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Jamuhar, Sasaram, Rohtas (Bihar)

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### **Ordinances and Syllabus Governing to 4-Year 6 Month 9-Semester Bachelor Of Physiotherapy Programme**

Session:- 2023-24

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## ORDINANCES GOVERNING TO BACHELOR OF PHYSIOTHERAPY PROGRAMME

This Ordinance is prepared in the light of the Ministry of Health and Family Welfare Allied Health Section 2015-16, Model Curriculum Handbook Physiotherapy regulations and measures for maintenance of standard in field of Higher Education. The ordinance fulfills the prescribed requirements in term of Admission Procedure, Examination System.

### CHAPTER 1: INTRODUCTION TO THE HANDBOOK

The report 'From Paramedics to Allied Health Professionals: Landscaping the Journey and Way Forward' that was published in 2012, marked the variance in education and training practices for the allied and healthcare courses offered by institutions across the country. This prompted the Ministry of Health and Family Welfare to envisage the creation of national guidelines for education and career pathways of allied and healthcare professionals, with a structured curriculum based on skills and competencies. Thus, this handbook has been designed to familiarize universities, colleges, healthcare providers as well as educators offering allied and healthcare courses with these national standards.

Individually created for different professional groups of allied and healthcare, this handbook aims to reduce the variation in education by comprising of a standardized curriculum, career pathways, nomenclature and other details for each profession. The change from a purely didactic approach will create better skilled professionals and improve the quality of overall patient care. In the absence of a national standard-setting authority, this handbook can also guide the thousands of young adults who choose healthcare as a profession – not as physician or nurses but to play several other critical support roles – on the appropriate course of action to enable them to be skilled allied and healthcare professionals of the future.

### WHO IS AN ALLIED AND HEALTHCARE PROFESSIONAL?

The Ministry of Health and Family Welfare, accepted in its entirety the following definition of an allied and healthcare professional based on the afore-mentioned report:

“Allied and healthcare professionals (AHPs) includes individuals involved with the delivery of health or healthcare related services, with qualification and competence in therapeutic, diagnostic, curative, preventive and/or rehabilitative interventions. They work in multidisciplinary health teams in varied healthcare settings including doctors (physicians and specialist), nurses and public health officials to promote, protect, treat and/or manage a person(‘s) physical, mental, social, emotional, environmental health and holistic well-being.

**Primary care** refers to the work of health professionals who act as a first point of consultation for all patients within the health care system. Such a professional would usually be a primary care physician, such as a general practitioner or family physician, a licensed independent practitioner such as a physiotherapist, or a non-physician primary care provider (mid-level provider) such as a physician assistant or nurse practitioner. Depending on the locality, health system organization, and sometimes at the patient's discretion, they may see another health care professional first, such as a pharmacist, a nurse (such as in the United Kingdom), a clinical officer (such as in parts of Africa), or an Ayurvedic or other traditional medicine professional (such as in parts of Asia). Depending on the nature of the health condition, patients may then be referred for secondary or tertiary care.

Since the past few years, many professional groups have been interacting and seeking guidance on all those who would qualify under the purview of “allied and healthcare professionals”. In the healthcare system, statutory bodies exist for clinicians, nurses, pharmacists and dental practitioners; but a regulatory structure for around 50 professions is absent in India. Currently, the Government is

considering these professions under the ambit of the allied and healthcare system. However, this number is subject to changes and modifications over time, particularly considering how quickly new technologies and new clinical avenues are expanding globally, creating newer cadres of such professionals.

## SCOPE AND NEED FOR ALLIED AND HEALTHCARE PROFESSIONALS IN THE INDIAN HEALTHCARE SYSTEM

The quality of medical care has improved tremendously in the last few decades due to the advances in technology, thus creating fresh challenges in the field of healthcare. It is now widely recognized that health service delivery is a team effort involving both clinicians and non-clinicians, and is not the sole duty of physicians and nurses. Professionals that can competently handle sophisticated machinery and advanced protocols are now in high demand. In fact, diagnosis is now so dependent on technology, that allied and healthcare professionals (AHPs) are vital to successful treatment delivery.

Effective delivery of healthcare services depends largely on the nature of education, training and appropriate orientation towards community health of all categories of health personnel, and their capacity to function as an integrated team. For instance, in the UK, more than 84,000 AHPs, with a range of skills and expertise, play key roles within the National Health Service, working autonomously, in multi-professional teams in various settings. All of them are first-contact practitioners and work across a wide range of locations and sectors within acute, primary and community care. Australia's health system is managed not just by their doctors and nurses, but also by the 90,000 university-trained, autonomous AHPs vital to the system.

As the Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India. Although an enormous amount of evidence suggests that the benefits of AHPs range from improving access to healthcare services to significant reduction in the cost of care, the Indian healthcare system still revolves around the doctor-centric approach. The privatization of healthcare has also led to an ever-increasing out-of-pocket expenditure by the population. However, many examples assert the need of skilled allied and healthcare professionals in the system, such as in the case of stroke survivors, it is the support of AHPs that significantly enhance their rehabilitation and long-term return to normal life. AHPs also play a significant role to care for patients who struggle mentally and emotionally in the current challenging environment and require mental health support; and help them return to well-being.<sup>ii</sup> Children with communication difficulties, the elderly, cancer patients, patients with long term conditions such as diabetes people with vision problems and amputees; the list of people and potential patients who benefit from AHPs is indefinite.

Thus, the breadth and scope of the allied and healthcare practice varies from one end to another, including areas of work listed below:

- Across the age span of human development from neonate to old age;
- With patients having complex and challenging problems resulting from systemic illnesses such as in the case of diabetes, cardiac abnormalities/conditions and elderly care to name a few;
- Towards health promotion and disease prevention, as well as assessment, management and evaluation of interventions and protocols for treatment;

- In a broad range of settings from a patient's home to community, primary care centers, to tertiary care settings; and
- With an understanding of the healthcare issues associated with diverse socio-economies and cultural norms within the society.

## LEARNING GOALS AND OBJECTIVES FOR ALLIED AND HEALTHCARE PROFESSIONALS

The handbook has been designed with a focus on performance-based outcomes pertaining to different levels. The learning goals and objectives of the undergraduate and graduate education program will be based on the performance expectations. They will be articulated as learning goals (why we teach this) and learning objectives (what the students will learn). Using the framework, students will learn to integrate their knowledge, skills and abilities in a hands-on manner in a professional healthcare setting. These learning goals are divided into nine key areas:

1. Clinical care
2. Communication
3. Membership of a multidisciplinary health team
4. Ethics and accountability at all levels (clinical, professional, personal and social)
5. Commitment to professional excellence
6. Leadership and mentorship
7. Social accountability and responsibility
8. Scientific attitude and scholarship (only at higher level-PhD)
9. Lifelong learning

### 1. CLINICAL CARE

Using a patient/family-centered approach and best evidence, each student will organize and implement the preventive, investigative and management plans; and will offer appropriate follow-up services. Program objectives should enable the students to:

- Apply the principles of basic science and evidence-based practice
- Use relevant investigations as needed
- Identify the indications for basic medical procedures and perform them in an appropriate manner
- Provide care to patients – efficiently and in a cost-effective way – in a range of settings, and maintain foremost the interests of individual patients
- Identify the influence of biological, psychosocial, economic, and spiritual factors on patients' well-being and act in an appropriate manner
- Incorporate strategies for certain emergency care, health promotion and disease prevention with their patients

### 2. COMMUNICATION

The student will learn how to communicate with patients/clients, care-givers, other health professionals and other members of the community effectively and appropriately. Communication is a fundamental requirement in the provision of health care services. Program objectives should enable the students to:

- Provide sufficient information to ensure that the patient/client can participate as actively as possible and respond appropriately to the information
- Clearly discuss the diagnosis with the patient, and decide appropriate treatment plans in a sensitive manner that is in the patient's and society's best interests

- Explain the proposed healthcare service – its nature, purpose, possible positive and adverse consequences, its limitations, and reasonable alternatives wherever they exist
- Use effective communication skills to gather data and share information including attentive listening, open-ended inquiry, empathy and clarification to ensure understanding
- Appropriately communicate with, and provide relevant information to, other stakeholders including members of the healthcare team
- Use communication effectively and flexibly in a manner that is appropriate for the reader or listener
- Explore and consider the patient's ideas, beliefs and expectations during interactions with them, along with varying factors such as age, ethnicity, culture and socioeconomic background
- Develop efficient techniques for all forms of written and verbal communication including accurate and timely record keeping
- Assess their own communication skills, develop self-awareness and be able to improve their relationships with others
- Possess skills to counsel for lifestyle changes and advocate health promotion

### 3. **MEMBERSHIP OF A MULTIDISCIPLINARY HEALTH TEAM**

The student will put a high value on effective communication within the team, including transparency about aims, decisions, uncertainty and mistakes. Team-based health care is the provision of health services to individuals, families, and/or their communities by at least two health providers who work collaboratively to accomplish shared goals within and across settings to achieve coordinated, high-quality care. Program objectives will aim at making the students being able to:

- Recognize, clearly articulate, understand and support shared goals in the team that reflect patient and family priorities
- Possess distinct roles within the team; to have clear expectations for each member's functions, responsibilities, and accountabilities, which in turn optimizes the team's efficiency and makes it possible for them to use division of labor advantageously, and accomplish more than the sum of its parts
- Develop mutual trust within the team to create strong norms of reciprocity and greater opportunities for shared achievement
- Communicate effectively so that the team prioritizes and continuously refines its communication channels creating an environment of general and specific understanding
- Recognize measurable processes and outcomes, so that the individual and team can agree on and implement reliable and timely feedback on successes and failures in both the team's functioning and the achievement of their goals. These can then be used to track and improve performance immediately and over time.

### 4. **ETHICS AND ACCOUNTABILITY**

Students will understand core concepts of clinical ethics and law so that they may apply these to their practice as physicians. Program objectives should enable the students to:

- Describe and apply the basic concepts of clinical ethics to actual cases and situations
- Recognize the need to make health care resources available to patients fairly, equitably and without bias, discrimination or undue influence
- Demonstrate an understanding and application of basic legal concepts to the practice of physiotherapy

- Employ professional accountability for the initiation, maintenance and termination of patient-provider relationships
- Demonstrate respect for each patient's individual rights of autonomy, privacy, and confidentiality

#### 5. **COMMITMENT TO PROFESSIONAL EXCELLENCE**

The student will execute professionalism to reflect in his/her thought and action a range of attributes and characteristics that include technical competence, appearance, image, confidence level, empathy, compassion, understanding, patience, manners, verbal and non-verbal communication, an anti-discriminatory and non-judgmental attitude, and appropriate physical contact to ensure safe, effective and expected delivery of healthcare. Program objectives will aim at making the students being able to:

- Demonstrate distinctive, meritorious and high-quality practice that leads to excellence and that depicts commitment to competence, standards, ethical principles and values, within the legal boundaries of practice
- Demonstrate the quality of being answerable for all actions and omissions to all, including service users, peers, employers, standard-setting/regulatory bodies or oneself
- Demonstrate humanity in the course of everyday practice by virtue of having respect (and dignity), compassion, empathy, honour and integrity
- Ensure that self-interest does not influence actions or omissions, and demonstrate regards for service-users and colleagues

#### 6. **LEADERSHIP AND MENTORSHIP**

The student must take on a leadership role where needed in order to ensure clinical productivity and patient satisfaction. They must be able to respond in an autonomous and confident manner to planned and uncertain situations, and should be able to manage themselves and others effectively. They must create and maximize opportunities for the improvement of the health seeking experience and delivery of healthcare services. Program objectives should enable the students to:

- Act as agents of change and be leaders in quality improvement and service development, so that they contribute and enhance people's wellbeing and their healthcare experience
- Systematically evaluate care; ensure the use of these findings to help improve people's experience and care outcomes, and to shape clinical treatment protocols and services
- Identify priorities and effectively manage time and resources to ensure the maintenance or enhancement of the quality of care
- Recognize and be self-aware of the effect their own values, principles and assumptions may have on their practice. They must take charge of their own personal and professional development and should learn from experience (through supervision, feedback, reflection and evaluation)
- Facilitate themselves and others in the development of their competence, by using a range of professional and personal development skills
- Work independently and in teams. They must be able to take a leadership role to coordinate, delegate and supervise physiotherapy care safely, manage risk and remain accountable for the care given; actively involve and respect others' contributions to integrated person-centered care; yet work in an effective manner across professional and agency boundaries. They must know when and how to communicate with patients and refer them to other professionals and agencies, to respect the choices of service users and others, to promote shared decision-

making, to deliver positive outcomes, and to coordinate smooth and effective transition within and between services and agencies.

#### 7. **SOCIAL ACCOUNTABILITY AND RESPONSIBILITY**

The students will recognize that allied and healthcare professionals need to be advocates within the health care system, to judiciously manage resources and to acknowledge their social accountability.<sup>10</sup> They have a mandate to serve the community, region and the nation and will hence direct all research and service activities towards addressing their priority health concerns. Program objectives should enable the students to:

- Demonstrate knowledge of the determinants of health at local, regional and national levels and respond to the population needs
- Establish and promote innovative practice patterns by providing evidence-based care and testing new models of practice that will translate the results of research into practice, and thus meet individual and community needs in a more effective manner
- Develop a shared vision of an evolving and sustainable health care system for the future by working in collaboration with and reinforcing partnerships with other stakeholders, including academic health centers, governments, communities and other relevant professional and non-professional organizations
- Advocate for the services and resources needed for optimal patient care

#### 8. **SCIENTIFIC ATTITUDE AND SCHOLARSHIP**

The student will utilize sound scientific and/or scholarly principles during interactions with patients and peers, educational endeavors, research activities and in all other aspects of their professional lives. Program objectives should enable the students to:

- Engage in ongoing self-assessment and structure their continuing professional education to address the specific needs of the population
- Practice evidence-based practice by applying principles of scientific methods
- Take responsibility for their educational experiences
- Acquire basic skills such as presentation skills, giving feedback, patient education and the design and dissemination of research knowledge; for their application to teaching encounters.

#### 9. **LIFELONG LEARNING**

The student should be committed to continuous improvement in skills and knowledge while harnessing modern tools and technology. Program objectives will aim at making the students being able to:

- Perform objective self-assessments of their knowledge and skills; learn and refine existing skills; and acquire new skills
- Apply newly gained knowledge or skills to patient care
- Enhance their personal and professional growth and learning by constant introspection and utilizing experiences
- Search (including through electronic means), and critically evaluate medical literature to enable its application to patient care
- Develop a research question and be familiar with basic, clinical and translational research in its application to patient care
- Identify and select an appropriate, professionally rewarding and personally fulfilling career pathway

## INTRODUCTION OF NEW ELEMENTS IN ALLIED AND HEALTHCARE EDUCATION

### COMPETENCY-BASED CURRICULUM

A significant skill gap has been observed in the professionals offering healthcare services irrespective of the hierarchy and level of responsibility in the healthcare settings. The large variation in the quality of services is due to the diverse methodologies opted for healthcare education and the difference in expectations from a graduate after completion of a course and at work. What one is expected 'to perform' at work is assumed to be learned during the course, however, the course design focuses on what one is expected 'to know'. The competency-based curriculum thus connects the dots between the 'know what' and 'do how'.

The efficiency and effectiveness of any educational programme largely depends on the curriculum design that is being followed. With emerging medical and scientific knowledge, educators have realized that learning is no more limited to memorizing specific lists of facts and data; in fact, by the time the professional aims to practice in the healthcare setting, the acquired knowledge may stand outdated. Thus, competency-based education is the answer; a curricular concept designed to provide the skills that professionals need. A competency-based program is a mix of skills and competencies based on individual or population needs (such as clinical knowledge, patient care, or communications approaches), which is then developed to teach relevant content across a range of courses and settings. While the traditional system of education focuses on objectives, content, teacher-centric approach and summative evaluation; competency-based education has a focus on competencies, outcomes, performance and accomplishments. In such a case, teaching activities are learner-centered, and evaluation is continuous and formative in structure. The competency-based credentials depend on the demonstration of a defined set of competencies which enables a professional to achieve targeted goals. Competency frameworks comprise of a clearly articulated statement of a person's abilities on the completion of the credential, which allows students, employers, and other stakeholders to set their expectations appropriately.

Considering the need of the present and future healthcare delivery system, the curriculum design depicted in this handbook thus will be based on skills and competencies.

