLOWING.**

1. The articulating surfaces *of* the pelvis and femur.
2. The structure and function *of* the trabecular systems of the pelvic and femur.
3. The structure and function *of* ligaments of the hip joint.
4. The angle *of* inclination and the angle *of* torsion.
5. The planes and axes of the following pelvic motions and the accompanying motions at the lumbar spine and hip joints, pelvic rotation and anterior, posterior and lateral tilting of the pelvis.
6. The muscle activity that produces tilting and rotation *of* the pelvis.
7. Motions *of* the femur on the pelvis including planes and axes of rotation.
8. The structure and function *of* all the muscles associated with the hip joints.
9. The forces that act on the head *of* femur.
10. The position of greatest stability at the hip.

### **EXPLAIN THE FOLLOWING:**

1. How sagittal and frontal plane equilibrium are maintained in erect bilateral stance.

2. How frontal plane equilibrium is achieved in unilateral stance.
3. How force acting on the femoral head may be reduced.
4. How the functions of the two joint muscles at the hip are affected by changes in the position of the knee and hip.
5. The functional and structural relationship- among the hip, knee pelvis and lumbar spine.

**COMPARE THE FOLLOWING:**

1. Forces acting on the femoral head in erect bilateral stance with the forces acting on the head in erect unilateral stance.
2. Coxa valga with coxa vara on the basis of hip stability and mobility.
3. The motions that occur at the hip, pelvis and lumbar spine during forward trunk bending with the motion that occur during anterior and posterior tilting on the pelvis in the erect standing position.
4. Ante version with retroversion on the basis of hip stability and mobility.
5. The structure and function of the following muscles- Flexors and Extensors, abductors and adductors, lateral and medial fracture.

**I. THE KNEE COMPLEX.**

1. Describe the structure of the tibiofemoral joint, articulating surfaces on femur and tibia, the menisci, joint capsule and bursa, ligaments and other supporting structures, anterior- posterior and ligaments and medio- lateral stability, muscle structure, knee flexors. & extensors, axes of knee complex: Mechanical axis, Anatomic axis and axis of motion.
2. Describe the function of the tibiofemoral joint: range of motion, flexion and extension, rotation, abduction and adduction, locking and unlocking. Function of menisci and muscle function.
3. Describe the structure of the patellofemoral joint.
4. Describe the function of the patellofemoral joint.
5. Describe the effects of injury and disease in the tibiofemoral and patellofemoral joints.

**DESCRIBE THE FOLLOWING.**

1. The articulating surfaces of tibiofemoral and patellofemoral joints.
2. The joint capsule.
3. The anatomic and mechanical axes of knee.
4. Motion of the femoral condyles during flexion and extension in a closed kinematics chain.
5. Motion of the tibia in flexion & extension in an open kinematics chain.

**DRAW:**

1. The Q angle when an illustration of the lower extremity.
2. Moment arm of the quadriceps at the following degree of knee flexion: 90 deg., 130 deg., 30 deg., 10 deg.
3. The action lines of vastus lateralis and the vastus medialis oblique.



**LOCATE:**

1. The origin and insertion of all the muscles at the knee.
2. The bursae surrounding the knee.
3. The attachment of the ligaments of the medial compartments.

**IDENTIFY:**

1. Structures that contribute to the medial stability of the knee including dynamic and static stabilizers.
2. Structures that contribute, to the lateral stability of the knee including dynamic and static stabilizers.
3. Structures that contribute to the posterior stability of the knee including dynamic and static stabilizers.
4. Structures that contribute to the anterior stability of the knee including dynamic and static stabilizers.
5. Structures that contribute to the rotary stability of the knee.
6. The normal forces that are acting on the knee.

**COMPARE:**

1. The knee and the elbow joint on the basis of similarities/ dissimilarities in structure and function.
2. The lateral with the medial meniscus on the basis of structure and function.
3. The forces on the patellofemoral joint in full flexion with full extension.
4. The action of quadriceps in an open kinematics chain with that in a closed kinematics chain.
5. The effectiveness on the hamstrings as knee flexors in each of the following hip positions: hyperextension, ten degrees of *flexion* and full flexion (open kinematics chain).
6. The effectiveness of the rectus femoris as a knee extensor at sixty degree of knee flexion with its effectiveness at ten degrees of knee flexion.

**EXPLAIN:**

1. The function of the menisci.
2. How a tear of the medial collateral ligament may affect joint function.
3. The functions of the suprapatellar, gastrocnemius, infrapatellar and prepatellar bursae.
4. Why the semi flexed position of the knee is the least painful position.
5. Why the knee may be more susceptible to injury than the hip joint

**J. TYPE ANKLE- FOOT COMPLEX.**

Describe the structure, ligaments, axis and function of the following: ankle joint, tibiofibular joints, subtalar joints, talocalcaneonavicular joints, transverse tarsal joint, tarsometatarsal joint, plantar arches, Metatarsophalangeal joints, interphalangeal joints.

Define the terminology unique to the ankle foot complex, including inversion-eversion, pronation-supination, dorsiflexion, plantar flexion and adduction and abduction.

**DESCRIBE:**

1. The compound articulations of the ankle subtalar, talocalcaneonavicular, transverse tarsal and tarsometatarsal joints.

2. The role of the tibiofibular joints and supporting ligaments.
3. The degrees of freedom and range of motion available at the joint of the ankle and the foot.
4. The significant ligaments that support the ankle, subtalar and transverse tarsal joints.
5. The triplane nature of ankle joint motion.
6. The articular movements that occur in the weight-bearing subtalar joint during inversion-eversion.
7. The relationship between tibial rotation and subtalar/ talocalcaneonavicular inversion-eversion.
8. The relationship between hind foot inversion-eversion and mobility stability of the transverse tarsal joint.
9. The function of the tarsometatarsal joints, including when motion at these joints is called upon.
10. Supination-pronation of the forefoot at the tarsometatarsal joints.
11. Distribution of weight within the foot.
12. The structure and function of the plantar arches including the primary supporting structure.
13. When muscles supplement arch support, including those muscles that specifically contribute.
14. The effects of toe extension on the plantar arches.
15. The general function of the extrinsic muscles of ankle & foot.
16. The general function of the intrinsic muscle of foot.

#### **K. POSTURE.**

1. Describe the effects of gravity and indicate the location of the gravity line in the sagittal plane in optimal posture.
2. Analyze posture with respect to the optimal alignment of joints in the antero-posterior and lateral views.

#### **DESCRIBE:**

1. The position of hip knee and ankle joints in optimal erect posture.
2. The position of body gravity line in optimal erect posture, using appropriate points of reference.
3. The effect of gravitational moments of body segments in optimal erect posture.
4. The gravitational moments acting around the vertebral column, pelvis, hip, knee and ankle in optimal erect posture.
5. Muscles, ligamentous structures that counterbalance gravitational moments in optimal erect posture.
6. The following postural deviations: pesplanus, halluxvalgus, pes cavus, idiopathic scoliosis, kyphosis and lordosis.
7. The effects of the above postural deviations on body structures i.e. ligaments, joints and muscles.

#### **DETERMINE:**

1. How changes in the location of the body's gravity line will effect gravitational moments acting around specified joints axes.
2. How changes in the alignment of body segments will affect. Either the magnitude or the deviation of the gravitational moments.

3. How changes in the alignment of body segments will affect supporting structures such as ligaments, joint capsules, muscles, joint surfaces.

## **L. GAIT**

### **DEFINE:**

1. The stance, swing and double support phases of gait.
2. The subdivisions of the stance and swing phases of gait.
3. The time and distance parameters of gait.

### **DESCRIBE:**

1. Joint motion at the hip, knee and ankle *for* one extremity during a gait cycle.
2. The location of line of gravity in relation to the hip knee and ankle during the stance phases of gait.
3. The gravitational moments of force acting at hip, knee and ankle during the stance phase.

### **EXPLAIN:**

1. Muscle activity at the hip, knee and ankle throughout the gait cycle, including why and when a particular muscle is active and type of contraction required.
2. The role each of the determinates of gaits.
3. The muscle activity that occurs in the upper extremity and trunk.

### **COMPARE:**

1. Motion of upper extremities and trunk with motion of pelvis and lower extremities. .
2. The traditional gait terminology with the new terminology.
3. Normal gait with a gait in which there is a weakness of the hip extensors and abductions.
4. Normal gait with a gait in which there is unequal leg lengths.

## 6. SOCIOLOGY & PSYCHOLOGY

### Section -I

#### Sociology

##### I. Introduction:

Definition of sociology, sociology as a science of society, uses of the study of sociology, application of knowledge of sociology in physiotherapy and occupational therapy.

##### II Sociology & health:

Social factors affecting health status, social consciousness and perception of illness, social consciousness and meaning of illness, decision making in taking treatment. Institution of health of the people.

##### II. Socialization:

Meaning of socialization influences of social factor on personality socialization in hospitals, socialization in rehabilitation of patients.

##### III. Social Group:

Concept of social group, influence of formal and informal groups on health and sickness, the role of primary groups and secondary groups in the hospitals and rehabilitation setting.

##### IV. Family:

Influence of family on human personality, discussion of changes in the function of a family, influence of family on the individual's health family and nutrition, the effect of sickness on family, and psychosomatic disease.

##### V. Community:

Concept of community, role of rural and urban communities in public health, role of community in determining beliefs, practices and home remedies in treatment.

##### VI. Culture:

Components of culture, impact of culture on human, behavior, culture meaning of sickness, response & choice of treatment (role of culture as social consciousness in molding the perception of reality) culture induced symptoms and disease, sub-culture of medical workers.

**VII. Caste system:** Feature of modern caste system and its trends.

##### VIII. Social change:

Meaning of social change, factors of social change, human adoption and social change, social change and stress, social change and deviance, social change and health programmers, the role of social planning in the improvement of health and in rehabilitation.

##### IX Social control:

Meaning of social control, role of norms, *folkways*, customs, morals, religion, law and other means of social control in the *regulation* of human behavior, social deviance and disease.

##### X. Social problems of the disabled:

Consequences of the following social problems in relation to sickness *and* disability remedies to prevent these problems:

- a) Population explosion
  - b) Poverty and *unemployment* ~
  - c) Beggary
  - d) Juvenile delinquency
  - e) Prostitution
  - f) Alcoholism
  - g) Problems of women in employment.
- XI Social Security: Social security and social legislation in relation to the disabled.
- XII Social Worker: The role of medical social worker.

## SECTION-II

### A. GENERAL PSYCHOLOGY

- 1. Definition of psychology:** Definition of psychology, in relation to following schools method and branches. Structuralism, functionalism, behaviorism, psychoanalysis, Gestalt Psychology. Intersection, observation, inventory and experimental method. General, child, social, abnormal, industrial, clinical, counseling, educational.
- 2. Heredity and Environment:** Twins relative importance of heredity an environment, their role in relation to physical characteristics, intelligence and personality, nature- nature controversy.
- 3. Development and growth behavior:** Infancy, childhood, adolescence, adulthood, middle age, old age.
- 4. Intelligence:** Definition, IQ, Mental age, list of various intelligence tests- WAIS, WISC, and Bhatia's performance test, Raven's Progressive Metrics test.
- 5. Motivation:** Definition, motive, drive, incentive and reinforcement, basic information about primary needs: hunger thirst, sleep elimination activity, air avoidance of pain, attitude to sex. Psychological needs: Information, security, self-esteem, competence, love and hope.
- 6. Emotions:** Definition: differentiate from feelings, psychological changes of gland, heredity and emotion, nature and control anger, fear and anxiety.
- 7. Personality:**
  - a. Definitions: List of components: physical characteristics character, abilities temperament, interest and attitudes.
  - b. Discuss briefly the role of heredity, nervous system, physical characteristics, abilities, family and culture of personality development.
  - c. Basic concept of Freud: Unconscious, conscious, id ego and superego, list and define the oral, anal and phallic stages of personality department list and define the stages as proposed by Erickson, 4concept of learning as proposed by Dollard and Miller, drive cue, response and reinforcement.
  - d. Personality assessment: Interview, standardized, non-standardized, exhaustive, and stress interviews, Hst

and define inventories BAI, CPI and MMPI, projective test. Rorschach, TAT and sentence completion test.

**8. Learning: Definition:**

List the laws of learning as proposed by Thorndike, type of learning: Briefly describe, classical conditions, operant conditioning, insight observation and Traila and error type list the effective ways to learn: Massed Vs. spaced, whole vs. part, Recitation Vs reading serial Vs. International learning, role of language.

**9. Thinking:**

Definition, concepts creativity, steps in creative thinking, list the traits of creative people, delusions.

**10. Frustration:**

Definition, sources, solution, conflict, Approach, Avoidance and approach- avoidance solutions.