### PROMOTING SELF-DIRECTED LEARNING OF THE PROFESSIONALS

The shift in the focus from traditional to competency-based education has made it pertinent that the learning processes may also be revisited for suitable changes. It is a known fact that learning is no more restricted to the boundaries of a classroom or the lessons taught by a teacher. The new tools and technologies have widened the platform and introduced innovative modes of how students can learn and gain skills and knowledge. One of the innovative approaches is learner-centric and follows the concept of **self-directed learning**.

Self-directed learning, in its broadest meaning, describes a process in which individuals take the initiative with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying resources for learning, choosing and implementing learning strategies and evaluating learning outcomes (Knowles, 1975)

In self-directed learning, learners themselves take the initiative to use resources rather than simply reacting to transmissions from resources, which helps them learn more in a better way. Lifelong, self-directed learning (SDL) has been identified as an important ability for medical graduates (Harvey, 2003) and so is applicable to other health professionals including AHPs. It has been proven through many studies worldwide that the self-directed method is better than the teacher-centric

method of learning. Teacher-directed learning makes learners more dependent and the orientation to learning becomes subject-centred. If a teacher provides the learning material, the student is usually satisfied with the available material, whereas if a student is asked to work on the same assignment, he or she invariably has to explore extensive resources on the subject. Thus, the handbook promotes self-directed learning, apart from the usual classroom teaching and opens the platform for students who wish to engage in lifelong learning.

### CREDIT HOURS VS TRADITIONAL SYSTEM

Recently the National Assessment and Accreditation Council (NAAC) and the University Grants Commission (UGC) have highlighted the need for the development of a Choice-Based Credit System (CBCS), at par with global standards and the adoption of an effective grading system to measure a learner's performance.<sup>17</sup> All the major higher education providers across the globe are operating a system of credits. The European Credit Transfer System (ECTS), the 'National Qualifications Framework' in Australia, the Pan-Canadian Protocol on the Transferability of University Credits, the Credit Accumulation and Transfer System (CATS) in the UK as well as the systems operating in the US, Japan, etc. are examples of these. Globally, a need now exists for the use of a fully convertible credit-based system that can be accepted at other universities. It has now become imperative to offer flexible curricular choices and provide learners mobility due to the popularity of initiatives such as 'twinning programmes', 'joint degrees' and 'study abroad' programmes

In order to ensure global acceptability of the graduates, the current curriculum structure is divided into smaller sections with focus on hours of studying which can be converted into credit hours as per the international norms followed by various other countries.

### INTEGRATED STRUCTURE OF THE CURRICULUM

Vertical integration, in its truest sense, is the interweaving of teaching clinical skills and knowledge into the basic science years and, reinforcing and continuing to teach the applications of basic science concepts during the clinical years. (Many efforts called 'vertical integration' include only the first half of the process).

Horizontal integration is the identification of concepts or skills, especially those that are clinically relevant, that cut across (for example, the basic sciences), and then putting these to use as an integrated focus for presentations, clinical examples, and course materials. e.g., Integration of some of the basic science courses around organ systems, e.g., human anatomy, physiology, pathology; or incorporating ethics, legal issues, finance, political issues, humanities, culture and computer skills into different aspects of a course like the Clinical Continuum.

The aim of an integrated curriculum is to lead students to a level of scientific fluency that is beyond mere fact and concept acquisition, by the use of a common language of medical science, with which they can begin to think creatively about medical problems.

This innovative new curriculum has been structured in a way such that it facilitates horizontal and vertical integration between disciplines; and bridges the gaps between both theory & practice, and between hospital-based practice and community practice. The amount of time devoted to basic and laboratory sciences (integrated with their clinical relevance) would be the maximum in the first year, progressively decreasing in the second and third year of the training, making clinical exposure and learning more dominant.<sup>11</sup> However it may differ from course to course depending on the professional group.

## INTRODUCTION OF FOUNDATION COURSE IN THE CURRICULUM

The foundation course for allied and healthcare professions is an immersive programme designed to impart the required knowledge, skills and confidence for seamless transition to the second semester of a professional allied and healthcare course. Post admission, the foundation course is designed for a period of 6 months to prepare a student to study the respective allied and healthcare course effectively and to understand the basics of healthcare system. This aims to orient the student to national health systems and the basics of public health, medical ethics, medical terminologies, communication skills, basic life support, computer learning, infection prevention and control, environmental issues and disaster management, as well as orientation to the community with focus on issues such as gender sensitivity, disability, human rights, civil rights etc. Though the flexibility to the course designers have been provided in terms of – modifying the required numbers of hours for each foundation subject and appropriate placement of the subject across various semesters.

## LEARNING METHODOLOGIES

With a focus on self-directed learning, the curriculum will include a foundation course that focuses on communication, basic clinical skills and professionalism; and will incorporate clinical training from the first year itself. It is recommended that the primary care level should have sufficient clinical exposure integrated with the learning of basic and laboratory sciences. There should also be an emphasis on the introduction of case scenarios for classroom discussion/case-based learning.

Healthcare education and training is the backbone of an efficient healthcare system and India's education infrastructure is yet to gain from the ongoing international technological revolution. The report '*From Paramedics to Allied Health: Landscaping the Journey and way ahead*', indicates that teaching and learning of clinical skills occur at the patient's bedside or other clinical areas such as laboratories, augmented by didactic teaching in classrooms and lecture theatres. In addition to keeping up with the pace of technological advancement, there has been a paradigm shift to outcome-based education with the adoption of effective assessment patterns. However, the demand for demonstration of competence in institutions where it is currently limited needs to be promoted. The report also mentions some of the allied and healthcare schools in India that have instituted clinical skill centers, laboratories and high- fidelity simulation laboratories to enhance the practice and training for allied and healthcare students and professionals. The report reiterates the fact that simulation is the replication of part or all of a clinical encounter through the use of mannequins, computer-assisted resources and simulated patients. The use of simulators addresses many issues such as suboptimal use of resources and equipment, by adequately training the manpower on newer technologies, limitations for imparting practical training in real-life scenarios, and ineffective skills assessment methods among others. The table mentioned below lists various modes of teaching and learning opportunities that harness advanced tools and technologies.



**TABLE 1****CLINICAL LEARNING OPPORTUNITIES IMPARTED THROUGH THE USE OF ADVANCED TECHNIQUES**

<b>TEACHING MODALITY</b>	<b>LEARNING OPPORTUNITY EXAMPLES</b>
Patients	Teach and assess in selected clinical scenarios
	Practice soft skills
	Practice physical examination
	Receive feedback on performance
Mannequins	Perform acquired techniques
	Practice basic procedural skills
	Apply basic science understanding to clinical problem solving
Simulators	Practice teamwork and leadership
	Perform cardiac and pulmonary care skills
	Apply basic science understanding to clinical problem solving
Task under trainers	As specific to the physiotherapy profession. Joint manipulation, chest physiotherapy etc.

**ASSESSMENT METHODS**

Traditional assessment of students consists of the yearly system of assessments. In most institutions, assessments consist of internal and external assessments, and a theory examination at the end of the year or semester. This basically assesses knowledge instead of assessing skills or competencies. In competency-based training, the evaluation of the students is based on the performance of the skills as per their competencies. Hence, all the three attributes – knowledge, skills, and attitudes – are assessed as required for the particular competency.

Several new methods and tools are now readily accessible, the use of which requires special training. Some of these are given below:

- Objective Structured Clinical Examination (OSCE), Objective Structured Practical Examination (OSPE), Objective Structured Long Examination Record (OSLER)
- Mini Case Evaluation Exercise (CEX)
- Case-based discussion (CBD)
- Direct observation of procedures (DOPs)
- Portfolio
- Multi-source feedback
- Patient satisfaction questionnaire

An objective structured clinical examination (OSCE) is used these days in a number of allied and healthcare courses, e.g., Optometry, Physiotherapy, and Radiography. It tests the performance and competence in communication, clinical examination, and medical procedures/prescriptions. In physiotherapy, orthotics, and occupational therapy, it tests exercise prescription, joint mobilization/manipulation techniques; and in radiography it tests radiographic positioning, radiographic image evaluation, and interpretation of results. The basic essential elements consist of functional analysis of the occupational roles, translation of these roles ("competencies") into outcomes, and assessment of trainees' progress in these outcomes on the basis of demonstrated performance. Progress is defined solely by the competencies achieved and not the underlying processes or time served in formal educational settings. Most methods use predetermined, agreed

assessment criteria (such as observation check-lists or rating scales for scoring) to emphasize on frequent assessment of learning outcomes. Hence, it is imperative for teachers to be aware of these developments and they should suitably adopt them in the allied and healthcare education system.

## **CHAPTER 2:**

### **METHODOLOGY OF CURRICULUM DEVELOPMENT**

With the release of the report 'From Paramedics to Allied Health: Landscaping the journey and the way ahead', the Ministry of Health and Family Welfare prioritized the key recommendations and concerns raised by various allied and healthcare professionals' groups and experts as indicated in the report. One of the major recommendations in the report was the need for standardization of curriculum and pedagogic requirements for the major allied and healthcare professional courses.

The MoHFW has identified 12 priority professional streams in the phase-I for the purpose of standardization. The expertise of over 50 leading public and private allied and healthcare educational institutions for 12 different disciplines has been sought as part of this exercise. Additionally, international experts from Canada, Sweden, USA and UK are also being roped in, to arrive at a comprehensive and globally acceptable set of educational standards based on a skills and competencies approach. The opinions were sought from experts for all the courses, though curricula for the following two professions were not redesigned as they fall under the ambit of regulatory body- Rehabilitation Council of India governed by Ministry of Social Justice and Empowerment –

- Audiology and Speech Pathology
- Orthotics and Prosthetics

The National Skills Development Agency has also developed the National Skills Qualification Framework (NSQF). Under the aegis of the NSDA, the Healthcare Sector Skill Council (HSSC) has undertaken a similar process for a few entries level allied and healthcare courses (Certificate and Diploma level). The focus of Ministry of Health and Family Welfare is thus to pre-empt duplication of efforts and arrive at a comprehensive set of minimum standards for the allied and healthcare professions but for higher level professional qualifications. This would ensure that the key considerations and obligations of both the public and the private sector are adequately addressed.

In view of the above, the Ministry of Health and Family Welfare instituted 12 National Curricula Redesign Taskforce groups comprising of academicians and professionals from the best institutes and colleges across the country. These people served as subject experts and redesigned the curricula based on a standardized framework developed by the NIAHS TSU (National Initiative for Allied Health Sciences- Technical Support Unit), which is the technical arm supporting this project. The final curriculum has been reviewed and approved by the National Curricula Review Committee (NCRC), (constituted by the MoHFW), that consists of experts with versatile and immense experience in their respective streams, to assess the applicability of the curricula drafted in view of the healthcare system as a whole.

### **STEPS UNDERTAKEN IN THE CURRICULA REVIEW PROCESS –**

1. Curricula were sought from various States and institutions across the country in response to which the NIAHS TSU reviewed–
  - a. 118 curricula of allied and healthcare courses (different levels and different professions) from 10 states across the country;
  - b. 133 curricula of various allied and healthcare courses collected during phase-I of the NIAHS project.

2. Literature review –a comprehensive literature review was undertaken resulting in a detailed curriculum of the allied and healthcare courses, which included competency and skills-based models followed nationally as well as internationally, methodologies of curriculum development, assessment protocols, and many such aspects of curriculum development. The literature review helped the TSU to develop a reference document that comprised of a standard framework for a competency-based curriculum to be followed for the curricula review and redesign. A detailed mapping of all the resources was undertaken and shared with the task group experts via email.
3. Constitution of the National Curricula Redesign Taskforces for various professional groups – Specific taskforces were then instituted comprising of technical as well as subject experts who were engaged in the process of redesigning the curriculum.
4. Constitution of the National Curricula Review Committee (NCRC) – The NCRC comprising of experts with versatile and immense experiences of their respective domain, was then constituted for final review and approval on the curriculum drafted by the taskforce and NIAHS TSU.
5. National Curricula Redesign Taskforce Consultations– a series of consultations were conducted with subject experts including both regional and national task group experts to develop a ‘skill and competency’ framework for education and career pathways. The consultations were facilitated by the NIAHS TSU members and were led by the chairperson of the group. Post this, the draft version and recommendations were compiled by the TSU members and sent to the experts for final review and consent.
6. Local consultations – These were also conducted in different hospitals and other healthcare settings to get suggestions, feedbacks and ideas from the subject experts for their respective curricula.
7. Response draft – Comments and suggestions were received on the draft and a response draft curriculum was prepared, which was then re-circulated for final consent and validation by the taskgroup experts.
8. Submission and approval of draft curriculum – The final draft of the curriculum handbook was then submitted by the taskforce chairman to the National Curricula Review Committee for approval and final sign-off.
9. Public opinion – The handbook was uploaded to seek public opinion from national and international experts, students, faculty, and practitioners of the respective professional groups.
10. Final approval by the NCRC- The comments and suggestions by the public were then reviewed and considered for any possible modification by the taskforce group. The final approval and sign off for the overall structure were then sought from NCRC.
11. Dissemination- The final handbook (guidelines) is disseminated by the Ministry of Health and Family Welfare for further adoption and incorporation by institutes/universities as applicable to ensure standardization.

### **CHAPTER 3:**

#### **BACKGROUND OF THE PROFESSION**

##### **STATEMENT OF PHILOSOPHY– WHY THIS PROFESSION HOLDS SO MUCH IMPORTANCE**

Physiotherapy practice spans the continuum from health promotion to prevention to rehabilitation for individuals and populations throughout the lifespan. Physiotherapy diagnoses movement dysfunctions based on skillful examination and evaluation regardless of the cause or etiology and provide skilled therapeutic intervention to foster improvement in physical functioning and maximizing overall quality of life. Physiotherapists provide the initial access into the health care system for persons with impairments and functional limitations amenable to physiotherapy and engage in collegial referral relationships with other health care professionals.

Physiotherapist's role also includes that of case manager, teacher, researcher, and consultant. The faculty believes the first priority of education is to prepare people for a well-rounded, balanced life with broad social and cultural interests and as involved, active citizens of our country.

Physiotherapist must have commitments to lifelong learning and to search for the evidence that supports and advances practice. Critical thinking, problem solving, intellectual perseverance and courage are all essential characteristics of the successful physiotherapist.

### ABOUT PHYSIOTHERAPY

Physiotherapists are health care professionals with a significant role in health promotion and treatment of injury and diseases. They combine their in-depth knowledge of the body and how it works with specialized hands-on clinical skills to assess, diagnose and treat symptoms of illness, injury or disability.

All physiotherapists registered to practice are qualified to provide safe and effective physiotherapy. They have met national entry-level education and practice standards, and have successfully passed a standardized physiotherapy competence examination.

### SCOPE OF PRACTICE

Physiotherapists plan and administer physiotherapy/ rehabilitation treatments independently and also being a part of the multidisciplinary team. The minimum education requirement is often a baccalaureate degree or postgraduate degrees in Physiotherapy.

Physiotherapy is an essential part of the health and community/welfare services delivery system. Physiotherapists practice independently of other health care/service providers and also within multidisciplinary rehabilitation/habilitation programmers to prevent, gain, maintain or restore optimal function and quality of life in individuals with loss and disorders of movement.

Physiotherapists are guided by their own code of ethical principles. Thus, they may be concerned with any of the following purposes:

1. Promoting the health and well-being of individuals and the general public/society, emphasizing the importance of physical activity and exercise.
2. Preventing impairments, activity limitations, participatory restrictions and disabilities in individuals at risk of altered movement behaviors due to health or medically related factors, socio-economic stressors, environmental factors and lifestyle factors.
3. Providing interventions/treatment to restore integrity of body systems essential to movement, maximize function and recuperation, minimize incapacity, and enhance the quality of life, independent living and workability in individuals and groups of individuals with altered movement behaviors resulting from impairments, activity limitations, participatory restrictions and disabilities
4. Modifying environmental, home and work access and barriers to ensure full participation in one's normal and expected societal roles

Physiotherapists may also contribute to the development of local, national and international health policies and public health strategies.

### SETTINGS IN WHICH PHYSIOTHERAPY IS PRACTICED

Physiotherapy is delivered in a variety of settings which allow it to achieve its purpose. Prevention, health promotion, treatment/intervention, habilitation and rehabilitation take place in multiple settings that may include, but are not confined to, the following:

1. Community based rehabilitation programmers

2. Community settings including primary health care centers, individual homes, and field settings
3. Education and research centers
4. Fitness clubs, health clubs, gymnasias and spas
5. Hospices
6. Hospitals
7. Nursing homes
8. Occupational health centers
9. Out-patient clinics
10. Physiotherapist private offices, practices, clinics
11. Prisons
12. Public settings (e.g., shopping malls) for health promotion
13. Rehabilitation centres and residential homes
14. Schools, including pre-schools and special schools
15. Senior citizen centres
16. Sports centres/clubs
17. Workplaces/companies

### **RECOGNITION OF TITLE AND QUALIFICATION**

Within the multidisciplinary team, the professional responsible for administering physiotherapy treatment also at times referred to as the physiotherapist. The terminology Physiotherapist is an internationally adopted nomenclature and thus should also be applicable in an Indian context.

### **THE RECOMMENDED TITLE THUS STANDS AS THE “PHYSIOTHERAPIST” WITH THE ACRONYM – “PT” FOR THIS GROUP OF PROFESSIONALS.**

It is a known fact that with the career advancement, the nomenclature will also vary and will also depend on the sector and profile of the professional. Considering the 10 NSQF levels designed by the NSDA, the following level progression table has been proposed by the taskforce to map the nomenclature, career pathways and progression in different sectors of professional practice for Physiotherapist.

The table 2 below indicates the various channels of career progression in three distinct sectors such as clinical setting, academic and research route. It is envisaged that the physiotherapist will have one entry pathway – students with bacalaureate. The level of responsibility will increase as the career progresses and will starts with level six (6) for bacalaureate holders. The table also indicates the corresponding level of qualification with experience required by the professional to fulfill the requirements of each level. Considering the extent of patient dealing in case of physiotherapist and such other professions, government aims to phase out the Diploma and PG Diploma level courses and promote bachelor and master degree courses. In the academic front, as per UGC guidelines, to work at the position of a Lecturer/Assistant Professor the candidate must attain master degree. The table also indicates that career progression of physiotherapist is up to the level 10, however it needs to be stated that therapy prescription of patients, department management and final Clinical decision will be with the treating physiotherapist, unit head and Head of Physiotherapy department.

TABLE 2 NOMENCLATURE BASED ON CAREER PROGRESSION FOR PHYSIOTHERAPIST

Levels	Clinical (Designation)	Academic (Designation)	Research (Designation)	Eligibility & Experience	Annual performance-based appraisal
Level 6	Physiotherapist	Tutor	Professional Field Worker	Fresh BPT	<ul style="list-style-type: none"> <li>Proficiency test CR, self-appraisal &amp; HOD / Principal's Appraisal/year</li> </ul>
Level 7	Senior Physiotherapist	Lecturer	Junior Research Fellow	5 years of experience as Physiotherapist (BPT)/Fresh MPT	<ul style="list-style-type: none"> <li>Proficiency test CR, self-appraisal &amp; HOD /Principal's Appraisal/year</li> <li>2 Conference presentation</li> <li>1 publication during tenure period</li> </ul>
Level 8	Chief Physiotherapist	Assistant Professor	Research Fellow	<p><b>For Clinical</b>, Five years' experience in the post of senior physiotherapist for BPT and for MPT its 5 years.</p> <p><b>For Academic and Research</b> Fresh MPT-Exclusively (55 % required for taking Academic Designation as per UGC Norms)</p>	<ul style="list-style-type: none"> <li>Proficiency test CR, self-appraisal &amp; HOD/ Principal's Appraisal/year</li> <li>2 Conference presentation</li> <li>2 publications during tenure period</li> <li>Enrollment for PhD</li> </ul>
Level 9	Superintendent Physiotherapist / Deputy Director PT	Associate Professor	Senior research Fellow	<p><u>For Clinical</u> including 5 years' experience as chief Physiotherapist</p> <p><b>For Academic and Research</b> 8 years as Assistant Professor (Designation as per UGC Norms)</p>	<ul style="list-style-type: none"> <li>Proficiency test CR &amp; Self-appraisal/year</li> <li>2 Conference presentation</li> <li>3 publications (as first author) during tenure period</li> </ul>
Level 10	Director Physiotherapist / Head of the Physiotherapy Department	Professor/ Principal/ Dean	Research Head	<p><b>For Clinical</b> Including 5 years' experience as Deputy Director PT/ Superintendent Physiotherapist</p> <p><b>For Academic and Research</b> (Designation as per UGC Norms) 5 years' experience as Associate Professor PhD (Desirable) Senior most Professor will be the principal</p>	<ul style="list-style-type: none"> <li>5 Publication (as first author) during tenure period</li> <li>PhD (desirable) (Designation as per UGC Norms)</li> <li>Judgment on all aspects of Physiotherapy work and protocol development on treatment delivery and quality assurance</li> </ul>

A relaxation of 5% may be provided at the graduate and master's level for the Scheduled Caste/Scheduled Tribe/Differently-abled (Physically and visually differently-abled) categories for the purpose of eligibility and for assessing good academic record during direct recruitment to teaching positions. The eligibility marks of 55% marks (or an equivalent grade in a point scale wherever grading system is followed) and the relaxation of 5% to the categories mentioned above are permissible, based on only the qualifying marks without including any grace mark procedures.

\*Persons entering the teaching profession in universities and colleges shall be designated as Assistant Professors and shall be placed in the Pay Band of Rs.15600-39100 with AGP of Rs.6000. Lecturers already in service in the pre-revised scale of Rs8000-13500, shall be re-designated as Assistant Professors with the said AGP of Rs.6000. (Ref: HRD regulation No.1-32/2006-U. II/U. I (1) dated 31<sup>st</sup> December,2008)

### DEFINITION OF PHYSIOTHERAPY AND PHYSIOTHERAPIST

This includes treatment preparation, planning, treatment delivery, clinical and rehabilitative care of the patient on a daily basis during treatment and immediate post treatment review. However, the role of the PT always encompasses the safe and accurate delivery of the physiotherapy treatment. As the physiotherapy professional in daily contact with the patient it also includes monitoring of daily improvement of the patient according to his/her condition. Furthermore, the PTs liaise with all the other associated professionals in ensuring that the needs of the patient are met.

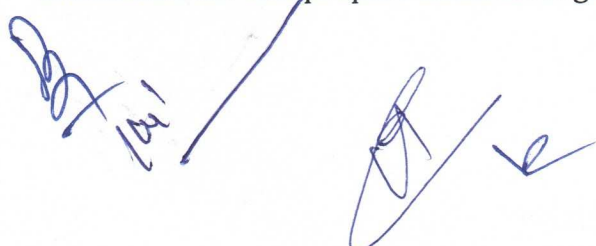
### EDUCATION OF THE PHYSIOTHERAPIST

When developing any education programme it is necessary that programme planning should be outcome-based, meeting local and national manpower requirements, personal satisfaction and career potential for the professionals with supporting pathway in the development of the profession. One of the major changes is the shift from a focus based on traditional theoretical knowledge and skills to competency-based education and training. Optimal education/training requires that the student is able to integrate knowledge, skills and attitude in order to perform a professional act adequately in a given situation.

Thus, the following curriculum aims to focus on skills and competencies-based approach for learning and are designed accordingly. The curriculum is prescriptive and is designed with an aim to standardize the content across the nation.

### ENTRY REQUIREMENTS

The students entering the PT program should have completed the recognized secondary school studies as the qualification stipulated for physiotherapy course (degree) is **10+2 or equivalent examination with science subject** from a recognized university or board which would provide the foundation for and prepare them for higher education studies.



## COURSE DURATION

It is recommended that any program developed from this curriculum should have a minimum of the following duration to qualify as an entry level professional in physiotherapy -

- **4 years and six months program (including six months of internship) - Bachelor's degree level**

The emphasis initially should be on the academic content establishing a strong scientific basis and in the later year on the application of theory to clinical/reflective practice. In Bachelor degree program minimum one year (starting from 2<sup>nd</sup> year onwards) should be devoted to clinical practice and this should be on a continuum of rotation from theory to practice over the program. The aim of the 4- and 1/2-year degree program is to enable the development of the PT as a key member of the multidisciplinary team and to enable him/her to execute advanced preparation/ planning/delivery of physiotherapy treatment as well as quality assurance.

With the change in the disease dynamics and multifold increase in the cases needing physiotherapy treatment, it is imperative that a well-structured program of postgraduate education is also encouraged so as to enhance research capacity within the country to widen the scope of clinical practice for the profession. Thus, a master's degree program is recommended with minimum of two years of education in specialized field of physiotherapy. The post graduate students can contribute significantly in research and academics.

PhD also play a significant role in the academic system of physiotherapy; however, the curriculum has not indicated any prescriptive guidelines for that level apart from mapping it on the career and qualification map.

## TEACHING FACULTY AND INFRASTRUCTURE

The importance of providing an adequate learning environment for the students cannot be over emphasized. Both the physical infrastructure and the teaching staff must be adequate.

Teaching areas should facilitate different teaching methods. Large lecture theatres may be appropriate, but smaller teaching areas should also be provided for tutorial and problem/case-based learning approaches.

It is recommended that a faculty and student ratio of 1:3 for PG and for UG 1:10 to be followed.

## JOB AVAILABILITY

As per ILO documentation, employers worldwide are looking for job applicants who not only have technical skills that can be applied in the workplace, but who also can communicate effectively, including with customers; can work in teams, with good interpersonal skills; can solve problems; have good ICT skills; are willing and able to learn; and are flexible in their approach to work.<sup>23</sup> Graduates can expect to be employed in hospitals and private practices as physiotherapists. A career in research, following the completion of a higher degree such as a PhD, is an option chosen by some graduates. Graduates are eligible for employment overseas where their qualifications, training and experience are highly regarded.

Graduates have good employment prospects, and will enter a field in which the demand for professionals has increased in recent years and will keep on increasing due to chronic conditions, lifestyle change. An ageing population requiring increased medical rehabilitation services, together with the continuing introduction of hi-tech equipment, ensures strong demand for future graduates.



## CHAPTER 4:

### CURRICULUM OF PHYSIOTHERAPY COURSES

#### **BACKGROUND**

The need for quality in treatment is a critical component of physiotherapy and requires knowledge and understanding of the basic sciences as well as the interaction between the techniques and procedures used in physiotherapy. In an era of greater complexity of technology and techniques, the role of the physiotherapist (PT) and his/her level of responsibility is continually evolving and expanding. Given the complexity of modern physiotherapy, the recognition of the profession of PT and development of dedicated education programmes specific to that profession must be addressed. Education programmes should provide the PT with the scientific theoretical foundation of the profession and enable them, as practitioners, to be able to synthesize, evaluate and apply their knowledge in a clinical setting.

#### **THE AIMS OF THE RECOMMENDED CURRICULUM ARE TO PRODUCE PTS WHO ARE**

- Technically and clinically competent for independent decision-making;
- Enable to assess a patient;
- Aware of patient conditions and treatment along with the importance of quality assurance;
- Understand the theoretical basis for evidence-based practice;
- Effective members of the multidisciplinary team;
- Prepared to participate in or initiate research into practice;

All aspects of physiotherapy have been considered in the development of this curriculum together with the identification of the roles expected for different levels of physiotherapists based on their qualification and experience. The need for connecting the dots between the education and employment practices has been the road map for devising this curriculum.

The National Curriculum Taskforce on Physiotherapy and NIAHS TSU has successfully designed the career and qualification map indicating the growth opportunities for a professional in the career pathway based on the level as indicated in the National Skills Qualification Framework (NSQF). The career pathway indicates level 6 as the entry level after the completion of a minimum 3.5/4.5 years of degree level program on physiotherapy (Bachelor in physiotherapy). The component of the programs starting from degree and above has been detailed out in the coming chapters.

Foundation course has also been designed to bring all the students at the same level of understanding with respect to basic healthcare related norms before the start of a career in a healthcare professional course. The foundation course is mandatory for all the allied and healthcare professional courses and for entry level courses also.



# **BACHELOR IN PHYSIOTHERAPY**

## **INTRODUCTION:**

**LEARNING OBJECTIVES:** At the completion of this course, the student should be -

1. The purpose of this curriculum is to delineate the cognitive, affective and psychomotor skills deemed essential for completion of this program and to perform as a competent physiotherapist who will be able to examine, evaluate, diagnose, plan, execute and document physiotherapy treatment independently or along with the multidisciplinary team.
2. Evaluate patients for impairments and functional limitations and able to execute all routine physiotherapeutic procedures as per the evaluation.
3. Able to operate and maintain physiotherapy equipment used in treatment of patient, physiotherapy treatment planning (both electrotherapy and exercise therapy) & procedures independently.
4. Able to provide patient education about various physiotherapeutic interventions to the patient and care givers.

## **EXPECTATIONS FROM THE FUTURE PHYSIOTHERAPY GRADUATES**

1. Coursework entitles independent physiotherapy assessment and treatment in any healthcare delivery centers in India by the graduates.
2. The coursework is designed to train students to work as independent physiotherapists or in conjunction with a multidisciplinary team to diagnose and treat movement disorders as per red and yellow flags.
3. Course works will skill the graduate's physical/ functional diagnosis, treatment planning, management, administration of physiotherapy treatment and for patient support.
4. Graduates can find employment opportunities in hospitals/nursing homes/sports teams/fitness centers/Community Rehabilitation /Health planning boards/health promotions services in both private and public sectors as well as in independent physiotherapy clinics.
5. Physiotherapy graduate is encouraged to pursue further qualification to attain senior position in the professional field and also to keep abreast with the recent advances, new technology and research. The professional should opt for continuous professional education credits offered by national and international institutes.

## **TERMINAL OBJECTIVES (EXPECTED OUTCOMES):**

6. The graduate will be a competent and reflective physiotherapy practitioner who can function safely and effectively while adhering to legal, ethical and professional standards of practice in a multitude of physiotherapy settings for patients and clients across the lifespan and along the continuum of care from wellness and prevention to rehabilitation of dysfunction.
7. The graduate will utilize critical inquiry and evidence-based practice to make clinical decisions essential for autonomous practice.
8. The graduate will function as an active member of professional and community organizations. The graduate will be a service-oriented advocate dedicated to the promotion and improvement of community health.
9. The graduate will demonstrate lifelong commitment to learning and professional development.

## ELIGIBILITY FOR ADMISSION:

### SELECTION PROCEDURE:

1. He/she has passed the Higher Secondary (10+2) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks (45%) in physics, chemistry and biology (botany & zoology), ~~mathematics~~ <sup>per 10/12/23</sup>. (i.e. -Physics, chemistry and biology as mandates requirements).
2. Candidates who have studied abroad and have passed the equivalent qualification as determined by the Association of Indian Universities will form the guideline to determine the eligibility and must have passed in the subjects: Physics, Chemistry, Biology and English up to 12th Standard level.
3. Candidates who have passed the Senior Secondary school Examination of National Open School with a minimum of 5 subjects with any of the following group subjects.
  - a. English, Physics, Chemistry, Botany, Zoology
  - b. English, Physics, Chemistry, Biology and any other language
4. He/she has attained the age of 17 years as on – current year
5. He/she has to furnish at the time of submission of application form, a certificate of Physical fitness from a registered medical practitioner and two references from persons other than relatives testifying to satisfactory general character.
6. 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 date(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.

### DURATION OF THE COURSE

Duration of the course: 4 years or 8 semesters. (Total of 4320 hours in theory, practical & clinical) and minimum 960 hours of internship (to be completed in six months duration).

### TOTAL HOURS - 5280

### TOTAL NO OF SEAT AVAILABLE FOR ADMISSION

There shall be 120 seat for admission in the course

### MEDIUM OF INSTRUCTION:

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

### **ATTENDANCE:**

A candidate has to secure minimum-

1. 75% attendance in theoretical
2. 85% in Skills training (practical) for qualifying to appear for the final examination.

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

### **ASSESSMENT:**

Assessments should be completed by the academic staff, based on the compilation of the student's theoretical & clinical performance throughout the training program. To achieve this, all assessment forms and feedback should be included and evaluated. The passing marks for every subject in the semester should be 50% marks in aggregate in theory/ practical.

### **COMMENCEMENT OF THE COURSE -**

The course shall commence not later than 1<sup>st</sup> September of an academic year

### **COMMENCEMENT OF EXAMINATION -**

University examination will be conducted at the end of each semester.

### **WORKING DAYS DURING THE SEMESTER -**

Each semester shall consist not less than 100 working days excluding examination days.