**11.Sensation, Attention and perception.**

- a. List of senses: Vision, Hearing, Olfactory, Gustatory and cutaneous sensation, movement equilibrium and visceral sense. Define attention - and list factors that determine attention: nature of stimulus intensity, color, change, extensity, repetition, movement size, curiosity, primary motives.
- b. Define perception and list the principles of perception: Figure ground, constantcy, similarity, proximity, closure continuity values and interests, past experience, context, needs moods, religion, sex and age, perceived susceptibility perceived seriousness, perceived benefits and socio economic status.
- c. Define illusion and hallucination.
- d. List visual, auditory, cutaneous, gustatory and olfactory hallucination.

**12. Democratic'and Authoritarian Leadership:**

Qualities of leadership: physical factors intelligence, self -confidence, sociability, will and dominance. Define attitude. Change of attitude by: Additional information, change in group affiliation, enforced modification by law and procedures that affect personality. (Psychotherapy, counseling and religious conversion).

**13. Defense Mechanisms of the Ego:**

Denial, rationalization, projection, reaction formation, identification, repression, emotional insulation, undoing, interjection, acting depersonalization.

**B. HEALTH PSYCHOLOGY.**

**1. Psychological reactions of a patient:**

Psychological reactions *of* a patient during admission and treatment anxiety, shock denial, suspicion, questioning, loneliness, regression, shame, guilt, rejection, fear withdrawal, depression, egocentricity, concern about small matters, narrowed interests, emotional over reactions, perpetual changes, confusion disorientation, hallucination, delusion, illusions anger, hostility, lose *of* hope.

**2. Reaction to loss:**

Reactions to loss, death and bereavement shock and disbelief, development *of* awareness, restitution, resolution, stages *of* acceptance as proposed by Kubler - Ross.

**3. Stress:**

Physiological and psychological relation to health and sickness: psychosomatic, professional stress burnout.

**4. Communications:**

- a. Type verbal, non-verbal, element in communication, barriers to good communication, developing effective communication, specific communication techniques.
- b. Counseling: Definition, Aim differentiates from guidance, principles in counseling and personality qualities *of* counselors.

**5. Compliance:**

Nature, factors, contributing to non - compliance, improving, compliance.

**6. Emotional Needs:**

Emotional needs and psychological factors in relation to unconscious patients, handicapped patients, bed - ridden patients, chronic pain, spinal cord, injury, paralysis, cerebral palsy, burns, amputations, disfigurement, head injury, degenerative disorders, parkinsonism. Leprosy, incontinence and mental illness.

**7. Geriatric psychology:**

Specific psychological, reactions and needs *of* geriatric patients.

**8. Pediatric psychology:**

Specific psychological reactions and needs *of* pediatric patients.

**9. Behavior Modifications:**

Application *of* various conditioning and learning principles to modify patient behaviors.

**10. Substance abuse:**

Psychological aspects *of* substance abuse: smoking, alcoholism and drug addiction.

**11. Personality styles:**

Different personality styles *of* patients.

## 7. Computer Application (Practical)

- a) 1. To study the various components of a personal computer.
- b) 2. To have working Knowledge *of* hardware and software.
- c) 3. To practice the operational skill *of* common computer application including works processing & spread sheet software.
- d) 4. To have a basic knowledge *of* utility *of* multi- media.
- e) 5. To learn skills *of* web surfing-For literature, research relevance to the field *of* medicine.



## **THIRD YEAR B. PHYSIOTHERAPY**

### **1. GENERAL MEDICINE**

#### **COURSE OBJECTIVES:**

The objective of this course is that after 200 hours of lectures, demonstrations, in addition to clinics the student will be able to demonstrate a general understanding of the diseases that therapists would encounter in their practice. They should have a brief idea of the etiology and pathology, what the patient's symptoms and the resultant functional disability. This would help the candidates to understand the limitation imposed by the diseases on any therapy that may be prescribed.

#### **COURSE OUTLINE**

##### **1. Infection diseases:**

Tuberculosis, Tetanus, Typhoid fever, bacillary dysentery, amoebiasis, HIV Infection, AIDS, Measles & Nosocomial infection.

##### **2. Metabolic & deficiency disease**

- Diabetes mellitus, Obesity, Vitamin deficiency disease.
- Diseases of respiratory system (Anatomy & Physiology aspects)
- Asthma, Bronchitis, Collapse, Bronchiectasis, pneumonia, lung abscess, Empyema.
- COPD (Chronic bronchitis & Emphysema).

##### **3. CVS**

- Applied, clinical Anatomy and physiological aspect.
- Hypertension, Congestive Heart Failure, rheumatic fever, infective endocarditis.
- Pericarditis, Valvular heart diseases (mitral stenosis, mitral regurgitation, aortic stenosis, aortic regurgitation).
- Congenital heart disease (Atrial Septal Defect, Ventricular Septal Defect, Patent Ductus Arteriosus, tetralogy of Fallot), Eisenmenger syndrome.
- Ischemic heart diseases.
- Myocardial infarction.
- Deep vein thrombosis & pulmonary embolism.

#### **4. Hematology:**

- Anemia (Iron deficiency anemia, Megaloblastic anemia, Hemolytic anemia & Aplastic anemia).
- Thrombocytopenia (idiopathic thrombocytopenia, Purpura).
- Leukemia (Acute Lymphoid Leukemia, Chronic Myeloid Leukemia, Chronic Lymphoid Leukemia, Acute Myeloid Leukemia).
- Hemophilia, lymphadenopathy & splenomegaly

#### **5. Gastrointestinal System:**

- Peptic Ulcer, Hematemesis, dyspepsia, diarrhea, mal-absorption syndrome, Diseases of liver.
- Jaundice, viral hepatitis, cirrhosis of liver, ascites.

#### **6. Diseases of Kidney**

- Post streptococcal glomerulonephritis, Nephritic syndrome, urinary tract infection.
- Urinary calculi, Chronic renal failure.

#### **7. Endocrinology**

- Hypothyroidism, Hyperthyroidism, Addison's disease, Cushing's syndrome, Gigantism.

#### **8. Dermatology**

- Structure and function of normal skin Primary and Secondary lesion Pediculosis.
- Fungal infection: Dermatophytosis, Pityriasis vesicular, Candidiasis.
- Bacterial infection of the skin: impetigo & boil.
- Viral infections: Herpes.
- Eczema, Dermatitis & allergies.
- Acne, Alopecia, Vitiligo, Leukoderma.
- Psoriasis.
- Leprosy.
- Sexual Transmitted diseases & venereal Diseases- Syphilis, Gonorrhoea, HIV.
-

## **9. PSYCHIATRY**

Introduction: Definition: sign & symptoms, types of mental disorders psychosomatic complication

### **Disorders:**

1. Psychosis, schizophrenia, delusional disorders, acute and transient psychotic disorders.
2. Affective disorders: depression, disorders, mania, bipolar affective disorders.
3. Anxiety disorders: Agoraphobia, panic disorder, Generalized anxiety disorders.
4. Dissociative disorders: somatoform disorders, OCD.
5. Organic conditions- dementia, delirium, traumatic.

### **Special therapies:**

1. Psychotherapy – psychoanalysis, narco, synerthesis, hypnosis, psychodrama.
2. Group therapy.
3. Shock therapy.
4. Surgery in psychiatric conditions.

## **2. GENERAL SURGERY**

- 1. General principles of surgeries**
- 2. Describe different events accompanying in general anesthesia, principles of procedures, blood transfusion, body response to surgeries, anesthesia and blood trans fusion, Different types of anesthesia, complication and their management.**
- 3. Resuscitation & support**
  - a. Shock: types, clinical features, pathogenesis & treatment.
  - b. Hemorrhage: types, clinical features & management.
  - c. Fluid & electrolyte balances.
  - d. Blood transfusion : Indications & management.
- 4. Wound sinuse & ulcer**
  - a. Healing by 1st & 2<sup>nd</sup> intention.
  - b. Factors influencing would healing.
  - c. Pathogenesis of healing.
  - d. Scars:
    - i) Hypertrophic scar.
    - ji) Keloid.
    - iii) Types of wound.
- 5. Venous Disorders**
  - a. Varicose veins.
  - b. Deep vein thrombosis.
- 6. Lymphatics B Lymph Nodes**
  - a. Lymphomas.
  - b. Filariasis.

- c. Lymphangilis.
- d. Lymphoedema.
- e. cystic hygroma.

## **7. ARTERIAL DISORDERS**

- a. Acute & Chronic arterial obstruction with investigations & management - embolism and thrombi.
- b. Amputations: types, Indications and decision Making, surgical procedures, Complications and their management.
- c. Gangrene - types, etiology, pathogenesis and management.

## **8. CARDIO-THORACIC SURGERY**

Type of incision, pre and post operative Assessment, management and complications of Cardiothoracic Surgery and their management.

### **1. CARDIAC SURGERY**

General principles of cardiac surgery, Outline indications, Contra-indication, site of incision, pre and post operative management and complications of the following:

- a. Valvotomy and Valve Replacement.
- b. Open Heart Surgery/Cardiac By pass Surgery.
- c. Surgery on *Pericardium*.
- d. Operations in congenital disorders.
- e. Heart transplantation.
- f. Pacemaker.
- g. Coronary Angioplasty.
- h. Balloon Angioplasty and Vascular Surgery (Outline surgery of Artery and veins).

## ***I. THORACIC SURGERIES***

a. General principles of Thoracic surgery, Outline indication, Contraindication, site of incision, common surgical procedures, pre and post operative management, Post operative pulmonary complications & their management following:

- Lobectomy.
- Pneumonectomy.
- Segmentectomy.
- Pleuro pneumonectomy.
- Thoracoplasty.
- Decortication.
- Tracheostomy.

b. Outline clinical features and management of carcinoma of lung.

c. Outline clinical *features* and management of the following: Fracture of ribs, Flail chest, stove-in chest, Pneumothorax, Lung Contusion and Laceration and injury to Vessels, Haemothorax, and Pulmonary embolism

d. Describe in detail the following procedures: Endotracheal tubing, Tracheal suction, weaning the patient from ventilator, Extubation and Post-extubation care.

e. Describe the principles of Cardio-pulmonary Resuscitation, Cardiac massage, Artificial Respiration, Defibrillators and their uses.

## **9. ABDOMINAL SURGERY**

Describe abdominal surgical incisions and their uses.

Outline indications, incisions, drains and complications and their management of various surgeries like:

Nephrectomy. Appendicectomy, Herniorraphy, Mastectomy, thyriodectomy, colostomy, Adrenalectomy, Cystectomy, Hysterectomy, Prostatectomy, Cholecystectomy, Ileostomy, Surgical procedures in various types of Hernias.

Clinical presentation, causes, Etiopathogenesis, management of the following:

Hernias, peptic ulcer, carcinoma of stomach, Acute & chronic pancreatitis, Cholelithiasis,

Cholecystitis, Neoplasm of gallbladder & bile duct.

## **10. NEURO SURGERY**

A. Outline indications , incisions, drains & complications and their Management about various surgeries of:

1. Surgeries of cranium, scalp & brain
2. Surgeries of vertebral column & spinal cord.
3. Surgeries of peripheral nerves.

B. Surgical interventions in hydrocephalus, Head injury, Benign & malignant tumors of brain and other congenital anomalies of brain.

## **11. BURNS & PLASTIC SURGERY**

- a. Classify burns by depth and surface area, calculation of burns, outline the causes, early & late complications and their management.
- b. List the potential deformities due to burns, methods of prevention and precautions, Mentions cosmetics and functional treatment measures.
- c. Outline the plastic surgery procedures and management in burns, including common deformities and prevention of burns contractures.
- d. Skin grafting & other procedures.
- e. Principles of cineplasty, tendon transplant, cosmetic surgeries, types of grafts & surgeries of hands.

## **12. Maxillo Fascial Injuries and Congenital Anomalies**

Cleft Lip, palate, cancer, lip & cheek their clinical presentation investigations and surgical management

## **13. Mouth, Eye, Cheek & Tongue**

Clinical presentation, investigations and surgical management of the following:

- a. Salivary tumors - benign & malignant.
- b. Carcinoma tongue
- c. Salivary retention cysts.

d. Acute parotites.

#### **14. THYROID GLAND**

Definition, Patho-physiology, diagnosis & management of

- i) Goiter.
- ii) Thyrotoxicosis.
- iii) Neoplasm.
- iv) Thyroglossial cyst.

#### **15. BREAST**

Surgical anatomy, nipple discharge acute & chronic Infections Different incisions & management of tumour.

**16. LIVER:** clinical presentation, Etiopathogenesis and management of the following

- a. Amoebic liver abscess
- b. Hydrated cyst
- c. Obstruction jaundice.

#### **17. SPLEEN**

Causes of splenomegaly, clinical presentation, examination findings & management.

**18. Clinical presentation, investigations and Management of the following-:**

Peritonitis, mesenteric cyst.

#### **19. SMALL & LARGE INTESTINE.**

Clinical presentation, investigations and Management of the following:

- a. Intestinal amoebiasis, tuberculosis & carcinoma
- b. Ulcerative colitis & Crohn's disease
- c. Mechanical intestinal obstruction.
- d. Paralytic ileus.
- e. Appendix



- f. All type of incisions & common, surgical procedures

## **20. RECTUM & ANAL CANAL**

- a. Anal fissure, fistula, hemorrhoids caranal canal rectal prolapsed

## **21. UROGENITAL SYSTEM**

- a. Renal calculi with complications.
- b. Renal tuberculosis & renal tumors.
- c. Hematuria, urinary obstruction.
- d. stricture urethra and penis.
- e. Passion testis & congenital anomalies.
- f. Hydrocoel & varicocoel.

### 3. ORTHOPEDICS

#### **COURSE DESCRIPTION**

Following the basic science the basic science course, this course introduces the student to the orthopedic conditions which commonly cause disability. Particular effort is made in this course to avoid burdening the student with any detail pertaining to diagnosis which will not contribute to their understanding of the limitation imposed by orthopedic pathology on the functioning of the individual.

#### **COURSE OBJECTIVES**

The objective of this course is that after 200 hours of lectures, demonstrations, in addition to clinics the student will be able to demonstrate an understanding of orthopedics conditions causing disability and their management.

#### **Section I**

##### **Traumatology**

##### **A. Bony Injuries**

1. Fractures (General) & Dislocations, classifications, healing of fracture, factors affecting healing, early & late complications, general principles of management.

2. Specific: Types, Complications, Management of the following fractures.

a. Upper limb Fractures: Clavicle, Scapula, Humerus, Ulna, Radius, Carpals, phalanges, Crush injuries of Hand.

b. Lower limb Fractures: Pelvis, Femur, Patella, tibia, Fibula, tarsals, Metatarsals.

C. Spine: Cervical, Thoracic, Lumbar.

##### **B. Soft Tissue Injuries**

1. Tendon, bursa, sprain, strain, compartment syndromes, Capsules, Synovial membrane, Semilunar cartilage Injuries, Anterior Cruciate Ligament, Posterior Cruciate Ligament, Medial Collateral Ligament, lateral Cruciate ligament.

#### **Section II**

##### **Inflammatory and Infective Conditions**

A. Etiology, pathology, clinical features, operative and non operative management of Tuberculosis and pyogenic osteomyelitis.

B. Etiology, pathology, clinical features, Investigations, operative and non operative management of Rheumatoid Arthritis, tuberculosis arthritis, pyogenic arthritis, ankylosing spondylitis, gouty arthritis, Neuropathic Joints, Hemophilic joints.

C. Poliomyelitis, etiology, Classification, pathology, clinical presentation, Post polio residual paralysis, non operative and operative management.

D. Synovitis, capsulitis.

### **Section III**

#### **Deformities:**

Etiology, epidemiology, Clinical Presentation, investigations, management of the following: Torticollis, Cervical rib, CTEV, CDH, Pes Cavus, Pes Planus, spina Bifida, Klippel feil Syndrome, Goucher's diseases, scoliosis, increased thoracic Kyphosis, Increased lumbar lordosis, coxa vara, Genu varum, Genu valgum, genu recurvatum, hallux valgus, hammer toe.

### **Section IV**

#### **Degenerative & Metabolic disorders:**

A. Etiology, Pathology, Clinical features, Investigations, management of Osteoarthritis of major joints, spondylosis, spondylolisthesis PIVD.

B. Etiology, Pathology, Clinical features, Investigations, management of rickets, osteomalacia, osteoporosis.

### **Section V**

#### **Bone tumours & Amputations**

a) Benign & Malignant, Classification, Pathology, Clinical Features, Management including chemotherapy and Radiotherapy.

b) Level of amputation of lower Limb and upper limb, causes of amputation.

### **Section VI**

#### **Corrective procedures**

Osteotomy, Arthroplasty (Hip, Knee, Ankle, shoulder & elbow), Bone Grafting, arthodesis, tendon transfers, Soft tissue release,

### **Section VI**

#### **Miscellaneous conditions**

De- Quervains Diseases, Duputerynes Contracture, Myositis Ossificans, Carpal Tunnel syndrome, Chondromalacia Patella, Perthes's Diseases, Avascular necrosis of femoral head, Internal derangement of Knee, Osteochondrosis.

## 4. Physiotherapy in Cardio-Respiratory Conditions

### COURSE DESCRIPTION

This course serves to integrate the knowledge gained by the students in Clinical Cardiorespiratory conditions with the skills gained in exercise therapy, electrotherapy and massage, thus enabling them to apply these in clinical situations of dysfunction due to cardiorespiratory pathology.

### COURSE OBJECTIVES

The objective of this course is that after 200 hours of lectures, demonstrations, practical and clinics the student will be able to identify cardio respiratory dysfunction, set treatment goals and apply their skills in exercise therapy, electrotherapy and massage in clinical situation to restore cardiorespiratory function.

#### Section-I

##### **Respiratory**

- Review of mechanism of normal respiration (rate, rhythm, use of accessory muscles).
- Chest examination, including auscultation, percussion, knowledge of various investigative procedures (invasive & non invasive) use in the diagnosis of various respiratory disorders.
- Chest deformities (Barrel chest, pigeon chest)
- Measurement: Chest expansion at different Levels.
- Techniques of physical treatment: Breathing exercise, Chest mobilization exercises Postural drainage, Huffing, Coughing, Percussion, Vibration & Chest Shaking.
- Review of the Pathological and principles of management by physiotherapy to the following conditions:
  1. COPD, Asthma, Lung abscess, Bronchiectasis.
  2. Pleurisy and Empyema, Pneumonia.
  3. Bacterial Disease.
  4. Rheumatic fever, Carcinoma of respiratory tract.
  5. Paralysis of diaphragm & Vocal cords.
  6. Chest wall deformities.
  7. Principles of Intensive Care Physiotherapy, Aerosol Therapy, Humidification.

#### Section-II

##### **Cardiovascular**

- 1). Review of anatomy and physiology of the cardiovascular system.
- 2). Knowledge of various investigative procedures, Physical assesment (invasive & non invasive) used in the diagnosis of 'various cardio vascular disorders.

3). Review of pathological changes, Clinical presentation, Principle of management by Physiotherapy of the following conditions:

- Hypertension.
- Hypotension.
- Aneurysm.
- Congestive Cardiac failure.
- Peripheral Vascular Disorders:
  - a. Atherosclerosis.
  - b. Arteriosclerosis.
  - c. Thrombosis.
  - d. Embolism.
  - e. Burger's diseases.
  - f. Thrombophlebitis.
  - g. Phlebitis.
- Gangrene.
- Lymphedema.

### **Section-III**

#### **Thoracic Surgery.**

Review of pathological changes and principle of pre and post operative management by physiotherapy of the following conditions:

- 1). Lobectomy, Pneumonectomy, Thoracotomy, Thoracoplasty, Endoscopy & Eye Hole surgeries.
- 2). Corrective surgeries of congenital heart defects, Angioplasties, Blood vessel grafting, Open heart surgeries & Heart transplant.

## 8. Physiotherapy in Orthopedic and Sports Conditions

### COURSE OBJECTIVES

The objective of this course is that after 300 hours of lectures, demonstrations, practicals and clinics the student will be able to identify disability due to musculoskeletal dysfunction, set treatment goals and apply their skills in exercise therapy, electrotherapy and massage in clinical situation to restore musculoskeletal function.

### COURSE DESCRIPTION

This course serves to integrate the knowledge gained by the students in Clinical Orthopaedics, with the skills gained in exercise therapy, electrotherapy and massage, thus enabling them to apply these in clinical situations of dysfunction due to musculoskeletal pathology.

### Theory

1. **Traumatology:** Brief review of the following condition and various management aims, physiotherapeutic intervention, means and technique of physiotherapy should be taught including Kalternborn, Maitland, Mulligan, Mckenzie etc.

#### A. Bony Tissue

1. Fracture and dislocations: Classification and type of displacement, method of immobilization, healing of fractures and factors affecting union, non union, delayed Union etc., common sites of fractures and their general physiotherapeutic management.
2. Specific fractures and their physiotherapeutic management.
  - a) Upper limb: Clavicle, humerus, ulna, radius, crush injuries of hand.
  - b) Lower Limb: fracture neck of femur, shaft of femur, patella, tibia fibula, pott's fracture, fracture of tarsal and metatarsals.
  - c) Spine: fracture and dislocations of cervical, thoracic and lumbar vertebrae with and without neurological deficits.

#### B. Soft tissue injuries:

- Synovitis.
- Capsulitis.
- Tendonitis and other tendon injuries around wrist, elbow, knee, shoulder, ankle.
- Bursitis, volkman's ischemic contracture.

- Tear of semilunar cartilage, meniscectomy.
- Injury to cruciate ligaments of knee.
- Internal derangement of knee.
- And other overuse injuries important for a Physiotherapist.

## **2. Surgical procedures:**

- a. Pre and post operative physiotherapy management of common corrective procedure like arthroplasty, arthrodesis, osteotomy, patellectomy, tendon transplants, soft tissue release, grafting, including post polio residual paralysis and leprosy deformities corrections.
- b. Amputation: Level of amputation of upper limb and lower limb, stump care, stump bandaging, Pre and post operative physiotherapy management, pre and post prosthetic management including check out of prosthesis, training etc.

**3. Deformities:** Etiology, pathology, clinical presentation, diagnostic criterion general, orthotic, and Physiotherapy Management of the following: Congenital torticollis, Cervical rib, CTEV, Pes cavus , Pes planus and other common congenital deformities, Scoliosis, Increased and decreased Kyphosis, increased & decreased Lordosis, Coxa vara, Genu valgum, Genu varum and recurvatum.

**4. Degenerative and infective conditions:** Etiology, pathology, clinical presentation, diagnostic criterion, general, orthotic, and Physiotherapy Management of the following:  
osteoarthritis of major joints, Spondylosis, Spondylitis, Spondylolisthesis, PIVD, Periarthritis of shoulder, Tuberculosis of spine, bone and major joints, and other miscellaneous orthopaedic conditions treated by Physiotherapy.

**5. Arthritis and Allied conditions (in details):** Etiology, pathology, clinical presentation, diagnostic criterion general, orthotic, and Physiotherapy Management of the following:

- a Osteo- Arthritis-generalized, Degenerative and traumatic.
- b. Rheumatoid Arthritis, Still's disease, infective Arthritis.
- c. Spondylitis, ankylosing spondylitis.
- d. Non articular Rheumatism, Fibrositis, trigger point, fibromyalgia.

- e. Perthes disease
  - f. Ganglion,
  - g. Duputeren's contracture
6. Etiopathogenesis and physiotherapy and general management of the Edema-Traumatic, Obstructive, position dependent and Paralytic.
7. **Deficiency disease-** Rickets, Osteomalacia, Osteoporosis and other deficiency disorders related to Physiotherapy their clinical presentation, etiopathogenesis, management strategies including physiotherapy interventions.
- 8. Sports Physiotherapy**
- 1. Principle of sports physiotherapy
  - 2. Causes of sports injury,
  - 3. Prevention of sports injuries,
  - 4. Management of acute sports injury,
  - 5. Common occurred injuries.,
  - 6. Role of physiotherapist in sports principle and advanced rehabilitation of the injured athlete.

### **Practical**

Various physiotherapy modalities and treatment techniques for the above-mentioned conditions to be demonstrated and practiced by the students in clinical setup.



## **FINAL YEAR B. PHYSIOTHERAPY**

### **1. NEUROLOGY**

#### **COURSE DESCRIPTION**

Following the basic science and clinical science course, this course introduces the student to the neurological conditions which commonly cause disability. Particular effort is made in this course to avoid burdening the student with any detail pertaining to diagnosis which will not contribute to their understanding of the limitations imposed by neurological pathology on the functioning of the individual.

#### **COURSE OBJECTIVE**

The objective of this course is that after 120 hours of lectures & demonstrations. In addition to clinics, the students will be able to demonstrate an understanding of neurological conditions causing disability and their management in addition, the student will be able to fulfill with 75% accuracy (as measured by written, oral & practical, internal evaluation) the following objectives of the course.

#### **COURSE OUTLINE**

##### **1. NEUROANATOMY.**

Review the basic anatomy of the brain and spinal cord including: Blood supply of the brain and spinal cord, anatomy of the visual pathway, connections of the cerebellum, and extra pyramidal system, relationship of the spinal nerves to the spinal cord segments, long tracts of the spinal cord, the brachial and lumbar plexuses, and cranial nerves.

##### **2. NEUROPHYSIOLOGY**

Review in brief the Neurophysiologic basic of disorder of tone posture, bladder control, muscle contraction, movement control and pain.

##### **3. CLINICAL FEATURE & MANAGEMENT.**

Briefly outline the clinical features and management of the following Neurological Disorders:

###### **1. Congenital childhood disorders.**

a. Cerebral palsy.

- b. Hydrocephalus.
- c. Spina Bifida.

## **2. Cerebrovascular accident.**

- a. General classification: thrombotic, embolic, hemorrhagic & inflammatory strokes.
- b. Gross localization and sequelae.
- c. Detailed rehabilitative program.