### **MARKS QUALIFYING FOR PASS -**

50% marks in aggregate in theory and Practical is required.

### **PROMOTION CRITERIA ETC. WILL BE AS PRESCRIBED BY THE UNIVERSITIES AFFILIATED BY THE UGC.**

Promotion criteria to the next year shall be as prescribed by the University. However, it is recommended that students may be permitted to next year only if the number of failed subjects is two or less than two and Student must clear these subjects before appearing for the final examination of next year. For example, failed subjects of I year must be cleared before appearing for 4<sup>th</sup> Semester examination and before the 6<sup>th</sup> Semester examination in case of failed subjects of II year and so on.

Only after passing all the subjects in all semesters, he/she will be allowed to undergo internship.

### **REVIEW OF ANSWER PAPERS OF FAILED CANDIDATES -**

As per the regulations prescribed for review of answer papers by the University.

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

1. Candidates having a break of study of five years and above from the date of admission and more than two spells of break will not be considered for readmission
2. The five years period of break of study shall be calculated from the date of first admission of the candidate to the course for the subsequent spells of break of study
3. Candidates having break of study shall be considered for re admission provided that they are not subjected to any disciplinary action and no charges are pending or contemplated against them.
4. All re admissions of candidates are subjected to the approval of the Vice Chancellor.

5. The candidates having a break of study up to five years shall apply for readmission to the Registrar of this University. The candidates shall be granted exemption in the subjects they have already passed.

#### **MAXIMUM DURATION OF THE PROGRAM -**

Candidates should complete the Bachelor of Physiotherapy degree course within a period of eight years from the date of joining in the course.

#### **DISCHARGE FROM THE PROGRAM -**

1. "If a student admitted to a course of study in an University and for any reason not able to complete the course or qualify for the degree by passing the examinations prescribed within a period comprising twice the duration prescribed in the Regulations for the concerned course, he/she will be discharged from the said course, his/her name will be taken off the rolls of the University and he/she will not be permitted to attend classes or appear for any examination conducted by the University thereafter."
2. "In respect of courses where internship is prescribed and if a student is for any reason not able to complete the internship within a period comprising twice the duration prescribed in the Regulations for the concerned course, such cases will be placed before a committee to be constituted by the Vice-Chancellor for making appropriate decision on a case-to-case basis, based on individual merits."
3. "The course of study shall mean and include all the undergraduate, post graduate diploma/degree broad and super specialty courses in medical and all the other Faculties of the University".
4. The above Regulations shall be applicable to all students already admitted and to be admitted to a course of study in a University."
5. "Notwithstanding anything contained in the foregoing, the students who fall in the category clause I above and who are in the final year of the respective courses be given one more last and final chance to appear for the University Examination with a condition that if they do not pass the examination even in their last chance, they shall be discharged from the course. The Controller of Examinations will admit such candidate to the University examinations only after their producing an undertaking (as per format given in students manual) to this effect."

#### **MIGRATION/TRANSFER OF CANDIDATES -**

The Vice Chancellor shall have the powers to place any migration/transfer he deems fit in the Board of Management and get approval for grant of permission for migration/transfer to candidates undergoing course of study in another University as prescribed by university

#### **VACATION -**

The Head of the Institution may declare 45 days of vacation in an academic year to the students without a semester break. The period(s) of vacation can be decided by the Head of the Institution.

#### **INTERNSHIP -**

All students of Bachelor of Physiotherapy must undergo a compulsory rotatory internship for a continuous period of 6 months approved by the college after passing all examinations in all subjects.

## **CLASSIFICATION OF SUCCESSFUL CANDIDATES -**

A successful candidate

1. Who secures 75% and above in the aggregate marks shall be declared to have secured 'FIRST CLASS WITH DISTINCTION' provided he/she passes the whole examination in the FIRST ATTEMPT;
2. Who secures above 60% and less than 75% in the aggregate marks and completes the course within the stipulated course period shall be declared to have passed the examinations in the 'FIRST CLASS, provide he/she passes the whole examination in the FIRST ATTEMPT';
3. Who secures above 50% and less than 60% in the aggregate marks and completes the course within the stipulated course period shall be declared to have passed the examinations in the 'SECOND CLASS'; and

All other successful candidates shall be declared to have PASSED the examinations.

## **MARKS QUALIFYING FOR PASS -**

Assessments should be completed by the academic staff, based on the compilation of the student's theoretical & clinical performance throughout the training programme. To achieve this, all assessment forms and feedback should be included and evaluated. Student must **attain at least 50%** marks in each Theory, Internal assessment and Practical independently / separately for each individual subject.

ASSESSMENTS:

	Internal	External	Total
<b>Theory</b>	40	60	100
<b>Practical</b>	50	50	100

INTERNAL ASSESSMENT (Theory Paper):

Class Test-I	Class Test -II	Class Test -III	Attendance	Assignment / Work book assignments & Viva	Total
Best Two of Three CTs					
10	10	10	10	10	40

EVALUATION PRACTICAL'S / DISSERTATIONS / PROJECT REPORTS:

Internal	External	Total
50	50	100

DURATION OF EXAMINATIONS:

Internal	External
1.5 Hrs	3 Hrs

ASSESSMENT of PRACTICALS (Internal 50 Marks):

Experiments	Attendance	Viva + Record	Total Internal
20 Marks	15 Marks	15 Marks	50 Marks

ASSESSMENT of PRACTICALS (External 50 Marks):

Experiments	File Work	Viva	Total External
20 Marks	15 Marks	15 Marks	50 Marks

#### ASSESSMENT of INTERNSHIP:

The Internee shall maintain the record of work, which is to be verified and certified by the Technologist followed by HoD under whom he/she works. Apart from scrutiny of record of work, assessments and evaluation of training shall be undertaken by an objective approach using situation tests in knowledge, skill and attitude during & at the end of training. Based on the record of work and date of evaluation The Director/ Principal shall issue certificate for satisfactory completion of training following which the University shall award the degree.

The Satisfactory completion shall be determined on the basis of following.

- a) Proficiency of knowledge required for each Imaging Technique or Procedures
- b) The Competency and Skills expected to manage each radiographic technique.
- c) Responsibility, Punctuality, workup of radiographic techniques, involvement in special procedures and preparation of reports.
- d) Capacity to work in team (behavior with colleagues, nursing staff and relationship with medical and paramedical staffs)
- e) Initiating, participating in discussions and developing research aptitude.

#### LOGBOOK OF INTERNSHIP

Duly signed and completed Internship logbook is compulsory to submit in the departments/college to obtain internship completion letter.

#### Note:

Evaluation of the Internship of the both semesters shall be done as per **annexure-I**. The reports are forwarded by the Dean of the faculty with the recommendation letter must be submitted to the Controller of examinations office within 15 working days after completion of the Internship.



**CURRICULUM OUTLINE**  
**FIRST SEMESTER (0-6 MONTHS)**

Sl. No.	Course Titles	Hours			Weekly class		Credits			Marks			
		Theory	Practical	Total	hours		Theory	Practical	Total	Theory	I.A.	Practical	I.A. Total
BPT111	Human Anatomy-1	60	75	135	9		4	5	9	60	40	50	50 200
BPT112	Human Physiology -1	60	30	90	6		4	2	6	60	40	50	50 200
BPT113	Biochemistry	45	15	60	4		3	1	4	60	40	50	50 200
BPT114	Sociology	45	-	45	3		3	-	3	60	40	-	- 100
<b>FOUNDATION COURSE - INTERNAL EXAMINATION</b>													
BPT115	Introduction to Healthcare Delivery System in India	30	-	30	2		2	-	2	60	40	-	- 100
BPT116	Basic computer and information science	15	30	45	3		1	2	3	60	40	-	- 100
BPT117	English, Communication and soft skills	30	15	45	3		2	1	3	60	40	50	50 200
BPT118	Introduction to quality and patient safety.	15	-	45	3		2	-	3	60	40	-	- 100
BPT119	Medical Terminology & Record Keeping	30	-	30	3		2	-	2	60	40	-	- 100
<b>Total</b>		<b>330</b>	<b>165</b>	<b>525</b>	<b>36</b>		<b>19</b>	<b>11</b>	<b>36</b>	<b>420</b>	<b>280</b>	<b>200</b>	<b>200 1300</b>

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**SECOND SEMESTER (7 - 12 MONTHS)**

Sl. No.	Course Titles	Hours		Weekly class hours	Credits		Marks			
		Theory	Practical	Total	Theory	Practical	Total	Theory	I.A.	Practical
BPT120	Human Anatomy-2 (Including Applied Anatomy)	60	90	150	4	6	10	60	40	50
BPT121	Human Physiology-2 (Including Applied Physiology)	60	45	105	4	3	7	60	40	50
BPT122	General and Clinical Psychology	45	15	60	3	1	4	60	40	50
BPT123	Basic principles of Biomechanics	45	30	75	3	2	5	60	40	50
<b>FOUNDATION COURSE - INTERNAL EXAMINATION</b>										
BPT124	Community Orientation and Clinical Visit	-	45	45	-	3	3	-	-	50
	<b>Total</b>	<b>210</b>	<b>225</b>	<b>435</b>	<b>14</b>	<b>15</b>	<b>29</b>	<b>240</b>	<b>200</b>	<b>250</b>
										<b>900</b>

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### THIRD SEMESTER (13-18 MONTHS)

Sl. No.	Course Titles	Hours			Weekly class hours	Credits			Marks				
		Theory	Practical	Total		Theory	Practical	Total	Theory	I.A.	Practical	I.A.	Total
BPT211	Pathology	45	15	60	4	3	1	4	60	40	50	50	200
BPT212	Microbiology	45	15	60	4	3	1	4	60	40	50	50	200
BPT213	Pharmacology	45	-	45	3	3	-	3	60	40	-	-	100
BPT214	Biomechanics and kinesiology	75	75	150	10	5	5	10	60	40	50	50	200
BPT215	Foundation of Exercise Therapy and therapeutic massage	45	60	105	7	3	4	7	60	40	50	50	200
<b>FOUNDATION COURSE - INTERNAL EXAMINATION</b>													
BPT216	Clinical observation	-	-	75	5	-	-	5	-	-	-	-	100
	<b>Total</b>	<b>255</b>	<b>165</b>	<b>495</b>	<b>33</b>	<b>17</b>	<b>11</b>	<b>33</b>	<b>360</b>	<b>200</b>	<b>250</b>	<b>250</b>	<b>1000</b>

### FOURTH SEMESTER (19-24 MONTHS)

Sl. No.	Course Titles	Hours			Weekly class hours	Credits			Marks				
		Theory	Practical	Total		Theory	Practical	Total	Theory	I.A.	Practical	I.A.	Total
BPT221	Exercise Therapy	75	105	180	12	5	7	12	60	40	50	50	200
BPT222	Bio physics	15	30	45	3	1	2	3	60	40	50	50	200
BPT223	Electrotherapy (LMHF & Equipment care)	75	120	195	13	5	8	13	60	40	50	50	200
<b>FOUNDATION COURSE - INTERNAL EXAMINATION</b>													
BPT224	Medical/ Physiotherapy Law and Ethics	30	-	30	2	2	-	2	60	40	-	-	100
BPT225	Clinical Education	-	90	90	12	-	6	12	-	-	50	50	100
	<b>Total</b>	<b>195</b>	<b>345</b>	<b>540</b>	<b>42</b>	<b>13</b>	<b>23</b>	<b>42</b>	<b>240</b>	<b>160</b>	<b>200</b>	<b>200</b>	<b>800</b>

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### FIFTH SEMESTER (25-30 MONTHS)

Sl. No.	Course Titles	Hours		Weekly class hours	Credits		Marks			
		Theory	Practical		Theory	Practical	Total Theory	I.A.	Practical	Total
BPT311	Clinical Orthopedics & Traumatology	60	-	4	4	-	4	40	-	100
BPT312	General Surgery including burns and plastic surgery & Obstetrics and Gynecology	60	15	5	4	1	5	40	50	200
BPT313	General Medicine, Pediatrics & psychiatry	60	15	5	4	1	5	40	50	200
BPT314	Community Medicine	60	-	4	4	-	4	40	-	100
<b>NOT FOR UNIVERSITY EXAMINATION</b>										
BPT315	Evaluation Methods & Outcome Measures	30	30	4	2	2	4	40	50	200
BPT316	Diagnostic imaging for Physiotherapist	15		1	1	-	1	40	-	100
BPT317	Clinical education	-	195	13	-	13	13	-	50	100
	<b>Total</b>	<b>285</b>	<b>255</b>	<b>36</b>	<b>19</b>	<b>17</b>	<b>37</b>	<b>240</b>	<b>200</b>	<b>1000</b>

### SIXTH SEMESTER (31-36 MONTHS)

Sl. No.	Course Titles	Hours		Weekly class hours	Credits		Marks			
		Theory	Practical		Theory	Practical	Total Theory	I.A.	Practical	Total
BPT321	Physiotherapy in Orthopedics & sports	60	75	9	4	5	9	40	50	200
BPT322	Physiotherapy In General Medicine and General surgery	60	75	9	4	5	9	40	50	200
BPT323	Clinical Neurology & Neurosurgery	45	15	4	3	1	4	40	50	200
<b>NOT FOR UNIVERSITY EXAMINATION</b>										
BPT324	Professionalism and values	15	-	1	1	-	1	60	-	100
BPT325	Clinical education	-	195	13	-	13	13	-	50	100
	<b>Total</b>	<b>180</b>	<b>360</b>	<b>36</b>	<b>12</b>	<b>24</b>	<b>36</b>	<b>240</b>	<b>200</b>	<b>800</b>

**SEVENTH SEMESTER (37-42 MONTHS)**

Sl. No.	Course Titles	Hours		Weekly class hours	Credits		Total Theory	I.A.	Marks		Total
		Theory	Practical		Theory	Practical			Practical	I.A.	
BPT411	Physiotherapy in Neurology & psychosomatic disorder	60	75	9	4	5	9	60	40	50	200
BPT412	Biostatistics & Research Methodology	60		4	4	-	4	60	40	-	100
BPT413	Health Promotion and Fitness	15	30	3	1	2	3	60	40	50	200
BPT414	Clinical cardiovascular & pulmonary	60		4	4	-	4	60	40	-	100
<b>Not for university examination</b>											
BPT415	Principles of Management	30		2	2	-	2	60	40	-	100
BPT416	Critique inquiry, case presentation and discussion		15	1	-	1	1	-	50	50	100
BPT417	Clinical education		195	13	-	13	13	-	50	50	100
<b>Total</b>		<b>225</b>	<b>315</b>	<b>36</b>	<b>15</b>	<b>21</b>	<b>36</b>	<b>300</b>	<b>200</b>	<b>200</b>	<b>900</b>

**EIGHTH SEMESTER (43-48 MONTHS)**

Sl. No.	Course Titles	Hours		Weekly class hours	Credits		Total Theory	I.A.	Marks		Total
		Theory	Practical		Theory	Practical			Practical	I.A.	
BPT421	Physiotherapy in cardiovascular, pulmonary & intensive care	60	75	9	4	5	9	60	40	50	200
BPT422	Community Physiotherapy	45	45	6	3	3	6	60	40	50	200
BPT423	Clinical reasoning & Evidence based physiotherapy	15	15	2	1	1	2	60	40	50	200
BPT424	Administration and Teaching Skills	15	30	3	1	2	3	60	40	50	200
BPT425	Research Project	15	30	3	1	2	3	60	40	50	200
BPT426	Clinical education	-	195	13	-	13	13	-	50	50	100
<b>Total</b>		<b>150</b>	<b>390</b>	<b>36</b>	<b>10</b>	<b>26</b>	<b>36</b>	<b>300</b>	<b>200</b>	<b>300</b>	<b>11,00</b>

**NINTH SEMESTER**

Sl. No.	Course Titles	Hours		Total	Weekly class hours	Evaluation
		Theory	Practical			
BPT511	Internship		960 (Minimum)	960	NA	Evaluation done as per annexure-I
	<b>Total</b>			<b>960</b>		

**INTERNSHIP** – Minimum 960 hours (calculated based on 8 hours per day, if 120 working days in six- month span)

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**SUBJECT DESCRIPTION** - It is designed to provide students with the working knowledge of the structure of the human body which is essential foundation for their clinical studies.