## **3. Traumatic disorders**

Trauma-broad localization, first aid and management of sequelae of head injury and spinal cord injury.

## **4. Diseases of the spinal cord**

- Craniocerebral junction anomalies.
- Syringomyelia.
- Cervical and lumbar disc lesions.
- Spinal Tumors (Intramedullary & Extra medullary)
- Spinal archnoiditis.

## **5. Demyelinating diseases (central and peripheral)**

- Guillian- Barre syndrome.
- Acute disseminated encephalomyelitis.
- Transverse myelitis.
- Multiple sclerosis.

## **6. Degenerative disorders.**

- Parkinson's disease.
- Dementia.

## **7. Infectious disorders of Nervous system**

- a. Pyogenic Meningitis sequel.
- b. Tuberculous infection of central nervous system.
- c. Poliomyelitis.

**8. Diseases of the muscle:** classification, signs, symptoms, progression and management.

- a. Muscular Dystrophy: definition, classification, course and management.
- b. Myasthenia Gravis: Definition, course and management.
- c. Myopathy: definition, classification, course and management.

**9. Peripheral nerve disorders.**

- a. Peripheral nerve injuries: localization and management.
- b. Entrapment neuropathies.
- c. Peripheral neuropathies.

**10. Miscellaneous.**

- a. Epilepsy: Definition, classification and management.
- b. Intracranial tumors: Broad classification, signs and symptoms.
- c. Motor neuron disease.
- d. Dystonia.

**4. ASSESSMENT**

Clinical assessment of neurological function to be taught through bedside or demonstration clinics spread out over at least 5 sessions.

1. Basic history taking to determine whether the brain, spinal cord or peripheral nerve is involved.
2. Assessment of higher mental function such as orientation, memory, attention, speech and language.
3. Assessment of cranial nerves.
4. Assessment of motor power.
5. Assessment of sensory function: touch, pain and position.
6. Assessment of tone: spasticity, rigidity and hypotonia.
7. Assessment of cerebellar function.
8. Assessment of higher cortical function: apraxia, etc.
9. Assessment of gait abnormalities.

## 2. PAEDIATRICS

### PEDIATRIC TOPICS:-

1. Introduction to pediatrics.
2. Growth and development: laws of growth, factors affecting growth & development, developmental delay.
3. Developmental mile stone: Motor, adaptive, social milestones.
4. Congenital deformities, Cleft lip cleft palate, choandatresia imperforate clinical presentation, diagnosis and management.
5. Etiology, sign, symptoms and treatment I of the following:
  - Clubfoot .
  - Flatfoot.
  - Knock knees.
  - Bowlegs.
7. Spina-bifida & meningocele Diagnosis, treatment and complication.
8. Scoliosis diagnosis & Management
9. Congenital dysplasia Hip : clinical presentation, diagnosis & management.
10. Obstetric palsies: Etiology, management, follow up & prevention
11. Cerebral palsy, etiology, clinical presentation, classifications, management.
12. Osteogenesis imperfect: Pathogenesis type and treatment.
13. Rickets: Etiology clinical picture and treatment.
14. Scurvy Etiology clinical picture and treatment.
15. Anemia Etiology type and management.
16. PEM Type classification and nutritional therapy.
17. Muscular dystrophy Presentation and management.
18. Genetic Disorders: Diagnosis and treatment.
19. Down's syndrome Clinical profile and management.
20. Epilepsy: Types and treatment.
21. Disability, Handicap Definition & implication.
22. Worm infestation Types and treatment.

23. Tuberculosis Primary complex diagnosis & treatment.
24. Bronchial asthma: Etiology & treatment including AC secure asthma.
25. Congenital Heart Disease: types, clinical presentation, diagnosis and treatment.
26. Rheumatic fever Diagnosis criteria, complication & treatment.
28. Diarrhea: Etiology, treatment, ORD & fluidotherapy.
29. Pneumonia: Causes sign symptom & treatment.
30. Nephritic Syndrome: definition pathogenesis & treatment.

### 3. GERIATRICS

#### Course Objective:

After the end of the course the physiotherapist should be able to:

- Collect history from a geriatric patient.
- Clinically assess a geriatric patient.
- Know the common problems in elderly.
- Know the multiple diseases occurring in one elderly patient.
- Know the problems associated with multiple drug therapy in elderly.

#### Detailed Syllabus:

1. The ageing process- Loss of sense, effect on skeletal system, altered homeostasis and how these may affect pathological processes.
2. How to make life active in old age - Healthy life style & modifying risk factors which may cause other health problems: like treating hypertension, hyper cholestremia to prevent stroke & MI.
3. Causes of frequent falls, common fractures associated with fall, risk factors, and management of fractures
4. Aetiopathogenesis Urine & fecal incontinence in old age and management.
5. Aetiopathogenesis, clinical presentations investigations and management of stroke in old age.
6. Palliative care, prevention, cause & management of bed sores in old age.
7. Aetiology, pathology, clinical presentation and management of the following in old age
  - Delirium & dementia.
  - Depression.
  - Parkinsonism.
  - COPD.
  - IHD. & CCF.
  - Rheumatoid arthritis, Osteoarthritis, Osteoporosis.
  - Diabetes mellitus.
8. Examination and Investigations in older person
  - Mini mental state examination.
  - Geriatric depression scale.
  - Barstool ADL.

## 4. OBS & GYNE, ENT, OPHTHALMOLOGY

### Section –I

#### **OBS &Gynecology**

1. Anatomy of Female reproductive system:
  - i) External genital.
  - ii) Ovaries fallopian tubes, uterus & vagina.
  - iii) Blood and nerve supply to genital organs.
2. Physiology of Pregnancy:
  - i) Menstruation.
  - ii) Pregnancy and fetal development.
  - iii) Physiological changes in various maternal system and organs.
  - iv) Endocrine system in pregnancy.
3. Complication of pregnancy:
  - i) Abortion, Ectopic.
  - ii) APH & PPH.
  - iii) PIH.
  - iv) Abnormal Presentation.
4. Antenatal and postnatal cases:
  - i) Normal Pregnancy- Symptoms signs, investigation, immunization, nutrition and supplements.
  - ii) Normal Delivery
  - iii) Normal Puerperium role of Physiotherapy in Pregnancy, delivery, puerperium
5. Common Gynecological Problems and role of physiotherapy
  - i) Disorders of menstruation, menorrhagia, DUB, menopause, menarche.
  - ii) Pelvic inflammatory disease.
  - iii) Fibroid uterus.
  - iv) Stress incontinent.
6. Common Obstetrics and Gynecological operation
  - i) Caesarean
  - ii) Hysterectomy
  - iii) D & C
  - iv) MTP
  - v) Tubectomy
  - vi) D & E

## **Section-II**

### **ENT**

**1. Clinical Presentation, pathology, complications, and treatment of the following conditions:**

**a. Rhinitis**

- i) Acute rhinitis
- ii) Chronic non-specific & specific rhinitis
- iii) Atrophic rhinitis
- iv) Vasomotor rhinitis

**b. Sinusitis**

- i) Acute rhino sinusitis & Chronic sinusitis

**c. Otitis Media**

- i) Acute otitis media
- ii) Chronic otitis media

**4. Otosclerosis:** Incidence, Clinical features & Medical and Surgical Rx.

**5. Mastoidectomy:** Types of hearing loss, methods to detect hearing loss. Presbycusis, hearing aids, hearing loss in children.

**6. Andrology:** Pure tone audiometry, impedance audiometry, types of speech, speech defects, speech therapy.

## **Section-III**

### **Ophthalmology**

#### **EYE EXAMINATION**

Eye-Anatomy and Physiology

- a) Common inflammations and other infections of the eye diagnosis and management.
- b) Ptosis, defects of the external rectus, management.
- c) Cataract, diagnosis and management.
- d) Refractions-Myopia, hyper Metropia, diagnosis and management.
- e) Pleoptic Exercises and indications.
- f) Physiological defects of vision and management.
- g) Cornea ulcers, management.



## 5. PHYSIOTHERAPY IN NEUROLOGY

### ***COURSE DESCRIPTION***

This course serves to integrate the knowledge gained by the students in Clinical Neurology, with the skills gained in exercise therapy, electrotherapy and massage, thus enabling them to apply these in clinical situations of dysfunction due to pathology in the nervous system.

### ***COURSE OBJECTIVES***

The objective of this course is that after 300 hours of lectures & demonstrations, practical and clinics, the student will be able to identify disability due to neurological dysfunction, set treatment goals and apply their skill in exercise therapy, electrotherapy and massage in clinical situation to restore neurological function. In addition, the student will be able to fulfill with 75% accuracy (as measured by written, oral & practical internal evaluations) the following objectives of the course.

### **SECTION-I**

### ***COURSE OUTLINE***

#### **A. Review of Clinical Neuroanatomy & Neurophysiology:**

Review, the structure and function of a ) neuron b) synapse c) supporting tissue, Review the organization and function of a) cerebral hemispheres b) cerebellum c) spinal cord d) peripheral nerves e) pyramidal system f) extra pyramidal system. Review the factors influencing alpha motor neuron activity. Review the neurological basis of muscle tone and movement and demonstrate the following: a) hypertonia b) spasticity and rigidity c) ataxia d) athetosis e) chorea

#### **B. Principles of Assessment**

Review a ) skill in history taking b) assessment of higher functions, cortical sensations, cranial nerves, dorsal column sensation and pain & temperature sensations c) assessment of motor function: grading of muscle power, assessment of range of movement, balance and coordination d) assessment of superficial and deep reflexes e) assessment of reflex maturation in terms of stimulus, position negative/positive reaction and their significance f) assessment of gait- both normal and abnormal ( spastic, ataxic and paralytic patterns) Emphasis should be placed on teaching accurate assessment techniques and various recording methods e.g. color coding on body charts, graphs etc.

#### **C. Principles of Treatment**

Review the treatment principles as follows:-

- a. Sensory re-education: hypersensitivity, hyposensitivity and anesthesia.
- b. Treatment of altered tone: hyper tonicity and hypo tonicity.
- c. Motor re-education: Strengthening exercise, coordination exercise, joint mobilization exercise, use of equilibrium and labyrinthine systems, use of PNF patterns, controlled sensory stimulation to bias the spindle cells e.g. Vibration, tactile, ice etc. use of stretch to elicit movement (facilitation), light joint compression (inhibition) use of rifle, activity to improve motor function, phylogenic sequence of motor behavior.
- d. Treatment to improve function: Free exercise, gait training with and without aids, activities of daily living, mat exercise, exercise for recreation.

- e. Review the use of ambulatory aids in neurological conditions: In spastic upper motor neuron lesions, In lower motor lesions, in dorsal column dysfunction and cerebral dysfunction.
- f. Review the use of splints and braces in spastic upper motor neuron and in flaccid lower motor neuron lesions, in both upper and lower limbs.
- g. Review the management of chronic pain in neurological conditions with respect to the type of pain, treatment modalities available, selection criteria for each modality and possible complications.

#### **D. Cerebral Palsy**

Define cerebral palsy and describe the topographical classification, monoplegia, diplegia, paraplegia, hemiplegia & tetraplegia.

Describe types of cerebral palsy. Assess reflex activity at different levels: Cortical, mid brain, brain stem, spinal. Assess developmental milestones from birth to five years, Assess functional ability: Prone to supine (rolling) Coming to sitting, quadruped, crawling, kneeling, kneel-stand, stand with support and walking. Examine for contractures as follows: hip flexion, adduction, internal rotation: Knee flexion: ankle plantar flexion, inversion, eversion. Flexion contracture of elbow, wrist & fingers and spinal deformities.

Treatment - Describe and demonstrate the treatment motor dysfunction: Passive movement, stretching of soft tissue tightness, use of ice to reduce spasticity, positioning the child to prevent soft tissue contractures, to inhibit abnormal reflexes and to facilitate volitional movement. Describe and demonstrate techniques of carrying of different type of CP children, encouraging bimanual activities in different starting positions like prone sitting and standing and activities across the midline. Describe appropriate home programmes for positioning the child, handling them and assisting improvement of function. Introduction to treatment techniques: Bobath, Rood.

#### **E. Peripheral Nerve Lesions**

Identify type of peripheral nerve lesions. Assess the motor system: Specific muscles. Range of motion, active and passive ranges, muscle girth. Assess sensory system: touch, pain, temperature, par aesthesia, nerve reverberation. Assess autonomic function: sweating, skin condition, soft tissue atrophy. Treatment: describe muscle reeducation techniques: electrical stimulation (selection of current): active, assisted, resisted movements: Passive and self assistive stretching and massage. Describe sensory reeducation and pain relief by various modalities; describe the common splints used peripheral nerve lesions. Static, dynamic and functional. Isolating muscle contraction, specific muscle strengthening.

Post- Operative management: Pressure bandaging reeducation after transfer. Describe a home programme.

#### **F. Neuro Muscular Diseases**

1. Amyotrophic Lateral sclerosis: introduction, etiopathology, clinical sign & symptoms, impairments, disabilities, evaluation Procedure, physiotherapy management.
2. Demyelinating inflammatory polyradiculoneuropathies: Introduction, etiopathology, clinical sign & symptoms, impairments, disabilities, evaluation procedure & physiotherapy management.
3. Muscular Dystrophy: Describe stages of the disease: ambulatory, wheelchair and bed stages. Describe significance of exercise resisted, active and free. Identify and assess common contractures and deformities. Assess range of motion and muscle power. Assess functional ability.  
Demonstrate treatment program for strengthening weak muscles:  
Active movements and hydrotherapy. Increase range of motion by suspension therapy, powder board, passive stretching positioning etc.  
Demonstrate gait training with appropriate orthoses, Describe management of chest complication:

breathing exercises chest percussion, drainage of secretions and assisted coughing.

### **G. Basal Ganglion disorders:**

Introduction to the function of basal Ganglion, relation with posture and movement.

- i. Parkinsonism: Review the natural history, course and prognosis of the disease. Identify and assess problems in posture sitting, kneeling and standing balance, voluntary and automatic movements rigidity. Tremor and gait. Assess also hearing, speech and finger dexterity. Describe disability grading according to Yulu. Demonstrate treatment: postural awareness and relaxation training. Gait training techniques: associated reactions, heel-toe gait, overcoming obstacles, start and stop on command, turning and walking backwards, forwards and sideward. Describe an appropriate home exercise programme.
- ii. Huntingtons Diseases: etiopathology, sign& symptoms, stages, examination procedure, physiotherapist treatment goals and treatment techniques.
- iii. Wilsons Diseases: etiopathology, sign& symptoms, stages, examination procedure, physiotherapist treatment goals and treatment techniques.
- iv. Tardive Dyskinesia : etiopathology, sign& symptoms, stages, examination procedure, physiotherapist treatment goals and treatment techniques.
- v. Dystonias : etiopathology, sign& symptoms, stages, examination procedure, physiotherapist treatment goals and treatment techniques.

### **H. Spinal Cord Lesions:**

Describe types of spinal cord lesions. Describe sign of tract and root

Interruptions, Describe positioning of the patient in acute spinal cord injury, Describe assessment of the motor system: tone, power of specific muscle range of motion and limbs girth. Describe assessment of sensory system and reflexes.

Describe assessment of functional ability and balance reactions in appropriate cases. Describe assessment of respiratory function. Muscles of respiration, coughing ability and vital capacity. Describe how the level of lesion is ascertained.

Treatment: Describe the stages of immobilization & stage when weight bearing is allowed, Describe spinal orthosis. Demonstrate motor reeducation programmes and programme for respiratory care in high level paraplegics and quadriplegics. Demonstrate progressive ambulation, mat exercises, various strengthening programmes, methods of decreasing spasticity and improving sitting balance. Demonstrate paraplegic gaits and reeducation in functional activities: transfer and protective falling. Describe common ambulatory aids used in paraplegics and common plints used .in tetraplegics. Describe the use of Hydrotherapy in paraplegics. Describe the concept of team approach in rehabilitation of these patients.

### **I. Hemiplegia:**

Define hemiplegia and identify the following: Sensory disturbance, alterations in tone, loss of selective movement, loss of balance reactions and communications problems.

Treatment: Describe the unilateral and bilateral approaches to treatment. Describe positioning in the supine position, on the affected and on the unaffected sides. Demonstrate activities in the recumbent position arm mobilization. Trunk elongation-scapular movement, arm elevation, activities for a recovering arm: activities for the lower limb. i.e. hip and knee flexion over the side of the bed, knee extension with dorsi flexion, hip control, and isolated knee extension

Mat activities: demonstrate rolling on to affected and unaffected sides, sitting and kneeling. Describe the technique of making a patient sit passively and active assisted in sitting: Demonstrate Transfer Technique. Describe activities in sitting: equal weight transference on buttocks, shuffling on buttocks, weight transfer through arms balance reaction on trunk & head.

Demonstrate activities in the standing position : standing from plinth, from chair ( assisted and independent), weight bearing an affected leg, knee, control in stand weight transfers forward, backward and side wards, Gait training and stair climbing. Describe tilt board activities in the lying and sitting positions. Describe additional methods of stimulation using verbal cues, ice, pressure & tapping. Describe management of shoulder pain and shoulder hand syndrome. Identify and describe hemiplegics gait, identify synergy, Components and abnormal reflex activities. Demonstrate reeducation of gait, motor relearning techniques functional approach and use of orthosis.

#### **J. CEREBELLAR LESIONS:**

Identify and assess abnormal tone, decomposition of movement. Rapid alternate movements, Pleurothotonus, proprioception, dysmetria, posture and gait. Treatment: Demonstrate exercises for in coordination- Frenkel's and weighted exercises. Demonstrate techniques for reeducation of balance and equilibrium reactions by visual compensation. Describe use of appropriate aids far ambulation depending in the severity of affection - walker, elbow crutches, quadruped, walking sticks, etc.

#### **K. POLIOMYELITIS & Post Polio syndrome:**

Define poliomyelitis and review the stages in the disease -acute, recovery and residual paralysis. Describe treatment in the acute stage: heat chest care, positioning. Describe the assessment of a patient in the recovery stage: active and passive range of motion, soft tissue tightness, muscle power & spinal deformities. Demonstrate treatment in the recovery stage: muscle strengthening- progress resistive exercises. Describe the role of suspension and hydrotherapy. Describe the treatment of soft tissue tightness by passive stretching, auto-stretching, pre-operative assessment of contractures: hip flexion, TA contracture, knee flexion and foot deformities. Review orthotic aids commonly used the management of polio. Describe tendon transfer operations commonly performed. Describe functional retraining for self care, gait training and posture correction.

**L. Multiple Sclerosis:** etiopathology, sign& symptoms, stages, examination procedure, physiotherapy treatment goals and treatment techniques.

**M. Balance & Vestibular Disorders:** basic physiology and balance control, common vestibular disorder, assessment, therapeutic goals and treatment techniques.

### **Section II**

#### **Neuro surgery**

Review of pathological changes and principle of pre and post operative management by physiotherapy of the following conditions.

- 1) Common surgeries of the cranium & brain.
- 2) Common surgeries of vertebral column & spinal cord.
- 3) Common surgeries of peripheral nerves.
- 4) Surgical interventions in traumatic head injuries.

**Practical**

Various Physiotherapy modalities and treatment techniques for above  
Mentioned conditions should be demonstrated and practiced by the students

## **6. Physiotherapy in General Medical & Surgical Conditions**

### **Section-I**

#### **General, Gynecology and Obstetrics and ENT.**

Review of pathological changes and principle of pre and post operative management by physiotherapy of the following conditions:

- 1) Common abdominal surgeries. Including GIT, liver, spleen, Kidney, bladder etc.
- 2) Common operation of reproductive system, including surgical intervention for child delivery. Ante natal & post natal, physiotherapy.
- 3) Common operations of the ear, nose, throat & Jaw as related to physiotherapy.
- 4) Common organ transplant surgeries - heart, liver, bone marrow etc.

### **Section-II**

#### **Wounds, Burns & Plastic Surgery.**

Review of pathological changes and principle of pre and post operative management by physiotherapy of the following conditions:

- 1) Wounds, ulcers, pressure sores:
- 2) Burns & their complications.
- 3) Common reconstructive surgical proceedings of the management of wounds, ulcers, burns & consequent contractures & deformities.

### **Section-III**

#### **Pediatrics.**

A. Review the examination & assessment of a pediatric patient.

B. Review of pathological change and principle of management by Physiotherapy of the following conditions:

- 1) Common congenital and acquired muscle skeletal disorders.
- 2) Common congenital and acquired neurological disorders (CNS & PNS)
- 3) Common heredity disorders.
- 4) Common nutritional, metabolic & vitamin deficiency disorders

5) Cerebral palsy, myopathy and muscular dystrophies.

#### **Section-IV**

##### **Geriatrics**

- A. Review of the examination & assessment of a geriatric patient.
- B. Review of pathological changes and principle of management by Physiotherapy of the following conditions:
- 1) Musculoskeletal disorders.
  - 2) Cardiopulmonary disorders
  - 3) Neurological disorders (CNS & PNS)
  - 4) Injuries & accidents specific to the aged.

#### **Section-VI**

##### **Skin & Psychiatric disorders**

Review of the Pathological and principles of management by physiotherapy to the following conditions,

1. Common conditions of Skin-Acne, Psoriasis, Alopecia, Leucoderma, leprosy, Sexually transmitted diseases.
2. Psychiatric Disorders- Psychosis, Psychoneurosis, Senile dementia.

##### **Practical**

Various Physiotherapy modalities and treatment techniques for above Mentioned conditions should be demonstrated and practiced by the students.

## 7. RATIONALE OF REHABILITATION

### COURSE DESCRIPTION

Following the basic sciences and clinical science course, this course will enable the students to understand their role in the management of disability within the rehabilitation team.

### COURSE OBJECTIVES

The objective of this course is that after 120 hours of lectures, demonstrations in addition to clinics, the student will be able to demonstrate an understanding of:

- A. The concept of team approach in rehabilitation will be discussed and implemented, through practical demonstration, with contributions from all members of the team.
- B. Observation and identification of diagnostic features in physical conditions will be practiced through clinical demonstration.
- C. Medical and surgical aspects of disabling conditions will be explained in relation to rehabilitation.
- D. Identification of residual potentials in patients with partial or total disability (temporary or permanent).
- E. Formulation of appropriate goals (long & short term) in treatment & rehabilitation will be discussed.

### Section I

#### **(Disability & Rehabilitation)**

1. Introduction to Disability & Rehabilitation.
2. Definition concerned in the phases of disability process.
3. Definition concerned with causes of impairment, functional limitation & disability.
4. Disability prevention and Rehabilitation Principles of physical Medicine, different Rehabilitation teams, their members and their role.
5. Community based Rehabilitation, Rural rehabilitation incorporated with Primary Health Centers.
6. Present rehabilitation services.
7. Reservation and Legislation for rehabilitation services for the disabled.
8. Principles of prescription writing and referral services.

### Section II

#### **(Bioengineering)**

1. Definition and principles of bioengineering. Designing and construction of upper lower extremity orthosis and spinal orthosis. Upper extremity and lower extremity prosthesis
2. Prescription, fitting, and checking.
3. Prescription of foot wear modifications and their importance
4. Wheel chair: various parts, prescription, modification, wheel chair activities & training.
5. Design and construction of adoptive devices.



### **Section III**

#### **(Physical Medicine)**

Principles of physical Medicine, calculation of percentage of physical Disability, Physical evaluation, principles of management and rehabilitation.

### **Section IV**

#### **(Communication rehabilitation)**

1. Principle of Management of Communication: Impairment.
2. Speech production
3. Communication disorders secondary to brain damage.
4. Evaluating Language
5. Aphasia and its treatment.
6. Dysarthria and its treatment.
7. Non- aphasic Language disorders.

### **Section V**

#### **(Social Rehabilitation)**

1. Principles in management of social problems.
2. Social needs of the patient.
3. Rehabilitation center environment.
4. The social worker as a member of the rehabilitation team.
5. Contribution on social work.

### **Section VI**

#### **(Vocational Rehabilitation)**

1. Principle in Management of Vocational problems
2. Vocational Evaluation.
3. Vocational Goals for the disabled.
4. Community Resources.

### **Section VII**

#### **(Administration)**

1. Description of various rehabilitation Institutions, centers and attached to Hospitals or other wise in India and abroad.
2. Space locations, climatic and environmental conditions, Preparation of scheme for set up of rehabilitation units in a hospital or outside hospital with a given number of patients and specific condition
3. Basic principles of Administration and organization philosophy & approach
4. Organizational of structure of the rehabilitation units of the handicapped including : Finances, Budgets and income and expenditure statement.

### **Section VIII**

#### **(Organization)**

1. Principle or relationship between personnel of rehabilitation unit and other department.
2. Principles of relationship between the institution and the guardians of the handicapped or patient.
3. Principle of relationship between head of the unit with various government and semi-government, trusts and juniors.
4. Relationship between a staff and his supervisors equals and juniors.
5. Personnel Management: recruitment, ACR, implementation of policies, use of resources. Accounts register, fees register, other office registers like cash book, stock, various forms and parents correspondence, leave registers, (including leave Account, miscellaneous like, financial records, grant applications etc.)
6. Principle of maintaining department secrecy,
7. Definition of policy and how best it Is to be carried out:.
8. Introduction to job analysis of importance.
9. Methods of teaching to handicapped and other workers in rehabilitation Unit.
10. Principles of teaching and guiding student's juniors and senior in O.T. and PT training schools and centers.