**THEORY -**

1. **Histology:** General Histology, study of the basic tissues of the body; Microscope, Cell, Epithelium, Connective Tissue, Cartilage, Bone, Muscular tissue, Nerve Tissue – TS & LS, Circulatory system – large sized artery, medium sized artery, large sized vein, lymphoid tissue, Skin and its appendages.
2. **Embryology**
  - a. Ovum, Spermatozoa, fertilization and formation of the Germ layers and their derivations.
  - b. Development of skin, Fascia, blood vessels, lymphatic,
  - c. Development of bones, axial and appendicular skeleton and muscles,
  - d. Neural tube, brain vessels and spinal cord,
  - e. Development of brain and brain stem structures
3. **Regional Anatomy**
  - a. **Thorax:**
    - i. Cardio – Vascular System Mediastinum: Divisions and contents Pericardium: Thoracic Wall: position, shape and parts of the heart; conducting System; blood Supply and nerve supply of the heart; names of the blood vessels and their distribution in the body – region wise.
    - ii. Respiratory system - Outline of respiratory passages: Pleura and lungs: position, parts, relations, blood supply and nerve supply; Lungs – emphasize on bronchopulmonary segments.
    - iii. Diaphragm: Origin, insertion, nerve supply and action, openings in the diaphragm.
    - iv. Intercostal muscles and Accessory muscles of respiration: Origin, insertion, nerve supply and action.
  - b. **Abdomen:**
    - i. Peritoneum: Parietal peritoneum, visceral peritoneum, folds of peritoneum, functions of peritoneum.
    - ii. Large blood vessels of the gut.
    - iii. Location, size, shape, features, blood supply, nerve supply and functions of the following: stomach, liver, spleen, pancreas, kidney, urinary bladder, intestines, gall bladder.
  - c. **Pelvis:** Position, shape, size, features, blood supply and nerve supply of the male and female reproductive system.
  - d. **Endocrine glands:** Position, shape, size, function, blood supply and nerve supply of the following glands: Hypothalamus and pituitary gland, thyroid glands, parathyroid glands, Adrenal glands, pancreatic islets, ovaries and testes, pineal glands, thymus.

**SUBJECT DESCRIPTION:** The course in Physiology over the first year is designed to give the student an in-depth knowledge of fundamental reactions of living organisms, particularly in the human body. The major topics covered include the following: the cell; primary tissue; connective tissue; skin; muscle; nervous tissue; blood; lymphoid tissues; respiration; blood vessels; circulation; cardiac cycle; systemic circulation; gastrointestinal tract; kidneys; uterus; urinary tract; pregnancy; endocrine system.

**THEORY****1. General Physiology**

- a. Cell: Morphology. Organelles: their structure and functions
- b. Transport Mechanisms across the cell membrane
- c. Body fluids: Distribution, composition.

**2. Blood**

- a. Introduction: Composition and functions of blood.
- b. Plasma: Composition, formation, functions. Plasma proteins.
- c. RBC: count and its variations. Erythropoiesis- stages, factors regulating. Reticulo-endothelial system (in brief) Hemoglobin -structure, function and derivatives Anemia (in detail), types of Jaundice. Blood indices, PCV, ESR.
- d. WBC: Classification. Morphology, functions, count, its variation of each. Immunity
- e. Platelets: Morphology, functions, count, its variations
- f. Hemostatic mechanisms: Blood coagulation-factors, mechanisms. Their disorders. Anticoagulants.
- g. Blood Groups: Landsteiner's law. Types, significance, determination, Erythroblastosis foetalis.
- h. Blood Transfusion: Cross matching. Indications and complications.
- i. Lymph: Composition, formation, circulation and functions.

**3. Nerve Muscle Physiology**

- a. Introduction: Resting membrane potential. Action potential – ionic basis and properties.
- b. Nerve: Structure and functions of neurons. Classification, Properties and impulse transmission of nerve fibers. Nerve injury – degeneration and regeneration.
- c. Neuroglia: Types and functions.
- d. Muscle: Classification. Skeletal muscle: Structure. Neuromuscular junction: Structure. Neuromuscular transmission, myasthenia gravis. Excitation- Contraction coupling. Rigor mortis.

**4. Cardiovascular System**

- a. Introduction: Physiological anatomy and nerve supply of the heart and blood vessels. Organisation of CVS. Cardiac muscles: Structure. Ionic basis of action potential and pacemaker potential. Properties.
- b. Conducting system: Components. Impulse conduction Cardiac Cycle: Definition. Phases of cardiac cycle. Pressure and volume curves. Heart sounds – causes, character. ECG: Definition. Different types of leads. Waves and their causes. P-R interval. Heart block.
- c. Cardiac Output: Definition. Normal value. Determinants. Stroke volume and its regulation. Heart rate and its regulation. Their variations

- d. Arterial Blood Pressure: Definition. Normal values and its variations. Determinants. Peripheral resistance. Regulation of BP.
- e. Arterial pulse.
- f. Shock – Definition. Classification–causes and features
- g. Regional Circulation: Coronary, Cerebral and Cutaneous circulation.
- h. Cardiovascular changes during exercise.

## 5. Respiratory System -

- a. Introduction: Physiological anatomy – Pleura, tracheo-bronchial tree, alveolus, respiratory membrane and their nerve supply. Functions of respiratory system. Respiratory muscles.
- b. Mechanics of breathing: Intrapleural and Intrapulmonary pressure changes during respiration. Chest expansion. Lung compliance: Normal value, pressure-volume curve, factors affecting compliance and its variations. Surfactant – Composition, production, functions. RDS
- c. Spirometry: Lung volumes and capacities. Timed vital capacity and its clinical significance. Maximum ventilation volume. Respiratory minute volume.
- d. Dead Space: Types and their definition.
- e. Pulmonary Circulation. Ventilation-perfusion ratio and its importance.
- f. Transport of respiratory gases: Diffusion across the respiratory membrane. Oxygen transport – Different forms, oxygen-haemoglobin dissociation curve. Factors affecting it. P50, Haldane and Bohr effect. Carbon dioxide transport: Different forms, chloride shift.
- g. Regulation of Respiration: Neural Regulation. Hering-breuer's reflex. Voluntary control. Chemical Regulation.
- h. Hypoxia: Effects of hypoxia. Types of hypoxias. Hyperbaric oxygen therapy. Acclimatization Hypercapnia. Asphyxia. Cyanosis – types and features. Dysbarism
- i. Disorders of Respiration: Dyspnea. Orthopnea. Hyperpnea, hyperventilation, apnoea, tachypnoea. periodic breathing – types Artificial respiration
- j. Respiratory changes during exercise.

## 6. Digestive System -

- a. Introduction: Physiological anatomy and nerve supply of alimentary canal. Enteric nervous system
- b. Salivary Secretion: Saliva: Composition. Functions. Regulation. Mastication (in brief)
- c. Swallowing: Definition. Different stages. Function.
- d. Stomach: Functions. Gastric juice: Gland, composition, function, regulation. Gastrin: Production, function and regulation. Peptic ulcer. Gastric motility. Gastric emptying. Vomiting.
- e. Pancreatic Secretion: Composition, production, function. Regulation.
- f. Liver: Functions of liver. Bile secretion: Composition, functions and regulation. Gall bladder: Functions.
- g. Intestine: Succus entericus: Composition, function and regulation of secretion. Intestinal motility and its function and regulation.
- h. Mechanism of Defecation.

## 7. Endocrine System -

- a. Introduction: Major endocrine glands. Hormone: classification, mechanism of action.

### Functions of hormones

- b. Pituitary Gland: Anterior Pituitary and Posterior Pituitary hormones: Secretory cells, action on target cells, regulation of secretion of each hormone. Disorders: Gigantism, Acromegaly, Dwarfism, Diabetes insipidus. Physiology of growth and development: hormonal and other influences.
- c. Pituitary-Hypothalamic Relationship.
- d. Thyroid Gland: Thyroid hormone and calcitonin: secretory cells, synthesis, storage, action and regulation of secretion. Disorders: Myxedema, Cretinism, Grave's disease.
- e. Parathyroid hormones: secretory cell, action, regulation of secretion. Disorders: Hypoparathyroidism. Hyperthyroidism. Calcium metabolism and its regulation.
- f. Adrenal Gland: Adrenal Cortex: Secretory cells, synthesis, action, regulation of secretion of Aldosterone, Cortisol, and Androgens. Disorders: Addison's disease, Cushing's syndrome, Conn's syndrome, Adrenogenital syndrome.
- g. Adrenal Medulla: Secretory cells, action, regulation of secretion of adrenaline and noradrenaline. Disorders: Pheochromocytoma.
- h. Endocrine Pancreas: Secretory cells, action, regulation of secretion of insulin and glucagon. Glucose metabolism and its regulation. Disorder: Diabetes mellitus.
- i. Calcitriol, Thymus and Pineal gland (very brief).
- j. Local Hormones. (Briefly) .

**PRACTICALS** – Practical classes include hematology experiments, clinical examinations, amphibian chart, and recommended demonstrations.

1. **Haematology:** To be done by the students

- a. Study of Microscope and its uses
- b. Determination of RBC count
- c. Determination of WBC count
- d. Differential leukocyte count
- e. Estimation of hemoglobin
- f. Calculation of blood indices
- g. Determination of blood groups
- h. Determination of bleeding time
- i. Determination of clotting time Demonstrations only
- j. Determination of ESR
- k. Determination of PCV

2. **Amphibian Experiments** – Demonstration and Dry charts Explanation. Instruments used for frog experiments. Kymograph, heart liver, Muscle trough, stimulator.

- a. Simple muscle curve.
- b. Effect of increasing the strength of the stimuli
- c. Effect of temperature on muscle contraction
- d. Effect of two successive stimuli.
- e. Effect of Fatigue.
- f. Effect of load on muscle contraction
- g. Genesis of tetanus and clonus.
- h. Velocity of impulse transmission.

**THEORY****1. Nutrition –**

- a. Introduction, Importance of nutrition Calorific values, Respiratory quotient – Definition, and its significance Energy requirement of a person - Basal metabolic rate: Definition, Normal values, factor affecting BMR Special dynamic action of food.
- b. Physical activities - Energy expenditure for various activities. Calculation of energy requirement of a person
- c. Balanced diet
  - i. Recommended dietary allowances
  - ii. Role of carbohydrates in diet: Digestible carbohydrates and dietary fibers
  - iii. Role of lipids in diet
  - iv. Role of proteins in diet: Quality of proteins - Biological value, net protein utilization, Nutritional aspects of proteins-essential and non- essential amino acids. Nitrogen balance
  - v. Nutritional disorders.

**2. Carbohydrate Chemistry –**

- a. Definition, general classification with examples, Glycosidic bond
- b. Structures, composition, sources, properties and functions of Monosaccharides, Disaccharides, Oligosaccharides and Polysaccharides.
- c. Glycosaminoglycan (mucopolysaccharides)

**3. Lipid Chemistry –**

- a. Definition, general classification
- b. Definition, classification, properties and functions of Fatty acids, Triacylglycerol, Phospholipids, Cholesterol
- c. Essential fatty acids and their importance
- d. Lipoproteins: Definition, classification, properties, Sources and function Ketone bodies

**4. Amino-acid Chemistry –**

- a. Amino acid chemistry: Definition, Classification, Peptide bonds
- b. Peptides: Definition, biologically important peptides
- c. Protein chemistry: Definition, Classification, Functions of proteins,

**5. Enzymes –**

- a. Definition, Active site, Cofactor (Coenzyme, Activator), Proenzyme. Classification with examples, Factors effecting enzyme activity, Enzyme inhibition and significance, Isoenzymes, Diagnostic enzymology (clinical significance of enzymes)

**6. Nucleotide and Nucleic acid Chemistry -**

- a. Nucleotide chemistry: Nucleotide composition, functions of free nucleotides in body.
- b. Nucleic acid (DNA and RNA) chemistry: Difference between DNA and RNA, Structure of DNA (Watson and Crick model), Functions of DNA. Structure and functions of tRNA, rRNA, mRNA.

**7. Digestion and Absorption -**

- a. General characteristics of digestion and absorption, Digestion and absorption of carbohydrates, proteins and lipids. Disorders of digestion and absorption – Lactose intolerance.

**8. Carbohydrate Metabolism -**

- a. **Introduction, Glycolysis** – Aerobic, Anaerobic Citric acid cycle, Substrate level

phosphorylation.

- b. **Glycogen metabolism** – Glycogenesis, Glycogenolysis, Metabolic disorders glycogen, Gluconeogenesis, Cori cycle
- c. Hormonal regulation of glucose, Glycosuria, Diabetes mellitus.

#### 9. Lipid Metabolism -

- a. Introduction to lipid metabolism, Lipolysis, Oxidation of fatty acids -oxidation offatty acids,
- b. Lipogenesis - Denovo synthesis of fatty acids, chain elongation, desaturation, triacylglycerol synthesis, fat metabolism in adiposetissues
- c. Ketone body metabolism: Ketone body formation (ketogenesis), utilization (ketolysis), ketosis, Rothera's test.
- d. Cholesterol metabolism: synthesis, degradation, cholesteroltransport
- e. Hypercholesterolemia and its effects (atherosclerosis and coronary heart diseases) Hypocholesterolemic agents, Common hyperlipoproteinemia, Fatty liver

#### 10. Amino acid and Protein Metabolism -

- a. Catabolism of amino acids - Introduction, transamination, deamination, Fate of ammonia, transport of ammonia, Urea cycle
- b. Specialized products formed from amino acids - from glycine, arginine, methionine, phenylalanine and tyrosine.

#### 11. Vitamins -

- a. Definition, classification according to solubility,
- b. Individual vitamins - Sources, Coenzyme forms, functions, RDA, digestion, absorption and transport, deficiency and toxicity.

#### 12. Mineral Metabolism-

- a. Definition, Sources, RDA, Digestion, absorption, transport, excretion, functions, disorder of Individual minerals - Calcium, phosphate, iron, Magnesium, fluoride, selenium, molybdenum, copper. Phosphate, calcium and iron in detail.

#### 13. Cell Biology -

- a. Introduction, Cell structure, Cell membrane structure and function, various types of absorption. Intracellular organelles and their functions, briefly on cytoskeleton.

#### 14. Muscle Contraction -

- a. Contractile elements in muscle, briefly on the process of muscle contraction, Energy for muscle contraction.

#### 15. Biochemistry of Connective tissue -

- a. Introduction, various connective tissue proteins: Collagen, elastin - Structure and associated disorders. Glycoproteins, Proteoglycans.

#### 16. Hormone Action -

- a. Definition, classification, Mechanism of hormone action. Receptors, signal transduction, second messengers and cell function.

#### 17. Acid-Base balance -

- a. Acids, bases and buffers, pH. Buffer systems of the body, bicarbonate buffer system Role of lungs and kidneys in acid base balance, Acid base imbalance.

#### 18. Water balance -

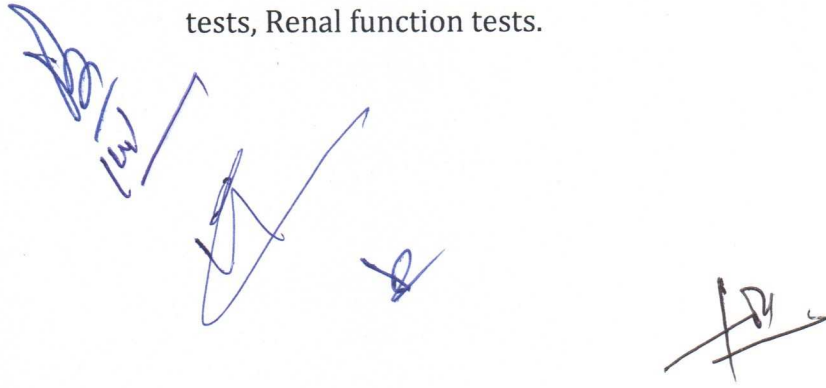
- a. Water distribution in the body, Body water, water turnover, Regulation of water balance: role of ADH and thirst centre.

#### 19. Electrolyte balance -

- a. Osmolarity. Distribution of electrolytes.
- b. Electrolyte balance: Role of aldosterone, rennin angiotensin system and ANF.

## 20. Clinical Biochemistry -

- a. Normal levels of blood and urine constituents, Relevance of blood and urine levels of Glucose, Urea, Uric acid, Creatinine, Calcium, Phosphates, pH and Bicarbonate. Liver function tests, Renal function tests.