## **8. PHYSIOTHERAPY ETHICS & LAW.**

1. History of physiotherapy.
2. Philosophy and Philosophical statements.
3. Major Ethical principles applied to moral issue in health care.
4. Rules of professional conduct.
5. Scope of practice.
6. Relationships with patients.
7. Relationships with medical colleagues.
8. Relationships between professional with carrier.
9. Relationships with in the profession.
10. Confidentiality and responsibility.
11. Pervision of services and advertising.
12. -Sale of goods.
13. Personnel and professional standard.
14. Professional standard.
15. Professional and government licensing, Accreditation and Education standards.
16. Laws and legal concepts.
  - Law.
  - Legal concepts.
  - Protection from Malpractice claims.
  - Consumer protection Act.
  - Liability and Documentation.

## 9. RESEARCH METHODOLOGY AND BIOSTATISTICS

### Section-I

- a. Introduction & importance of research in Clinical practice, scientific approach, characteristics, purpose and limitations of research.
- b. Ethical issues in research, elements of informed constant.
- c. Research question including literature review.
- d. Research design, statics and basic concepts.
- e. Structure of a research proposal.
- f. Questionnaires, surveys and sampling
- g. Measurement, principles of measurement, reliability and validity.
- h. Reading published research for critical analysis.
  - i. Techniques of Descriptive research.
  - j. Writing the research for publication.
- k. Basic concepts for stage presentation of research.

### Section-II

- a. Biostatistics:
  - b. Descriptive stastics.
  - c. Comparison of means, T-tests.
  - d. Analysis of variance.
  - e. Multiple comparisons.
  - f. Non-parametric statistics.
  - g. Correlations.

## **GUIDELINES FOR INTERNSHIP TRAINING PROGRAMME**

### **Introduction:**

- ❖ Internship is a phase of training wherein a graduate is expected to conduct actual practice of physiotherapy and health care and acquire skills under supervision so that he/she may become capable of functioning independently.
- ❖ Internship is a phase of training where in a candidate is expected to conduct actual Physiotherapy practice, with fair independence in clinical decision making in low risk cases where as to work under supervision at high risk areas; so that at the end of Internship he/ she is capable to practice Physiotherapy independently.
- ❖ The Internship programme shall mainly focus on acquisition of specific skills listed in the major areas of training by —hands on experience & also on ability to conduct a scientific project.

### **1. GENERAL OBJECTIVES:**

- 1) The Chief of parent institute shall be responsible for implementation of Internship programme & also for the issue of Internship completion certificate.
- 2) Internship shall commence not later than 15 days from the day of declaration of results of IV B.P.T. examination.
- 3) It shall be binding on the candidate to follow strictly, the code of conduct prescribed by the Haryana State Council for Physiotherapy, Any breach in the conduct / discipline shall disqualify the candidate from pursuing Internship for a period of One week to One month or more depending upon the gravity of breach of conduct.
- 4) Stipend is strongly recommended during the Internship.
- 5) Compulsory Internship shall include rotational clinical assignments, administrative skills & a scientific project over a period of 26 weeks/6 months. Candidate is however encouraged to extend optional —Hands on practice for six additional months in the desired areas at the hospitals, attached to a college conducting B.P.T. programme or the listed by the Haryana state council for physiotherapy; as per the Rules & Regulations applicable to Internees regarding attendance, attitude, performance & evaluation. Such clinical experience on successful completion & on passing in evaluation shall be documented & shall be strongly recommended for additional credits for higher education or employment.
- 6) On successful completion of Internship, to the satisfaction of the Head of Physiotherapy Department & the Chief of the parent institution, the Internship completion certificate shall be issued by the parent institution; and it will be forwarded to the concern University for the Award of B.P.T. Degree and to the Haryana state council for further reference. Internship completion certificate issued by the college is only valid for registration in Haryana State Council for Physiotherapy.

### **OBJECTIVES:**

At the end of Internship programme, the candidate shall be able to-

- 1) Detect & evaluate Anatomical, Patho-physiological, & Psycho-somatic impairments resulting in Dysfunction of movement of all the ages, & occupations; as well as epidemiological sectors in the population; & arrive at the appropriate Physical & Functional diagnosis.
- 2) Understand the rationale & basic investigative approach to the Medical system & surgical intervention regimens & accordingly, Plan & implement specific Physiotherapeutic measures effectively or make a timely decision for referral to appropriate specialty.
- 3) Select strategies for cure & care; adopt preventive, restorative & Rehabilitative measures for maximum possible independence of a client/ patient, at home, work place & in the community.
- 4) Help in all types of emergencies medical, surgical, neonatal, & pediatric by appropriate therapeutic procedures & shall be able to implement, as a first level care Cardio Pulmonary resuscitation and first-aid providing support to the injured area, splinting etc, in the situation when medical aid is not available.

- 5) Demonstrate skill to promote Health in general as well as competitive level, such as sports, work productivity, Geriatric & Women's health etc, and keeping in mind National and state level Health policies.
- 6) Develop skill to function as an essential member in co-partnership of the health team organized to deliver the health & family welfare services in existing socioeconomic, political & cultural environment.
- 7) Develop communication skill for purpose of transfer of suitable techniques to be used creatively at various stages of treatment, compatible with the psychological status of the beneficiary & skill to motivate the client & his family to religiously carry out prescribed home exercise programme & compliance to follow ergonomic advice given as a preventive / adoptive measure.
- 8) Demonstrate skill of administrative work, managing patients attending Physiotherapy services, by developing skills to use appropriate manipulative mobilization methods, Neurophysiologic maneuvers, techniques of Bronchial hygiene, Breathing retraining; application of Electro\therapeutic modalities & Therapeutic exercise; for the purpose of, evaluation, assessment, diagnostic procedures; & for the purpose of treatment as well, bearing in mind their indications & contraindications.
- 9) Develop ability to prescribe, assess (fitting) & use of appropriate orthotic & prosthetic devices; in addition to an ability to fabricate simple splints for extremities, for the purpose of prevention, support & training for ambulation & activities of daily living.<sup>3</sup>
- 10) Develop ability to do Functional Disability evaluation of Movement; & recommend for rest or alternative work substitution during the period of recovery or in case of permanent disability.
- 11) Practice professional autonomy & ethical principle with referral as well as first contact client in conformity with ethical code for Physiotherapists and as per the guideline of GSCPT.

#### **INTERNSHIP SCHEDULE:**

- ❖ Candidate shall be posted to Rotational Clinical assignments of total 26 weeks/6 months, including administrative skills pertaining to Physiotherapy practice & a scientific project of 3 hours per week [total not less than 78 hours]. The schedule of Internship shall be as follows:

<b>Assignment</b>	<b>Discipline</b>	<b>Duration</b>
Musculoskeletal Physiotherapy	OPD/Indoor Orthopedics/Burns/ Surgical amputations/Hand rehab./Sports injury/ wound & skin care.	8 weeks
Neurophysiotherapy	OPD/Neurology/Neurosurgery/ Pediatrics/ EMG-NCV	6 weeks
Cardio-Pulmonary Physiotherapy	OPD/ Medical/Surgical Intensive care	6 weeks
Community Physiotherapy	Women's health + Geriatric health at primary health center or community/ Industrial health/ fitness clinic.	6 weeks

- ❖ Clinical Posting in Community P.T can also be conducted at the rural set up with prior permission from the HOD and the Dean/ Principal of the parent institution. Internee must work under supervision of qualified registered physiotherapist.
- ❖ Duration in different discipline can be changed/modified by the head of the institute as per requirements in some special situations.

#### **SCIENTIFIC PROJECT**

- ❖ During the Internship, candidate shall undertake a scientific project of 3 hours per weeks [total duration not less than 78 hours]. Scientific projects may include case study, case presentation, assignment, camp,

public awareness programme.

- ❖ The candidate shall submit the project not earlier than two week to the last day of internship & the HOD, physiotherapy department of parent institution shall sign on the same if the project is up to her /his satisfaction.

### **EVALUATION**

- ❖ During the rotational posting, student shall treat all kinds of patients & also undertake skills of maintaining administrative records & Maintenance of equipment.
- ❖ The candidate shall maintain a log book & record all the events of the respective posting. He /She shall be closely monitored by the senior Physiotherapy staff in charge throughout the posting & the same shall also sign in the Log book on completion of the assignment.
- ❖ There shall be formative & summative assessment at the end of each of the posting given in the schedule & score will be given to each by the panel of minimum 3 teachers involved in supervision of the student during the respective assignment.
- ❖ Student shall repeat the respective assignment for a period of 25% of the period allotted to the respective posting, if he /she fails to score minimum 3 in the average of overall Formative + Summative score obtained during the respective posting.

### **During the Internship, student MUST CONDUCT following procedures**

#### **A) Electro-therapeutic procedures**

- 1) Application of Low frequency currents [galvanic/faradic like, rectangular, triangular, surged, interrupted etc.] for
  - Electro-diagnosis-
    - short-long pulse test
    - Motor points,
    - S.D. curves,
    - Sensory threshold,
    - Pain threshold & tolerance,
  - Therapeutic purpose-  
Iontophoresis of various pharmaco-therapeutic drugs, Cathodal & anodal galvanism, Electrical reeducation, T.N.S, Interferential current therapy ,Beat frequency, medium frequency currents , strong surged faradic stimulations, for pain relief & reduction of swelling etc.
- 2) Application of Superficial & Deep thermal agents- Cryotherapy, Hot packs, Paraffin wax bath, Infra-red radiations, short wave diathermy.
- 3) Calculation of appropriate dosage & application of
  - U.V.R [B /C] for wound care, & U.V.A. for skin conditions
  - Continuous & pulsed Ultrasound of 1 & 3 MHz frequency for direct application, with coupling agents, water bags & phonophoresis.
- 4) Testing of all the electrical equipment.

#### **B) Therapeutic Gymnastic Procedures-**

- ❖ Selection & application of appropriate gymnastic tool for the management of dysfunction of mobility, strength, power, endurance (M.M.T.), balance, coordination, cardio-pulmonary fitness; & for functional training such as transfers, mat activity, postural correction, gait training with or without aids, ambulation & A.D.L.

- ❖ Group activity procedures-Select & implement group activity by effective & appropriate command & demonstration, such as Jacobson`s Relaxation exercises, standard Yoga postures, Mat exercises, transfer exercises, shoulder/ Back class, General fitness/ Aerobic exercises . Balancing exercises , Breathing exercise and different pranayama.

### **C) Manipulative mobilization procedures**

- ❖ Therapeutic Massage maneuvers, for extremities, face, neck & back.
- ❖ Assessment of Physiological movements, & end-feel.; identification of target soft tissue to be mobilized, & application of NON-Thrust mobilization techniques of Kaltenborne, Maitland, Mulligan, Buttlar, Mckenzie & muscle energy methods, passive sustained stretching on Spine & extremities, manual traction for cervical & lumbar spine.

- D) **Therapeutic exercise** [including auto-stretching exercises.] for Home programme, for restoration & maintenance of function, prevention of Dysfunction.

### **E) Neuromotor & Psychosomatic procedures**

- ❖ Manual muscle testing [group & individual], identification of trick movements, muscle imbalance,
- ❖ Assessment of posture [static & dynamic] & its deviations,
- ❖ Assessment of Gait & its deviation; selection of appropriate walking aids, & training, stair climbing;
- ❖ Neuro- developmental & /neurophysiologic methods of assessment & treatment [M.R.P.,P.N.F, N.D.T., Brunstromme, Bobath, Butler etc] of voluntary control, spasticity, [Ashworth`s scale], coordination, balance, abnormal movements, functional re- education, standing, gait training, ADL training, passive mobilization for maintenance of paralytic limbs, Assessment of peripheral sensations, dermatomes, superficial & deep reflexes.

### **F) Cardio-Pulmonary Procedures**

- ❖ Assessment of B.P., R.R., Pulse, body temp. , Abnormal breath sounds, breathing pattern, chest expansion, exercise tolerance [6 min. walk test] , P.E.F.R.,
- ❖ Selection & application of nebulisation, humidification, positioning for postural drainage, percussion manipulations for bronchial hygiene, coughing –huffing maneuvers, suctioning for tracheostomized & non- tracheostomized patient, comatose patient, assist in bronchial hygiene in patients with Oxygen support or artificial ventilation;
- ❖ Selection & implementation of appropriate Breathing exercise, [inspiratory/ expiratory /modified inspiratory;]
- ❖ Cardio-pulmonary resuscitation

### **G) Other Therapeutic procedures**

- ❖ Fabrication [with plaster of Paris bandages/ thermoplast/similar material-] splints- cock up, knuckle bender, outriggers, opponence splint, soft cervical collar; posterior guards for gait training,
- ❖ Strapping & Taping of extremities for support, & pain relief
- ❖ Application of elastocrappe bandage for prevention of swelling, shaping of amputated stump
- ❖ Wound care-application of U.V.R., TNS, etc, dressing; UVR application for vitiligo, & psoriasis

### **H) Community Physiotherapy procedures**

- ❖ Collect, analyze, interpret, & present , simple community & hospital based data,
- ❖ Participate as a member in co-partnership in the Rehabilitation work in the community,
- ❖ Participate in the programmes in prevention & control of locally prevalent functional disorders
- ❖ Be capable of conducting survey & employ its findings as a measures towards arriving at a community functional diagnosis
  - ❖ Provide health education to an individual / community on –



- General fitness, ergonomic alterations for better quality life at home & work place,
- Preventive tools to avoid accidents, in the industrial area
- Skin care in case of loss /impairment of sensations
- Care of the back
  
- Antenatal/ post-natal exercises; management of pelvic dysfunction [urinary / anorectal incontinence; per vaginal prolapsed
- Specific warming up activities & appropriate maintenance exercises to elderly patients

#### **TO ASSIST IN PROCEDURES**

- ❖ Fabrication of pylon
- ❖ Electromyography
- ❖ Physiotherapy in Intensive care
- ❖ Disaster management

#### **EVALUATION SCHEME**

Skills during Formative Evaluation shall include following

- ❖ Musculo-skeletal Physiotherapy
- ❖ Neuro-Physiotherapy
- ❖ Cardio-pulmonary Physiotherapy
- ❖ Community Physiotherapy

#### **START OF INTERNSHIP PROGRAMME**

- ❖ The programme will commence within 15 days after the declaration of Final B.P.T. result by the University. In special circumstances with the permission of the head of the institute, student can start internship within 45 days of declaration of results.