**SUBJECT DESCRIPTION** - Sociology will introduce student to the basic sociology concepts, principles and social process, social institutions in relation to the individual, family and community and the various social factors affecting the family in rural and urban communities in India will be studied.

**THEORY****1. Introduction:**

- a. Meaning- Definition and scope of sociology
- b. Its relation to Anthropology, Psychology, Social Psychology.
- c. Methods of Sociological investigations- Case study, social survey, questionnaire, Interview and opinion poll methods.
- d. Importance of its study with special reference to Health Care Professionals.

**2. Social Factors in Health and disease situations:**

- a. Meaning of social factors
- b. Role of social factors in health and illness

**3. Socialization:**

- a. Meaning and nature of socialization.
- b. Primary, Secondary and Anticipatory socialization.
- c. Agencies of socialization.

**4. Social Groups:**

- a. Concepts of social groups, influence of formal and informal groups on health and sickness. The role of primary groups and secondary groups in the hospital and rehabilitation setup.

**5. Family:**

- a. The family, meaning and definitions.
- b. Functions of types of family
- c. Changing family patterns
- d. Influence of family on the individuals health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their importance to physiotherapy.

**6. Community:**

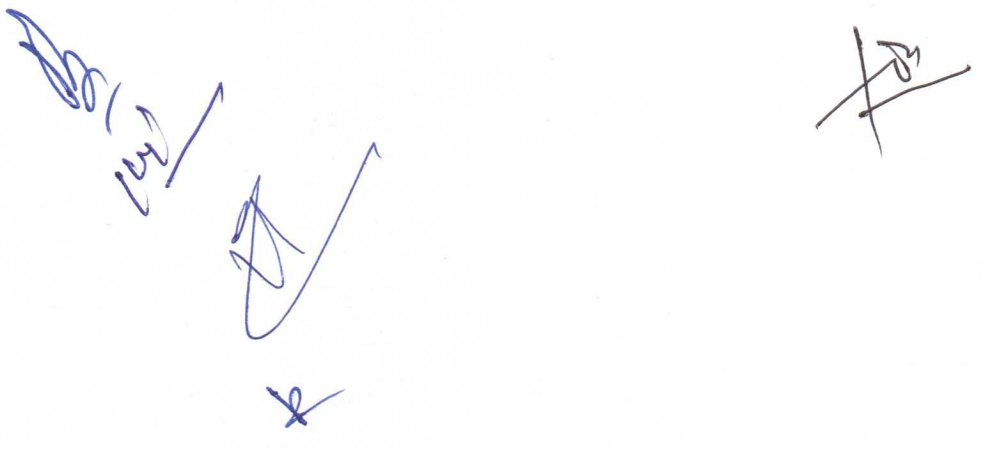
- a. Rural community: Meaning and features –Health hazards of ruralities, health hazards to tribal community.
- b. Urban community: Meaning and features- Health hazards of urbanities.

**7. Culture and Health:**

- a. Concept of Health
- b. Concept of Culture
- c. Culture and Health
- d. Culture and Health Disorders

**8. Social change:**

- a. Meaning of social changes.
- b. Factors of social changes.
- c. Human adaptation and social change
- d. Social change and stress.

- e. Social change and deviance.
  - f. Social change and health programme
  - g. The role of social planning in the improvement of health and rehabilitation.
- 9. Social Problems of 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. Alchoholism
  - g. Problems of women in employment
  - h. Geriatric problems
  - i. Problems of underprivileged.
- 10. Social Security:**
- a. Social security and social legislation in relation to the disabled.
- 11. Social worker:**
- a. Meaning of Social Work
  - b. The role of a Medical Social Worker.
- 

**Introduction To National Healthcare Delivery System in India**

**SUBJECT DESCRIPTION:** The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world. Topics to be covered under the subject are as follows:

**1. Introduction to healthcare delivery system**

- a. Healthcare delivery system in India at primary, secondary and tertiary care
- b. Community participation in healthcare delivery system
- c. Health system in developed countries.
- d. Private Sector
- e. National Health Mission
- f. National Health Policy
- g. Issues in Health Care Delivery System in India

**2. National Health Programme-** Background objectives, action plan, targets, operations, achievements and constraints in various National Metaprogramme.

**3. Introduction to AYUSH system of medicine**

- a. Introduction to Ayurveda.
- b. Yoga and Naturopathy
- c. Unani
- d. Siddha
- e. Homeopathy
- f. Need for integration of various system of medicine

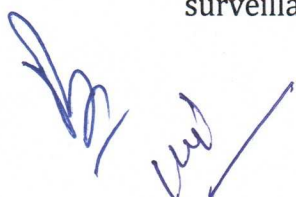
**4. Health scenario of India-** past, present and future

**5. Demography & Vital Statistics-**

- a. Demography – its concept
- b. Vital events of life & its impact on demography
- c. Significance and recording of vital statistics
- d. Census & its impact on health policy

**6. Epidemiology**

- e. Principles of Epidemiology
- f. Natural History of disease
- g. Methods of Epidemiological studies
- h. Epidemiology of communicable & non-communicable diseases, disease transmission, host defense immunizing agents, cold chain, immunization, disease monitoring and surveillance.



**SUBJECT DESCRIPTION:** The students will be able to appreciate the role of computer technology. The course has focus on computer organization, computer operating system and software, and MS windows, Word processing, Excel data worksheet and PowerPoint presentation. Topics to be covered under the subject are as follows:

1. **Introduction to computer:** Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.
2. **Input output devices:** Input devices (keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices (monitors, pointers, plotters, screen image projector, voice response systems).
3. **Processor and memory:** The Central Processing Unit (CPU), main memory.
4. **Storage Devices:** Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.
5. **Introduction of windows:** History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).
6. **Introduction to MS-Word:** introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.
7. **Introduction to Excel:** introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.
8. **Introduction to power-point:** introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.
9. **Introduction of Operating System:** introduction, operating system concepts, types of operating system.
10. **Computer networks:** introduction, types of networks (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.
11. **Internet and its Applications:** definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.
  - a. Application of Computers in clinical settings.

**PRACTICAL:** Practical on fundamentals of computers -



1. Learning to use MS office: MS word, MS PowerPoint, MS Excel.
2. To install different software.
3. Data entry efficiency



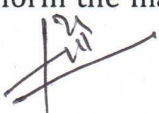

Major topics to be covered under Communication course –

1. Basic Language Skills: Grammar and Usage.
2. Business Communication Skills. With focus on speaking-Conversations, discussions, dialogues, short presentations, pronunciation.
3. Teaching the different methods of writing like letters, E-mails, report, case study, collecting the patient data etc. Basic compositions, journals, with a focus on paragraph form and organization.
4. Basic concepts & principles of good communication
5. Special characteristics of health communication
6. Types & process of communication – verbal, non-verbal and written communication. Upward, downward and lateral communication.
7. Therapeutic communication: empathy versus sympathy.
8. Communication methods for teaching and learning.
9. Communication methods for patient education.
10. Barriers of communication & how to overcome.

**BPT118****INTRODUCTION TO QUALITY AND PATIENT SAFETY**

1. **Quality assurance and management** - The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system.
    - a. Concepts of Quality of Care
    - b. Quality Improvement Approaches
    - c. Standards and Norms
    - d. Quality Improvement Tools
    - e. Introduction to NABH guidelines
  2. **Basics of emergency care and life support skills** - Basic life support (BLS) is the foundation for saving lives following cardiac arrest. Fundamental aspects of BLS include immediate recognition of sudden cardiac arrest (SCA) and activation of the emergency response system, early cardiopulmonary resuscitation (CPR), and rapid defibrillation with an automated external defibrillator (AED). Initial recognition and response to heart attack and stroke are also considered part of BLS. The student is also expected to learn about basic emergency care including first aid and triage. Topics to be covered under the subject are as follows:
    - a. Vital signs and primary assessment
    - b. Basic emergency care – first aid and triage
    - c. Ventilations including use of bag-valve-masks (BVMs)
    - d. Choking, rescue breathing methods
    - e. One- and Two-rescuer CPR
    - f. Using an AED (Automated external defibrillator).
    - g. Managing an emergency including moving a patient
- 
- 

At the end of this topic, focus should be to teach the students to perform the maneuvers in



simulation lab and to test their skills with focus on airways management and chest compressions. At the end of the foundation course, each student should be able to perform and execute/operate on the above-mentioned modalities.

3. **Bio medical waste management and environment safety-** The aim of this section will be to help prevent harm to workers, property, the environment and the general public. Topics to be covered under the subject are as follows:
  - a. Definition of Biomedical Waste
  - b. Waste minimization
  - c. BMW – Segregation, collection, transportation, treatment and disposal (including color coding)
  - d. Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste
  - e. BMW Management & methods of disinfection
  - f. Modern technology for handling BMW
  - g. Use of Personal protective equipment (PPE)
  - h. Monitoring & controlling of cross infection (Protective devices)
4. **Infection prevention and control** - The objective of this section will be to provide a broad understanding of the core subject areas of infection prevention and control and to equip

AHPs with the fundamental skills required to reduce the incidence of hospital acquired infections and improve health outcomes. Concepts taught should include –

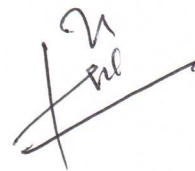
- a. Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],
- b. Prevention & control of common healthcare associated infections,
- c. Components of an effective infection control program, and
- d. Guidelines (NABH and JCI) for Hospital Infection Control

**5. Antibiotic Resistance-**

- a. History of Antibiotics
- b. How Resistance Happens and Spreads
- c. Types of resistance- Intrinsic, Acquired, Passive
- d. Trends in Drug Resistance
- e. Actions to Fight Resistance
- f. Bacterial persistence
- g. Antibiotic sensitivity
- h. Consequences of antibiotic resistance
- i. Antimicrobial Stewardship- Barriers and opportunities, Tools and models in hospitals

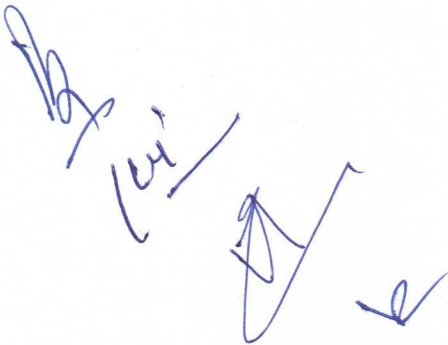
**6. Disaster preparedness and management-** The objective of this section will be to provide knowledge on the principles of on-site disaster management. Concepts to be taught should include-

- a. Fundamentals of emergency management,
- b. Psychological impact management,
- c. Resource management,
- d. Preparedness and risk reduction,
- e. Key response functions (including public health, logistics and governance, recovery, rehabilitation and reconstruction), information management, incident command and institutional mechanisms.



This course introduces the elements of medical terminology. Emphasis is placed on building familiarity with medical words through knowledge of roots, prefixes, and suffixes. Topics include: origin, word building, abbreviations and symbols, terminology related to the human anatomy, reading medical orders and reports, and terminology specific to the student's field of study. Spelling is critical and will be counted when grading tests. Topics to be covered under the subject are as follows:

1. Derivation of medical terms.
2. Define word roots, prefixes, and suffixes.
3. Conventions for combined morphemes and the formation of plurals.
4. Basic medical terms in health care and physiotherapy.
5. Form medical terms utilizing roots, suffixes, prefixes, and combining roots.
6. Interpret basic medical abbreviations/symbols.
7. Utilize diagnostic, surgical, and procedural terms and abbreviations related to the integumentary system, musculoskeletal system, respiratory system, cardiovascular system, nervous system, and endocrine system.
8. Interpret medical records/reports.
9. Data entry and management on electronic health record system.



## SECOND SEMESTER

**BPT121**

## **HUMAN ANATOMY II**

Studies are concerned with the topographical and functional anatomy of the limbs and thorax. Particular attention is paid to the muscles, bones and joints of the regions. The head and neck and central nervous system (CNS) are studied with particular reference to topics of importance to physiotherapists. The study of the CNS includes detailed consideration of the control of motor function.

**1. Musculo Skeletal Anatomy - (All the topics to be taught in detail)**

- a. Anatomical positions of body, axes, planes, common anatomical terminologies (Groove, tuberosity, trochanters etc)
- b. Connective tissue classification.
- c. Bones- Composition & functions, classification and types according to morphology and development.
- d. Joints-definition-classification, structure of fibrous, cartilaginous joints, blood supply and nerve supply of joints.
- e. Muscles – origin, insertion, nerve supply and actions.
- f. Upper Extremity
  - i. Osteology: Clavicles, Scapula, Humerus, Radius, Ulna, Carpals, Metacarpals, Phalanges.
  - ii. Soft parts: Breast, pectoral region, axilla, front of arm, back of arm, cubital fossa, front of fore arm, back of fore arm, palm, dorsum of hand, muscles, nerves, blood vessels and lymphatic drainage of upper extremity.
  - iii. Joints: Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand.
  - iv. Arches of hand, skin of the palm and dorsum of hand.
- g. Lower Extremity
  - i. Osteology: Hip bone, femur, tibia, fibula, patella, tarsals, metatarsals and phalanges.
  - ii. Soft parts: Gluteal region, front and back of the thigh (Femoral triangle, femoral canal and inguinal canal), medial side of the thigh (Adductor canal), lateral side of the thigh, popliteal fossa, anterior and posterior compartment of leg, sole of the foot, lymphatic drainage of lower limb, venous drainage of the lower limb, arterial supply of the lower limb, arches of foot, skin of foot.
  - iii. Joints: Hip Joint, Knee joint, Ankle joint, joints of the foot.
- h. Trunk & Pelvis:
  - i. Osteology: Cervical, thoracic, lumbar, sacral and coccygeal vertebrae and ribs.
  - ii. Soft tissue: Pre and Para vertebral muscles, intercostals muscles, anterior abdominal wall muscles, Inter-vertebral disc.
  - iii. Pelvic girdle and muscles of the pelvic floor.
- i. Head and Neck:
  - i. Osteology: Mandible and bones of the skull.
  - ii. Soft parts: Muscles of the face and neck and their nerve and blood supply-extra ocular muscles, triangles of the neck.
  - iii. Gross anatomy of eyeball, nose, ears and tongue.
- j. Neuro Anatomy - Organization of Central Nervous system - Spinal nerves and autonomic

Nervous system mainly pertaining to cardiovascular, respiratory and urogenital system

- i. Cranial nerves
- ii. Peripheral nervous system
- iii. Peripheral nerve
- iv. Neuromuscular junction
- v. Sensory end organs
- vi. Central Nervous System
- vii. Spinal segments and areas
- viii. Brain Stem
- ix. Cerebellum
- x. Inferior colliculi
- xi. Superior Colliculi
- xii. Thalamus
- xiii. Hypothalamus
- xiv. Corpus striatum
- xv. Cerebral hemisphere
- xvi. Lateral ventricles
- xvii. Blood supply to brain
- xviii. Basal Ganglia
- xix. The pyramidal system
- xx. Pons, medulla, extra pyramidal systems
- xxi. Anatomical integration

**PRACTICAL - List of Practical / Demonstrations \***

1. Upper extremity including surface Anatomy.
2. Lower extremity including surface Anatomy.
3. Head & Spinal cord and Neck and Brain including surface Anatomy.
4. Thorax including surface anatomy, abdominal muscles.
5. Histology-Elementary tissue including surface Anatomy.
6. Embryology-models, charts & X-rays.

**1. SPECIAL SENSES -**

- a. Vision: Introduction: Functional anatomy of eye ball. Functions of cornea, iris, pupil, aqueous humor – glaucoma, lens – cataract, vitreous humor, rods and cones. Photopic vision. Scotopic vision.
- b. Visual Pathway and the effects of lesions.
- c. Refractive Errors: myopia, hypermetropia, presbyopia and astigmatism.
- d. Visual Reflexes: Accommodation, Pupillary and Light. Visual acuity and Visual field. Light adaptation. Dark adaptation. Color vision – color blindness. Nyctalopia.
- e. Audition: Physiological anatomy of the ear. Functions of external ear, middle ear and inner ear. Structure of Cochlea and organ of corti. Auditory pathway. Types of Deafness. Tests for hearing. Audiometry.
- f. Taste: Taste buds. Primary tastes. Gustatory pathway.
- g. Smell: Olfactory membrane. Olfactory pathway.
- h. Vestibular Apparatus: Crista ampullaris and macula. Functions. Disorders

**2. NERVOUS SYSTEM -**

- a. Introduction: Organization of CNS – central and peripheral nervous system. Functions of nervous system. Synapse: Functional anatomy, classification, Synaptic transmission. Properties.
- b. Sensory Mechanism: Sensory receptors: function, classification and properties. Sensory pathway: The ascending tracts – Posterior column tracts, lateral spinothalamic tract and the anterior spinothalamic tract – their origin, course, termination and functions. The trigeminal pathway. Sensory cortex. Somatic sensations: crude touch, fine touch, tactile localization, tactile discrimination, stereognosis, vibration sense, kinesthetic sensations. Pain sensation: mechanism of pain. Cutaneous pain – slow and fast pain, hyperalgesia. Deep pain. Visceral pain – referred pain. Gate control theory of pain. tabes dorsalis, sensory ataxia.
- c. Motor Mechanism: Motor Cortex. Motor pathway: The descending tracts – pyramidal tracts, extrapyramidal tracts – origin, course, termination and functions. Upper motor neuron and lower motor neuron. Paralysis, monoplegia, paraplegia, hemiplegia and quadriplegia.
- d. Reflex Action: components, Bell-Magendie law, classification and Properties. Monosynaptic and polysynaptic reflexes, superficial reflexes, deep reflexes. Stretch reflex– structure of muscle spindle, pathway, higher control and functions. Inverse stretch reflex. Muscle tone – definition, and properties hypotonia, atonia and hypertonia. UMNL and LMNL
- e. Spinal cord Lesions: Complete transection and Hemi section of the spinal cord.
- f. Cerebellum: Functions. Cerebellar ataxia.
- g. Posture and Equilibrium: Postural reflexes – spinal, medullary, midbrain and cerebral reflexes.
- h. Thalamus and Hypothalamus: Nuclei. Functions. Thalamic syndrome
- i. Reticular Formation and Limbic System: Components and Functions.
- j. Basal Ganglia: Structures included and functions. Parkinson's disease.
- k. Cerebral Cortex: Lobes. Brodmann's areas and their functions. Higher functions of cerebral cortex – learning, memory and speech.
- l. EEG: Waves and features. Sleep: REM and NREM sleep.
- m. CSF: Formation, composition, circulation and functions. Lumbar puncture and its significance. Blood brain barrier. Hydrocephalus.

n. ANS: Features and actions of parasympathetic and sympathetic nervous system.

### 3. RENAL SYSTEM -

- a. Introduction: Physiological anatomy. Nephrons – cortical and juxtamedullary. Juxta-glomerular apparatus. Glomerular membrane. Renal blood flow and its regulation. Functions of kidneys.
- b. Mechanism of Urine Formation: Glomerular Filtration: Mechanism of glomerular filtration. GFR – normal value and factors affecting. Renal clearance. Inulin clearance. Creatinine clearance.
- c. Tubular Reabsorption: Reabsorption of Na<sup>+</sup>, glucose, HCO<sub>3</sub><sup>-</sup>, urea and water. Filtered load. Renal tubular transport maximum. Glucose clearance: TmG. Renal threshold for glucose.
- d. Tubular Secretion: Secretion of H<sup>+</sup> and K<sup>+</sup>. PAH clearance.
- e. Mechanism of concentrating and diluting the Urine: Counter-current mechanism. Regulation of water excretion. Diuresis. Diuretics.
- f. Micturition: Mechanism of micturition. Cystometrogram. Atonic bladder, automatic bladder.
- g. Acid-Base balance (very brief)
- h. Artificial Kidney: Principle of haemodialysis.
- i. Skin and temperature regulation.

### 4. REPRODUCTIVE SYSTEM -

- a. Introduction: Physiological anatomy reproductive organs. Sex determination. Sex differentiation. Disorder
- b. Male Reproductive System: Functions of testes. Pubertal changes in males. Spermatogenesis. Testosterone: action. Regulation of secretion. Semen.
- c. Female Reproductive System: Functions of ovaries and uterus. Pubertal changes in females. Oogenesis. Hormones: estrogen and progesterone-action. Regulation of secretion. Menstrual Cycle: Phases. Ovarian cycle. Uterine cycle. Hormonal basis. Menarche. Menopause. Pregnancy: Pregnancy tests. Physiological changes during pregnancy. Functions of placenta. Lactation. Contraception methods

### 5. Physiology of exercise -

- a. Effects of acute and chronic exercise on
  - i. O<sub>2</sub> transport
  - ii. Muscle strength/power/endurance
  - iii. B.M.R. /R.Q.
  - iv. Hormonal and metabolic effect
  - v. Cardiovascular system
  - vi. Respiratory system
  - vii. Body fluids and electrolyte
- b. Effect of gravity / altitude / acceleration / pressure on physical parameters
- c. Physiology of Age

### APPLIED PHYSIOLOGY -

More detailed study of the physiology and practical applications of the following selected topics with emphasis on aspects, which should help in understanding the nature and treatment of common clinical situations of interest in Physiotherapy.

#### 1. Pulmonary Functions

- a. Properties of gases, Mechanics of respiration, Diffusion capacity, special features of

- pulmonary circulation and their application.
- b. Respiratory adjustments in exercises.
- c. Artificial respiration
- d. Breath sounds.

## 2. Cardio vascular Functions

- a. Blood flow through arteries, arterioles, capillaries, veins and venuoles.
- b. Circulation of Lymph, Oedema
- c. Factors affecting cardiac output.
- d. Circulatory adjustment in exercise and in postural and gravitational changes,
- e. Pathophysiology of fainting and heart failure.

## 3. Muscles and Nervous System Functions

- a. Peripheral nervous system, neuromuscular transmission, Types of nerve fibers.
- b. Action potential, Strength-duration curve, ECG, EMG, VEP, NCV
- c. Degeneration and regeneration of nerve, Reactions of denervations.
- d. Synaptic transmission, Stretch reflex- Mechanism and factors affecting it.
- e. Posture, Balance and Equilibrium/Coordination of voluntary movement.
- f. Voluntary motor action, clonus, Rigidity, incoordination.
- g. Special senses- Vision, taste, hearing, vestibular, Olfaction
- h. Sympathetic and Parasympathetic regulation, Thermoregulation.

## 4. Blood functions

- a. Thalassemia Syndrome, Hemophilia, VWF
- b. Anemia, Leukocytosis
- c. Bone marrow transplant

## 5. Metabolic Functions

- a. Diabetes Mellitus, Physiological basis of Peptic Ulcer, Jaundice, GIT disorders and Dietary fiber, Thyroid functions, Vitamins deficiency.

## PRACTICAL

### 1. Clinical Examination

- a. Examination of Radial pulse.
- b. Recording of blood pressure
- c. Examination of CVS
- d. Examination of Respiratory system
- e. Examination of Sensory system
- f. Examination of Motor System
- g. Examination of reflexes
- h. Examination of cranial nerves
- i. Amphibian Experiments – Demonstration and Dry charts Explanation.
- j. Normal cardiogram of amphibian heart.
  - i. Properties of Cardiac muscle
  - ii. Effect of temperature on cardiogram.

### 2. Recommended Demonstrations

- a. Spirometry
- b. Artificial Respiration
- c. ECG
- d. Perimetry
- e. Mosso's Ergometry

**SUBJECT DESCRIPTION -**

Human Psychology involves the study of various behavioral patterns of individuals, theories of development, normal and abnormal aspects of motor, social, emotional and language development, communication and interaction skills appropriate to various age groups.

The study of these subjects will help the student to understand their clients while assessment and while planning appropriate treatment methods.

**THEORY -****1. Introduction to Psychology**

- a. Schools: Structuralism, functionalism, behaviorism, Psychoanalysis.
- b. Methods: Introspection, observation, inventory and experimental method.
- c. Branches: pure psychology and applied psychology
- d. Psychology and physiotherapy

**2. Growth and Development**

- a. Lifespan: Different stages of development (Infancy, childhood, adolescence, adulthood, middle age, old age).
- b. Heredity and environment: role of heredity and environment in physical and psychological development, "Nature v/s Nurture controversy".

**3. Sensation, attention and perception**

- a. Sensation: Vision, Hearing, Olfactory, Gustatory and Cutaneous sensation, movement, equilibrium and visceral sense.
- b. Attention: Types of attention, Determinants of attention (subjective determinants and objective determinants).
- c. Perception: Gestalt principles of organization of perception (principle of figureground and principles of grouping), factors influencing perception (past experience and context).
- d. Illusion and hallucination: different types.

**4. Motivation**

- a. Motivation cycle (need, drive, incentive, reward).
- b. Classification of motives.
- c. Abraham Maslow's theory of need hierarchy

**5. Frustration and conflict**

- a. Frustration: sources of frustration.
- b. Conflict: types of conflict.
- c. Management of frustration and conflict

**6. Emotions**

- a. Three levels of analysis of emotion (physiological level, subjective state, and overt behavior).
- b. Theories of emotion
- c. Stress and management of stress.

**7. Intelligence**

- a. Theories of intelligence.
- b. Distribution of intelligence.
- c. Assessment of intelligence



## 8. Thinking

- a. Reasoning: deductive and inductive reasoning
- b. Problem-solving: rules in problem solving (algorithm and heuristic)
- c. Creative thinking: steps in creative thinking, traits of creative people

## 9. Learning

- a. Factors affecting learning.
- b. Theories of learning: trial and error learning, classical conditioning, Operant conditioning, insight learning, social learning theory.
- c. The effective ways to learn: Massed/Spaced, Whole/Part, Recitation/Reading, Serial/Free recall, Incidental/Intentional learning, Knowledge of results, association, organization, and mnemonic methods.

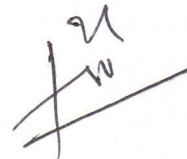
## 10. Personality

- a. Approaches to personality: type & trait, behavioristic, psychoanalytic and humanistic approach.
- b. Personality assessment: observation, situational test, questionnaire, rating scale, interview, and projective techniques.
- c. Defense Mechanisms: denial of reality, rationalization, projection, reaction formation, identification, repression, regression, intellectualization, undoing, introjection, acting out.

## 11. Social psychology

- a. Leadership: Different types of leaders. Different theoretical approaches to leadership.
- b. Attitude: development of attitude. Change of attitude.

- 12. **Clinical psychology** – Models of training, abnormal behavior assessment, clinical judgement, psychotherapy, self-management methods, physiotherapist patient interaction, aggression, self-imagery, stress management, assertive training, Group therapy, Body awareness, Pediatric, child and geriatric clinical psychology.



Biomechanics involves the study of basic concepts of human movement, and application of various biomechanical principles in the evaluation and treatment of disorders of musculoskeletal system. Students are taught to understand the various quantitative and qualitative methods of movement. Mechanical principles of various treatment methods are studied. Study of posture and gait are also included.

**THEORY****1. Basic Concepts in Biomechanics: Kinematics and Kinetics**

- a. Types
- b. of Motion
- c. Location of Motion
- d. Direction of Motion
- e. Magnitude of Motion
- f. Definition of Forces
- g. Force of Gravity
- h. Reaction forces
- i. Equilibrium
- j. Objects in Motion
- k. Force of friction
- l. Concurrent force systems
- m. Parallel force system
- n. Work
- o. Moment arm of force
- p. Force components
- q. Equilibrium of levers

**2. Joint structure and Function -**

- a. Joint design
- b. Materials used in human joints
- c. General properties of connective tissues
- d. Human joint design
- e. Joint function
- f. Joint motion
- g. General effects of disease, injury and immobilization.

**3. Muscle structure and function -**

- a. Mobility and stability functions of muscles
- b. Elements of muscle structure
- c. Muscle function
- d. Effects of immobilization, injury and aging

**4. Biomechanics of the Thorax and Chest wall -**

- a. General structure and function
- b. Rib cage and the muscles associated with the rib cage
- c. Ventilatory motions: its coordination and integration
- d. Developmental aspects of structure and function
- e. Changes in normal structure and function I relation to pregnancy, scoliosis and COPD

**5. The Temporomandibular Joint-**

- a. General features, structure, function and dysfunction

## **BPT125**

## **COMMUNITY ORIENTATION AND CLINICAL VISIT**

The objective of this particular section of the foundation course is to sensitize potential learners with essential knowledge; this will lay a sound foundation for their learning across the undergraduate program and across their career. Innovative teaching methods should be used to ensure the attention of a student and make them more receptive such as group activities, interactive fora, role plays, and clinical bed-side demonstrations.

1. The community orientation and clinical visit will include visit to the entire chain of healthcare delivery system -Sub centre, PHC, CHC, SDH, DH and Medical college, private hospitals, dispensaries and clinics.
2. The student will also be briefed regarding governance at village level including interaction and group discussion with village panchayat and front-line health workers.
3. Clinical visit to their respective professional department within the hospital.

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## THIRD SEMESTER

### BPT211

### PATHOLOGY

**SUBJECT DESCRIPTION:** This subject follows the basic subjects of Anatomy, Physiology and Biochemistry and it forms a vital link between preclinical subjects and clinical subjects. Pathology involves the study of causes and mechanisms of diseases. Microbiology involves the study of common organisms causing diseases including nosocomial infections and precautionary measures to protect one from acquiring infections. The knowledge and understanding of Microbiology & Pathology of diseases is essential to institute appropriate treatment or suggest preventive measures to the patient. Particular effort is made in this course to avoid burdening the student.

### **THEORY – General Pathology**

#### **1. Introduction to Pathology**

#### **2. Cell injuries –**

- a. Aetiology and Pathogenesis with a brief recall of important aspects of normal cell structure. Reversible cell injury: Types, Sequential changes, Cellular swellings, vacuolation, Hyaline changes, Mucoid changes. Irreversible cell injury: Types of Necrosis & Gangrene, Autolysis. Pathologic calcification: Dystrophic and Metastatic. Intracellular Accumulations - Fatty changes, Protein accumulations, Glycogen accumulations,
- b. Pigments - Melanin / Hemosiderin.
- c. Extra cellular accumulations: Amyloidosis - Classification, Pathogenesis, Pathology including special stains.

#### **3. Inflammation and Repair –**

- a. Acute inflammation: features, causes, vascular and cellular events.
- b. Inflammatory cells and Mediators. Chronic inflammation: Causes, Types, Classification nonspecific and granulomatous with examples.
- c. Repair, Wound healing by primary and secondary union, factors promoting and delaying the process.
- d. Healing in specific site including bone healing.

#### **4. Immunopathology –**

- a. Immune system: General concepts.
- b. Hypersensitivity: type and examples, antibody and cell mediated tissue injury with examples. . Secondary immunodeficiency including HIV infection. Auto-immune disorders: Basic concepts and classification, SLE.
- c. AIDS-Aetiology, Modes of transmission, Diagnostic procedures, handling of infected material and health education.

#### **5. Infectious diseases –**

- a. Mycobacterial diseases: Tuberculosis, Leprosy and Syphilis.
- b. Bacterial disease: Pyogenic, Diphtheria, Gram negative infection, Bacillary dysentery.
- c. Viral diseases: Poliomyelitis, Herpes, Rabies, Measles, Ricktsia, Chlamydial infection, HIV infection.
- d. Fungal disease and opportunistic infections.
- e. Parasitic diseases: Malaria, Filaria, Amoebiasis, Kala-azar, Cysticercosis, Hydatid cyst.

#### **6. Circulatory Disturbances –**

- a. Hyperemia/Ischemia and Haemorrhage Edema: Pathogenesis and types. Chronic venous congestion: Lung, Liver, Spleen, Systemic Pathology Thrombosis and Embolism:

Formation, Fate and Effects.

b. Infarction: Types, Common sites.

c. Shock: Pathogenesis, types, morphologic changes.

## **7. Growth Disturbances and Neoplasia**

a. Atrophy, Hypertrophy, Hyperplasia, Aplasia, Hypoplasia, Metaplasia, Malformation, agenesis, dysplasia.

b. Precancerous lesions.

c. Neoplasia: Definition, classification, Biological behaviour : Benign and Malignant, Carcinoma and Sarcoma.

d. Malignant Neoplasia: Grades and Stages, Local & Distant spread.

e. Carcinogenesis: Environmental carcinogens, chemical, viral, occupational. Heredity and cellular oncogenes and prevention of cancer.

f. Benign & Malignant epithelial tumours Eg. Squamous papilloma, Squamous cell carcinoma, Malignant melanoma. Benign & Malignant mesenchymal tumours Eg: Fibroma, Lipoma, Neurofibroma, Fibrosarcoma, Liposarcoma, Rhabdo-myosarcoma, Teratoma.