#### **LEAVE FOR INTERNS**

- ❖ An internee shall be entitled for maximum 6 days leave during six months period of internship posting. An internee will not be permitted to avail more than 2 days leave in any department. Period of leave in excess of 2 days in a department will have to be extended in the same department. Under any circumstances this period will not be condoned by any authority.
- ❖ However if any student wants to attend any state/national/international conference, workshop or seminar then maximally 3 days study leave can be granted to the students with production of the proper documents or certificate. It should not be more than 3 days in any conditions.

#### **Stipulation for repeat posting in concerned discipline**

- ❖ Unsatisfactory performance.
- ❖ Prolonged illness, Medical Certificate must be validated by a Medical Board set up by the Institution, where rotatory internship is being undertaken.
- ❖ To prevent Interns from prolonging the internship period due to extraneous reasons other than the above (i) and (ii) and taking extra leave beyond permitted leave, the repeat posting will be done.
- ❖ However head of the institute can allow 15 days more leave (other than 6 leave and 3 study leave) but student have to complete the extension for these 15 days leave at the end of internship programme. Stipend cannot be claimed for more than 6 months.
- ❖ If student takes leave more than these total leaves (6+3+15=24 days), he/she has to do the repeat posting at each place as prescribed and it will be considered as fresh internee. (Relaxation will be applicable in case of pregnancy on production of appropriate medical certificate.)

#### **NUMBER OF INTERNEES FOR EXTERNSHIP**

- ❖ The number of internees should not be more than addition 50% of the intake capacity of the academic institute or the number of students appears in final year university exam.
- ❖ The outside internees will be allowed on the merit base not on the first come first base. Merit will be made as per the following criteria.

- 50% marks obtained from all four years
- 50% marks from the interview or exam conducted by the institute
- For each extra attempts there will be reduction of 5%
- In government institute the outside students have to pay the fees as decided by the Haryana government.

**EXTERNSHIP**

Ordinarily rotatory internship must be undertaken in the institution where the student has enrolled.

However, a student can do internship in HSCP approved hospital/institution for which the following guidelines may be followed:

**Externship in Haryana:**

- ❖ A student must apply for permission to do internship outside from its parent institute along with the desired documents. Before considering the student's application to do internship in another hospital /physiotherapy college, he/she will be required Permission from the institutions where the student wishes to do internship.
- ❖ Student can do internship from 1 month to 6 months according to the permission granted by the both institutes.
- ❖ No stipend will be paid to the students if he/she does internship outside of parent institute.
- ❖ It is the duty of college to allow internship in parent institute to their students. No college can make compulsory rule to do internship outside of the parent institute.



FORMAT OF INTERNSHIP EVALUATION (For office use only)

Name: - \_\_\_\_\_ duration from \_\_\_\_\_ to \_\_\_\_\_ Assignment:

- \_\_\_\_\_

SUMMATIVE EVALUATION		FORMATIVE EVALUATION	
MAXIMUM SCORE	5 each	MAXIMUM SCORE	5 each
Punctuality		Cognitive(Problem solving/clinical decision & reasoning/ planning treatment	
Attitude towards patients & colleagues character		Physical Assessment Skills	
Urge for learning/ Initiative		Skills of Treatment maneuvers	
Accountability/ Responsibility		Skills of equipment handling	
Administrative ability (records/ maintenance of equipment)		Participation in Academic activities	
<b>Total</b>		<b>Total</b>	

**Grades:**

1. Poor
2. Below Average
3. Average
4. Good
5. Excellent

Head of the Department.

Dean/ Principal of the College

Minimum Grade required for passing – Average of Overall score obtained from the respective assignment is to be considered. Minimum score for passing shall be – 3. Average.

**INTERNSHIP COMPLETION CERTIFICATE**

**B.P.T. Programme**

Name of the College \_\_\_\_\_

Ref. No. \_\_\_\_\_

Date \_\_\_\_\_

This is to certify that Mr. /Ms./Mrs. \_\_\_\_\_ has successfully completed the Rotational Internship from \_\_\_\_\_ To \_\_\_\_\_ Details of the posting are as follows:

NO.	DEPARTMENT	PERIOD	GRADE
1.	Musculo-skeletal Physiotherapy	_____ to _____	
2.	Neuro-Physiotherapy	_____ to _____	
3.	Cardio-pulmonary physiotherapy	_____ to _____	
4.	Community Physiotherapy	_____ to _____	
5.	Extension due to absentee / Unsatisfactory performance _____ to _____ at the Department _____  Project _____ _____		
6.	[sign] _____ HOD Physiotherapy		
7.	[sign] _____ Department Dean /Principal		

## **Bachelor of Physiotherapy**

### **Examination Guidelines**

The examination shall be held twice in year, one regular in the month of April/May and the other supplementary examination in the month of September/October or on such dates as may be fixed by the Vice-Chancellor.

The date(s) fixed for the receipt of the admission form and fees for examinations without and with late fee, as fixed by Vice-Chancellor shall be notified by the Controller of Examination.

First B.P.T. Examination will be held at the end of first academic year, second at the end of second academic year, third at the end of third academic year and fourth or final (B.P.T.) Examination at the end of Fourth academic year.

A candidate who has passed the first year BPT examination of this University shall be join 2nd year BPT class. However, a candidate who has failed in one or more subjects in the first year BPT examination may be allowed to attend the next higher until he/she class appears and qualifies the 1st year BPT examination. A candidate will not be allowed to appear in 2nd year BPT Examination till he/she passes in all the subjects of Ist year BPT Examination as regular or ex-student.

A candidate who has passed the second year BPT examination of this University shall be eligible to join 3rd year BPT class. However, a candidate who has failed in one or more subjects in the second year BPT examination may be allowed to attend the next higher class until he/she appears and qualifies for the 2nd year BPT examination. A candidate will not be allowed to appear in 3rd year BPT Examination till he/she passes in all the subjects of 2nd year BPT Examination as regular or ex-student.

A candidate who has passed the Third year BPT examination of this University shall be eligible to join 4 year BPT class. However, a candidate who has failed in one or more subjects in the third year BPT examination may be allowed to attend the next higher class until he/she appears and qualities the 3rd year BPT examination. A candidate will not be allowed to appear in 44 year BPT Examination till helshe passes in all the subjects of 3rd year BPT Examination as regular or ex-students.

### **First Professional BPT Examination**

The First Professional B.P.T Examination shall be open to a person who:

a) has been enrolled for one academic year preceding the examination in a Physiotherapy College affiliated to this University.

b) has his/her name submitted to the Registrar by the Principal of the college with the following certificates:-

i) of having attended separately in theory and practical/clinical not less than 75% of the subjects of the lectures delivered and practical's conducted in each of the subjects prescribed for the examination provided that deficiency in the number of lectures delivered and practical's conducted may be condoned by the Director/Principal to the extent of 5% of the lectures delivered.

\* The practice of condonation of attendance up to 5 percent by the Principal/ Head of Institution has been stopped vide letter Endst No. UHSR/Acad./A-II/6798-6893 dated 11/6/18.

ii) of having secured at least 35% marks of the total marks fixed for internal assessment in each subject, separately in order to be eligible to appear in all University examinations.

iii) of good moral character.

Note: 1) Internal Assessment should be submitted to the Controller of Examination at least two weeks before the commencement of theory examinations. All the college shall adopt uniform criteria for Internal Assessment for which a record of each student shall be maintained in each department, which should be made available for inspection by the student concerned as well as university authorities.

The re-apper/fail students may be reassured if they so desire, next time for the purpose of improvement of internal assessment otherwise their previous score of assessment will be carried forward.

2) If a candidate fulfils the condition laid down in clause i and ii above for one or more subject (s) he/ she

may be allowed to take the examination in such subject (s) in which he/ she fulfils the requirements.

(c) The First Professional B. P.T. Examination shall be in the subjects as per syllabus and candidate shall be required to pass all the subjects-

i) There shall be a provision of internal assessment of 10% marks in each subject of B. P. T. course in theory and practical, separately.

ii) Each theory paper shall be of three hours duration.

iii) The minimum number of marks to pass the examination shall be 50% in theory including internal Assessment, and 50% in practical/clinical including Internal Assessment in each subject,

iv) A candidate securing 75% or above marks in any of the subjects shall be declared to have passed with Distinction in that subject provided he has passed the examination in first attempt.

v) A candidate who fails in one or more subjects in his/her 1st attempt, shall be permitted to attend classes in 2nd Prof B.P.T. course. However, he/she must pass First Prof B.P.T. examinations at least one term (6 months) before he/she is allowed to appear in the Second Prof B.P. I. examination.

vi) A candidate who passes in one or more subjects shall be exempted from appearing in these subjects at a subsequent examination. The candidate can appear in failed subject in the subsequent examination irrespective of the number of attempts already taken. The candidate will not have to appear in subjects already passed.

### **Second Professional BPT Examination**

The Second Professional B.P.T. Examination shall be open to a person who

- (a) has been enrolled for one academic year preceding the examination in a Physiotherapy College affiliated to this University.

(b) has previously passed the First Prof B.P.T. examination of this University or an examination of any other recognized University/ Institution in India considered equivalent for the purpose by the University

(c) has his/her name submitted to the Registrar by the Principal of the college with the following certificates.

i) of having attended separately in theory and practical / clinical not less than 75 percent of the lectures delivered and practical conducted in each of the subjects of Second Professional B.P.T. course prescribed for the examination provided that deficiency in the number of lectures delivered and practical conducted may be condoned by the Director/Principal to the extent of 5% of the lectures delivered.

\* The practice of condonation of attendance upto 5 percent by the Principal/ Head of Institution has been stopped vide letter Endst No. UHSR/Acad./A-11/6798-6893 dated 11/6/18.

**ii) of having secured at least 35% marks of the total marks fixed for internal assessment in each subject, separately, order to be eligible to appear in all University examinations.**

iii) of good moral character.

Note:

Internal Assessment should be submitted to the Controller of examination at least two weeks before the commencement of theory examinations. All the colleges shall adopt uniform criteria for Internal Assessment for which a record of each student shall be maintained in each department, which should be made available for inspection by the student concerned as well as University authorities. The re-appear/fail students may be res assessed, if they so desire, next time for the purpose of improvement of internal assessment, otherwise their previous score of assessment will be carried forward.

If a candidate fulfils the condition laid down in clause i and ii above for one or more subject (s) he/ she may be allowed to take the examination in such subject (s) in which he/ she fulfils the requirements.

The Second Professional B.P.T. Examination shall be held one year after First Professional B.P.T. Examination and the candidate is required to pass the subjects as per syllabus.

There shall be a provision of internal assessment of 10% marks in each subject of B.P.T. courses in theory and practical separately.

**The minimum number of marks to pass the examination shall be 50% in theory including Internal Assessment and 50% in practical/clinical including Internal Assessment in each subject.**

A candidate securing 75% or above marks in any of the subjects shall be declared to have passed with Distinction in that subject provided he has passed the examination in first attempt.

A candidate who passes in one or more subjects shall be exempted from appearing in these subjects at a subsequent examination. The candidate can appear in failed subject in the subsequent examination irrespective of the number of attempts already taken. The candidate will not have to appear in subjects already passed.

Provided that the candidate who fails in one or more subjects in his/her 1st attempt shall be permitted to attend classes of 3rd Prof B.P.T course. However, he/she must pass the Second Prof B.P.T examination at least one term (6 months) before he/she is allowed to appear in the Third Prof B.Ph.T. examination.

### **Third Professional BPT Examination**

The Third Professional B.P.T. Examination shall be open to a person who

- (a) has been enrolled for one academic year preceding the examination in a Physiotherapy College affiliated to the University
- (b) has previously passed the Second Prof B.P.T. examination of this University or an examination of any other recognized University/ Institution in India considered equivalent for the purpose by the University.
- c) has his/her name submitted to the Registrar by the Principal of the college with the following certificates:-



i) of having attended separately in theory and practical/ clinical not less than **75 percent** of the lectures delivered and practical conducted in each of the subjects of Third Professional B.P.T. course prescribed for the examination provided that deficiency in the number of lectures delivered and practical conducted may be condoned by the **Director/Principal to the extent of 5% of the lectures delivered.**

\* The practice of condonation of attendance upto 5 percent by the Principal/ Head of Institution has been stopped vide letter Endst No UHSR/Acad./A-11/6798-6893 dated 11/6/18.

ii) of having secured at least 35% marks of the total marks fixed for internal assessment in each subject, separately; order to be eligible to appear in all University examinations.

iii) of good moral character.

Note:

Internal Assessment should be submitted to the Controller of Examinations at least two weeks before the commencement of theory examinations. All the colleges shall adopt uniform criteria for Internal Assessment for which a record of each student shall be maintained in each department, which should be made available for inspection by the student concerned as well as University authorities. The re-appear/fail students may be re-assessed, if they so desire, next time for the purpose of improvement of internal assessment, otherwise their previous score of assessment will be carried forward.

If a candidate who fulfils the condition laid down in clause i & ii above for one or more subject (s) and not for the other. he/she may be allowed to take the examination in such subject (s) in which he/she fulfils the requirements.

The Third Professional B.P.T. Examination shall be held one year after the Second Professional Examination and the candidate is required to pass the subjects as per syllabus-

There shall be a provision of internal assessment of 10% marks in each subject of B.P.T. course in theory and practical, separately.

The minimum number of marks to pass the examination shall be 50% in theory including Internal Assessment and 50% in practical/clinical including Internal Assessment in each subject.

A candidate securing 75% or above marks in any of the subjects shall be declared to have passed with Distinction in that subject provided he has passed the examination in first attempt.

A candidate who passes in one or more subjects shall be exempted from appearing in these subjects at a subsequent examination. The candidate can appear in failed subject in the subsequent examination irrespective of the number of attempts already taken. The candidate will not have to appear in subjects already passed.

Provided that the Candidate who fails in one or more subjects in his/her 1st attempt shall be permitted to attend classes of Final Prof B.P.T. course. However, he/she must pass the Third Prof B.P.T. examination at least one term (6 months) before he/she is allowed to appear in the Final Prof. B.P.T. examination.

### **Final Professional BPT Examination**

The Final Professional B.P.T. Examination shall be open to a person who

- (a) has been enrolled for one academic year preceding their examination in a Physiotherapy College affiliated to this University.
- (b) has previously passed the Third Prof B.P.T. examination of this University or an examination of any other recognized University/ Institution in India considered equivalent for the purpose by the University.
- (c) has his/her name submitted to the Registrar by the Principal of the college with the following certificates-
  - i) of having attended separately in theory and practical/ clinical not less than 75 percent of The lectures delivered and practical conducted in each of the subjects of Final Professional B.P.T. course prescribed for the examination provided that deficiency in the number of lectures delivered and practical conducted may be condoned by the Director/Principal to the extent of 5% of the lectures delivered.

\* The practice of condonation of attendance upto 5 percent by the Principal/ Head of Institution has been stopped vide letter Endst No UHSR/Acad./A-I/6798-6893 dated 11/6/18.

ii) of having secured at least 35% marks of the total marks fixed for internal assessment in each subject, separately, order to be eligible to appear in all University examinations.

iii) of good moral character.

Note:

Internal Assessment should be submitted to the Controller of Examinations at least two weeks before the commencement of theory examinations. All the colleges shall adopt uniform criteria for Internal Assessment for which a record of each student shall be maintained in each department, which should be made available for inspection by the student concerned as well as University authorities.

If a candidate fulfils the condition laid down in clause i & ii above for one or more subject (s) and not for the other, her she may be allowed to take the examination in such subject (s) in which he/ she fulfils the requirements.

The Final Professional B.P.T. Examination shall be held one year after the Third Professional Examination and the candidate is required to pass the subjects as per syllabus:

There shall be a provision of internal assessment of 10% marks in each subject of B.P.T. course in theory and practical, separately.

The minimum number of marks to pass the examination shall be 50% in theory including Internal Assessment and 50% in practical/clinical including Internal Assessment in each subject.

A candidate securing 75% or above marks in any of the subjects shall be declared to have passed with Distinction in that subject provided he has passed the examination in first attempt.

A candidate who passes in one or more subjects shall be exempted from appearing in these subjects at a subsequent examination. The candidate can appear in failed subject in the subsequent examination irrespective of the number of attempts already taken. The candidate will not have to appear in subjects already passed.

### **General conditions**

The examiners shall be appointed by the University on the recommendations of the Board of Studies in Para Medical Sciences. Provided that **The senior most teacher in a subject who has taught the students for at least six months shall be appointed internal examiner.**

**No person below the rank of Reader/Assistant Professor in the subject of Degree level institution shall be appointed as an Internal Examiner. However, in compelling circumstances a Senior Lecturer/Lecturer with at least three years of teaching experience in the subject may be made an Internal Examiner.**

**External Examiner shall be appointed only from the teaching staff of Physiotherapy College outside the University.**

The University may get each paper/ part set from External and internal Examiners.

The practical examination shall be conducted jointly by the internal examiner of the respective institution and the external examiner for that institute.

The award list duly signed by both the examiners would be submitted to the Controller of Examinations immediately after the conduct of examination. A copy of the result of practical examination would be kept by the Internal Examiner for six months for reference and record.

In order to maintain secrecy the evaluation of answer books shall be got evaluated by putting fictitious roll numbers thereon-spot evaluation (table marking) or any other method under the direction of the Vice-Chancellor.

The Internal Assessment shall be determined by the Head of the Department concerned based on the

student's class work, homework, house examination records and participation in co-curricular activities and the same duly countersigned by the Principal shall be submitted to the Controller of Examination at least two weeks before the commencement of the examination.

### **Declaration of Result**

The Controller of Examinations shall publish the result after the examination. The candidates shall be issued Detailed Marks Certificate through their principals. The Decree of Bachelor of Physiotherapy (B.P.T.) shall be awarded by the University on successful completion of six months compulsory rotatory internship, duly certified by the Principal of the College.

### **Migration**

A student of any Physiotherapy College who has passed his **First Prof. B.P.T. examination may be permitted to migrate from one College to another under the jurisdiction of Pt. B.D. Sharma University of Health Sciences, Rohtak on the following conditions: -**

- a) The student has to apply for migration to the University within two months from the declaration of his/Tier First Prof. B.P.T. result.
- b) The applicant student will be permitted to migrate if a vacant seat is available in the College where, he/she wants to migrate.
- c) The applicant's total aggregate marks should not be less than the lowest marks obtained by a student of the college to which the migration is sought. This will be applicable only to the applicants seeking inter-University migration.
- d) The applicant must submit No Objection Certificate from both the Principals.
- e) Notwithstanding anything contained in the above rules, if an applicant does not fulfil any of the conditions given above, the Vice-Chancellor may allow a student to migrate under exceptional circumstances to another College.

### **Grace Marks**

**The grace marks up to a maximum of five marks may be awarded at the discretion of the University to a student who has failed only in one subject but has passed in all other subjects.**

### **Clinical Training**

All the candidates shall complete 300 teaching hours in Clinical Training during the course.

### **Compulsory Internship**

All the students after passing Final Prof B.P.T. examination shall go in for six months compulsory rotatory internship in the following departments in their College/Institution:-

- |   |         |
|---|---------|
| i) Physiotherapy Out-Patient Department         | 1 month |
| li) Orthopedic                                  | 1 month |
| ill) Neurology & Neuro Surgery including ICU    | 1 month |
| iv) Cardiology & Cardiothoracic Surgery         | 1 month |
| v) General Medicine & General Surgery           | 1 month |
| vi) Community based Rehabilitation / Geriatrics | 1 month |

After completion of internship the concerned **Principal will certify that the student has satisfactorily completed internship. Thereafter the student will be awarded the degree of Bachelor of Physiotherapy (B.P.T.).**

Under some exceptional circumstances a student may be permitted to complete his internship in another affiliated Physiotherapy College if Principals of both the colleges give their consent and the University issues No Objection Certificate to this effect. This would be allowed only if a seat is vacant in the college in which the student wants to complete his internship.

**All the students shall start their internship within 15 days from the declaration of result.**

Under exceptional circumstances, if a student cannot do so, he will have to take special. Permission of the University on the recommendations of the Principal.

### **General**

Notwithstanding the integrated nature of this course which is spread over more than one academic year, the Ordinance in force at the time a student joins the course shall held good only for the examination held during or at the end of the academic year and nothing in this Ordinance shall be deemed to debar the University from amending the Ordinance and the amended Ordinance, if any shall apply to all students, whether old or new.

<b>BACHELOR OF PHYSIOTHERAPY- I YEAR</b>									
<b>Sr.No.</b>	<b>Course</b>	<b>Subjects</b>	<b>Total Study Hours</b>		<b>Theory Marks</b>		<b>Practical Marks</b>		<b>Total Marks</b>
			<b>Theory</b>	<b>Practical</b>	<b>Internal</b>	<b>External</b>	<b>Internal</b>	<b>External</b>	
1	BPT 101	Anatomy	160	160	20	80	20	80	200
2	BPT 102	Physiology	120	160	20	80	20	80	200
3	BPT 103	Biochemistry	120		20	80	-	-	100
4	BPT 104	Electrotherapy-I	100	100	20	80	20	80	200
5	BPT 105	Exercise Therapy-I	100	100	20	80	20	80	200
6	BPT 106	Environmental Studies	50		Internal Exam (Grading System) (100 Marks)				

<b>Total</b>					<b>100</b>	<b>400</b>	<b>80</b>	<b>320</b>	<b>900</b>
<b>BACHELOR OF PHYSIOTHERAPY- II YEAR</b>									
Sr.No.	Course	Subjects	Total Study Hours		Theory Marks		Practical Marks		Total Marks
			Theory	Practical	Internal	External	Internal	External	
1	BPT 201	Pathology and Microbiology	60		20	80	-	-	100
2	BPT 202	Pharmacology	80		20	80	-	-	100
3	BPT 203	Electrotherapy-II	100	100	20	80	20	80	200
4	BPT 204	Exercise therapy-II	100	100	20	80	20	80	200
5	BPT 205	Biomechanics	60	60	20	80	20	80	200
6	BPT 206	Sociology & Psychology	200		20	80	-	-	100



7	BPT 207	Computer Application		80	-	-	20	80	100
8	BPT 208	Clinical Training		10 Hours per week for 32 weeks	-	-	-	-	-
<b>Total</b>					<b>120</b>	<b>480</b>	<b>80</b>	<b>320</b>	<b>1000</b>

**BACHELOR OF PHYSIOTHERAPY- III YEAR**

Sr.No.	Course	Subjects	Total Study Hours		Theory Marks		Practical Marks		Total Marks
			Theory	Practical	Internal	External	Internal	External	
1	BPT 301	General Medicine	100	100	20	80	20	80	200
2	BPT 302	General Surgery	100	100	20	80	20	80	200
3	BPT 303	Orthopedics	100	100	20	80	20	80	200
4	BPT 304	Physiotherapy in Cardio Respiratory Conditions	100	100	20	80	20	80	200

5	BPT 305	Physiotherapy in Orthopedic and Sports Conditions	150	150	20	80	20	80	200
6	BPT 306	Clinical Training		10 Hours per week for 32 weeks	-	-	-	-	-
<b>Total</b>					<b>100</b>	<b>400</b>	<b>100</b>	<b>400</b>	<b>1000</b>

**BACHELOR OF PHYSIOTHERAPY- IV YEAR**

Sr.No.	Course	Subjects	Total Study Hours		Theory Marks		Practical Marks		Total Marks
			Theory	Practical	Internal	External	Internal	External	
1	BPT 401	Neurology	60	60	20	80	20	80	200
2	BPT 402	Pediatrics	40		10	40	-	-	50
3	BPT 403	Geriatrics	40		10	40	-	-	50
4	BPT 404	OBS & Gyne, Ent, Ophthalmology	40		15	25+20+20 (65)	-	-	80

5	BPT 405	Physiotherapy in Neurology	150	150	20	80	20	80	200
6	BPT 406	Physiotherapy in General Medical and Surgical Conditions	120	120	20	80	20	80	200
7	BPT 407	Rationale of Rehabilitation	60	60	20	80	20	80	200
8	BPT 408	Physiotherapy Ethics and Law	80		10	40	-	-	50
9	BPT 409	Research Methodology and Bio5tatistics	120		20	80	-	-	100
10	BPT 410	Clinical Training		10 Hours per week for 32 weeks	-	-	-	-	-
<b>Total</b>					<b>145</b>	<b>585</b>	<b>80</b>	<b>320</b>	<b>1130</b>