## **8. Nutritional Disorders –**

a. Protein energy malnutrition: Marasmus, Kwashiorkor, and Vitamin deficiency disorders, classification with specific examples.

## **9. Genetic Disorders –**

a. Basic concepts of genetic disorders and some common examples and congenital malformation.

# **THEORY – Systemic pathology**

## **10. Hematology –**

a. Constituents of blood and bone marrow, Regulation of hematopoiesis. Anemia: Classification, clinical features & lab diagnosis.

b. Nutritional anemias: Iron deficiency anemia, Folic acid, Vit. B 12 deficiency anemia including pernicious anemia. Hemolytic Anaemias: Classification and Investigations. Hereditary hemolytic anaemias: Thalessemia, Sickle cell anemia, Spherocytosis and Enzyme deficiencies.

c. Acquired hemolytic anaemias

i. Alloimmune, Autoimmune

ii. Drug induced, Microangiopathic Pancytopenia - Aplastic anemia.

d. Hemostatic disorders, Vascular and Platelet disorders & lab diagnosis. Coagulopathies –

i. Inherited

ii. Acquired with lab diagnosis.

e. Leukocytic disorders: Leukocytosis, Leukopenia, Leukemoid reaction.

f. Leukemia: Classification, clinical manifestation, pathology and Diagnosis. Multiple myeloma and dysproteinemias.

g. Blood transfusion; Grouping and cross matching, untoward reactions, transmissible infections including HIV & hepatitis, Blood-components & plasma-pheresis.

## **11. Respiratory System**

a. Pneumonia, Bronchitis, Bronchiectasis, Asthma, Tuberculosis, Carcinoma of lungs, Occupational lung diseases

## 12. Cardiovascular Pathology

- a. Congenital Heart disease: Atrial septal defect, Ventricular septal defect, Fallot's tetralogy, Patent ductus arteriosus.
- b. Endocarditis. Rheumatic Heart disease.
- c. Vascular diseases: Atherosclerosis, monckeberg's medial calcification, Aneurysm and Arteritis and tumours of Blood vessels.
- d. Ischemic heart Disease: Myocardial infarction. Hypertension and hypertensive heart disease.

## 13. Alimentary tract:

- a. Oral Pathology: Ulcers, leukoplakia, Carcinoma, oral cavity diseases and tumour of salivary gland & esophagus and precancerous lesions, Esophagus inflammatory, functional disorders and tumours.
- b. Stomach: Gastritis, Ulcer & Tumours.
- c. Tumours and tumour like condition of the small and large Intestine: Polyps, carcinoid, carcinoma, Lymphoma.
- d. Pancreatitis and pancreatic tumours : i) Exocrine, ii) Endocrine Salivary gland tumours : Mixed, Warthin's

## 14. Hepato - biliary pathology.

- a. Jaundice: Types, aetio-pathogenesis and diagnosis. Hepatitis: Acute, Chronic, neonatal.
- b. Alcoholic liver disease
- c. Cirrhosis: Postnecrotic, Alcoholic, Metabolic and Portal hypertension Live rabscesses; Pyogenic, parasitic and Amoebic. Tumours of Liver

## 15. Lymphatic System

- a. Diseases of the gall bladder: Cholecystitis, Cholelithiasis, Carcinoma. Lymphadenitis - Nonspecific and granulomatous. Causes of Lymph Node enlargements. Reactive Hyperplasia, Primary Tumours - Hodgkin's and Non-Hodgkin's Lymphomas, Metastatic Tumours.
- b. Causes of Splenic Enlargements.

## 16. Musculoskeletal System

- a. Osteomyelitis, acute, chronic, tuberculous, mycetoma
- b. Metabolic diseases: Rickets/Osteomalacia, osteoporosis, Hyperparathyroidism, Paget's disease.
- c. Tumours Classification: Benign, Malignant, Metastatic and synovial sarcoma. Arthritis: Suppurative, Rheumatoid. Osteoarthritis, Gout, Tuberculous.

## 17. Endocrine pathology

- a. Diabetes Mellitus: Types, Pathogenesis, Pathology, Laboratory diagnosis non-neoplastic lesions of Thyroid: Iodine deficiency goiter, autoimmune Thyroiditis, Thyrotoxicosis, myxedema, Hashimoto's thyroiditis.
- b. Tumours of Thyroid: Adenoma, Carcinoma: Papillary, Follicular, Medullary, Anaplastic. Adrenal diseases: cortical hyperplasia, atrophy, tuberculosis, tumours of cortex and medulla.

## 18. Neuropathology

- a. Inflammations and Infections: TB Meningitis, Pyogenic Meningitis, viral meningitis and Brain Abscess

- b. Tuberculosis, Cysticercosis
- c. CNS Tumors, Astrocytoma, Neuroblastoma, Meningioma, Medulloblastoma

### 19. Dermatopathology

- a. Skin tumors: Squamous cell carcinoma, Basal cell carcinoma, Melanoma

#### PRACTICAL

Demonstration of Slides – The students may be demonstrated the common histopathological, hematological and cytological slides and specimens and charts and their interpretations.

**THEORY****1. General Microbiology -**

- a. Definitions: infections, parasite, host, vector, fomite, contagious disease, infectious disease, epidemic, endemic, pandemic, Zoonosis, Epizootic, Attack rate.
- b. Normal flora of the human body.
- c. Routes of infection and spread; endogenous and exogenous infections; source at reservoir of infections.
- d. Bacterial cell. Morphology limited to recognizing bacteria in clinical samples Shape, motility and arrangement. Structures, which are virulence, associated.
- e. Physiology: Essentials of bacterial growth requirements.
- f. Sterilization, disinfection and universal precautions in relation to patient care and disease prevention. Definition of asepsis, sterilization, disinfection.
- g. Antimicrobials: Mode of action, interpretation of susceptibility tests, resistance spectrum of activity.

**2. Immunology -**

- a. Basic principles of immunity immunobiology: lymphoid organs and tissues. Antigen, Antibodies, antigen and antibody reactions with relevance to pathogenesis and serological diagnosis.
- b. Humoral immunity and its role in immunity Cell mediated immunity and its role in immunity. Immunology of hypersensitivity, Measuring immune functions.

**3. Bacteriology -**

- a. To be considered under the following headings
- b. Morphology, classification according to pathogenicity, mode of transmission, methods of prevention, collection and transport of samples for laboratory diagnosis, interpretation of laboratory reports.
- c. Staphylococci, Streptococci and Pneumococci.
- d. Mycobacteria: Tuberculosis, *M. leprae*, atypical mycobacteria, Enterobacteriaceae,
- e. Vibrios: *V. cholerae* and other medically important vibrios, Campylobacters and Helicobacters, Pseudomonas.
- f. Bacillus anthracis, Sporing and non-sporing anaerobes: Clostridia, Bacteroides and Fusobacteria.

**4. General Virology -**

- a. General properties: Basic structure and broad classification of viruses. Pathogenesis and pathology of viral infections. Immunity and prophylaxis of viral diseases. Principles of laboratory diagnosis of viral diseases. List of commonly used antiviral agents.

**5. Mycology -**

- a. General properties of fungi. Classification based on disease: superficial, subcutaneous, deep mucosal opportunistic infections including Mycotoxins, systemic mycoses. General principles of fungal diagnosis, Rapid diagnosis. Method of collection of samples. Antifungal agents.

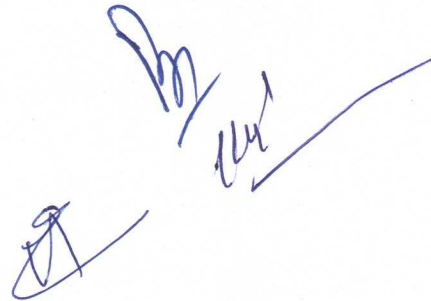
**6. Clinical/Applied Microbiology -**

- a. Streptococcal infections: Rheumatic fever and Rheumatic heart disease, Meningitis.
- b. Tuberculosis,
- c. Pyrexia of unknown origin, leprosy,
- d. Sexually transmitted diseases, Poliomyelitis,

- e. Hepatitis,
- f. Acute-respiratory infections, Central nervous System infections, Urinary tract infections,
- g. Pelvic inflammatory disease, Wound infection, Opportunistic infections, HIV infection,
- h. Malaria, Filariasis, Zoonotic diseases.

### **PRACTICAL**

1. Demonstration of Microscopes and its uses
2. Principles, uses and demonstration of common sterilization equipment
3. Demonstration of common culture media
4. Demonstration of motility by hanging drops method
5. Demonstration of Gram Stain, ZN Stain
6. Demonstration of Serological test: ELISA
7. Demonstration of Fungus



**SUBJECT DESCRIPTION** - This course introduces the student to basic pharmacology of common drugs used, their importance in the overall treatment including Physiotherapy. The student after completing the course will be able to understand the general principles of drug action and the handling of drugs by the body. The student will be aware of the contribution of both drug and physiotherapy factors in the outcome of treatment.

**1. General Pharmacology -**

- a. Introduction, Definitions, Classification of drugs, Sources of drugs, Routes of drug administration, Distribution of drugs, Metabolism and Excretion of drugs Pharmacokinetics, Pharmacodynamics, Factors modifying drug response, Adverse effects.

**2. Autonomic Nervous system-**

- a. General considerations - The Sympathetic and Parasympathetic Systems, Receptors, Somatic Nervous System
- b. Cholinergic and Anti-Cholinergic drugs, Adrenergic and Adrenergic blocking drugs, Peripheral muscle relaxants.

**3. Cardiovascular Pharmacology -**

- a. Drugs used in the treatment of heart failure: Digitalis, Diuretics, Vasodilators, ACE inhibitors Antihypertensive Drugs: Diuretics, Beta Blockers, Calcium Channel Blockers, ACE Inhibitors, Central Acting Alpha Agonists, Peripheral Alpha Antagonists, Direct acting Vasodilators
- b. Antiarrhythmic Drugs
- c. Drugs used in the treatment of vascular disease and tissue ischemia: Vascular Disease, Hemostasis Lipid-Lowering agents, Antithrombotics, Anticoagulants and Thrombolytics Ischemic Heart Disease - Nitrates, Beta-Blockers, Calcium Channel Blockers, Cerebral Ischemia Peripheral Vascular Disease.

**4. Neuropharmacology -**

- a. Sedative-Hypnotic Drugs: Barbiturates, Benzodiazepines
- b. Antianxiety Drugs: Benzodiazepines, Other Anxiolytics
- c. Drugs Used in Treatment of Mood Disorders: Monoamine Oxidase Inhibitors, Tricyclic Antidepressants, Atypical Antidepressants, Lithium
- d. Antipsychotic drugs

**5. Disorders of Movement -**

- a. Drugs used in Treatment of Parkinson's disease
- b. Antiepileptic Drugs
- c. Spasticity and Skeletal Muscle Relaxants

**6. Inflammatory/Immune Diseases -**

- a. Non-narcotic Analgesics and Nonsteroidal Anti-Inflammatory Drugs: Acetaminophen, NSAIDs, Aspirin, Nonaspirin NSAIDs, drug Interacts with NSAIDs
- b. Glucocorticoids: Pharmacological Uses of Glucocorticoids, adverse effects, Physiologic Use of Glucocorticoids
- c. Drugs Used in Treatment of Arthritic Diseases: Rheumatoid Arthritis, Osteoarthritis, Gout
- d. Drugs Used in the Treatment of Neuromuscular Immune/Inflammatory Diseases: Myasthenia gravis, Idiopathic Inflammatory Myopathies, systemic lupus Erythematosus, Scleroderma, Demyelinating Disease
- e. Respiratory Pharmacology: Obstructive Airway Diseases, Drugs used in Treatment of Obstructive airway Diseases, Allergic Rhinitis

## 7. Digestion and Metabolism -

- a. Gastrointestinal Pharmacology: Peptic Ulcer Disease, Constipation, Diarrhea Drugs Used in Treatment of Diabetes Mellitus: Insulin, Oral Hypoglycemic

## 8. Geriatrics -

- a. Pharmacology and the geriatric Population: Adverse effects of special concern in the Elderly, Dementia, Postural hypotension.



**1. Biomechanics of the vertebral column -**

- a. General structure and function
- b. Regional structure and function – Cervical region, thoracic region, lumbar region, sacral region
- c. Muscles of the vertebral column
- d. General effects of injury and aging

**2. Biomechanics of the peripheral joints -**

- a. The shoulder complex: Structure and components of the shoulder complex and their integrated function
- b. The elbow complex: Structure and function of the elbow joint – humeroulnar and humeroradial articulations, superior and inferior radioulnar joints; mobility and stability of the elbow complex; the effects of immobilization and injury.
- c. The wrist and hand complex: Structural components and functions of the wrist complex; structure of the hand complex; functional position of the wrist and hand.
- d. The hip complex: structure and function of the hip joint; hip joint pathology- arthrosis, fracture, bony abnormalities of the femur:
- e. The knee complex: structure and function of the knee joint – tibiofemoral joint and patellofemoral joint; effects of injury and disease.
- f. The ankle and foot complex: structure and function of the ankle joint, subtalar joint, talocalcaneonavicular joint, transverse tarsal joint, tarsometatarsal joints, metatarsophalangeal joints, interphalangeal joints, structure and function of the plantar arches, muscles of the ankle and foot, deviations from normal structure and function – Pes Planus and Pes Cavus

**3. Analysis of Posture and Gait -**

Static and dynamic posture, postural control, kinetics and kinematics of posture, ideal posture analysis of posture, effects of posture on age, pregnancy, occupation and recreation; general features of gait, gait initiation, kinematics and kinetics of gait, energy requirements, kinematics and kinetics of the trunk and upper extremities in relation to gait, stair case climbing and running, effects of age, gender, assistive devices, disease, muscle weakness, paralysis, asymmetries of the lower extremities, injuries and malalignments in gait; Movement Analysis :ADL activities like sitting– to standing, lifting, various grips, pinches.

**PRACTICAL-**

Shall be conducted for various joint movements and analysis of the same. Demonstration may also be given as how to analyze posture and gait. The student shall be taught and demonstrated to analysis for activities of daily living – ADL – (like sitting to standing, throwing, lifting etc.) The student should be able to explain and demonstrate the movements occurring at the joints, the muscles involved, the movements or muscle action produced, and mention the axis and planes through which the movements occur. The demonstrations may be done on models or skeleton.

**EXERCISE THERAPY**

**SUBJECT DESCRIPTION** - In this course, the students will learn the principles and effects of exercise as a therapeutic modality and will learn the techniques in the restoration of physical functions.

**THEORY**

1. **Introduction to Exercise Therapy** - The aims of Exercise Therapy, The techniques of Exercise Therapy, Approach to patient's problems, Assessment of patient's condition - Measurements of Vital parameters, Starting Positions - Fundamental positions & derived Positions, Planning of Treatment
2. **Methods of Testing**
  - a. Functional tests
  - b. Measurement of Joint range: ROM-Definition, Normal ROM for all peripheral joints & spine, Goniometer-parts, types, principles, uses, Limitations of goniometry, Techniques for measurement of ROM for all peripheral joints
  - c. Tests for neuromuscular efficiency
    - i. Electrical tests
    - ii. Manual Muscle Testing: Introduction to MMT, Principles & Aims, Indications & Limitations, Techniques of MMT for group & individual: Techniques of MMT for upper limb / Techniques of MMT for lower limb / Techniques of MMT for spine.
    - iii. Anthropometric Measurements: Muscle girth - biceps, triceps, forearm, quadriceps, calf
    - iv. Static power Test
    - v. Dynamic power Test
    - vi. Endurance test
    - vii. Speed test
  - d. Tests for Co-ordination
  - e. Tests for sensation
  - f. Pulmonary Function tests
  - g. Measurement of Limb Length: true limb length, apparent limb length, segmental limb length
  - h. Measurement of the angle of Pelvic Inclination
3. **Relaxation**
  - a. Definitions: Muscle Tone, Postural tone, Voluntary Movement, Degrees of relaxation, Pathological tension in muscle, Stress mechanics, types of stresses, Effects of stress on the body mechanism, Indications of relaxation, Methods & techniques of relaxation-Principles & uses: General, Local, Jacobson's, Mitchel's, additional methods.
4. **Passive Movements**
  - a. Causes of immobility, Classification of Passive movements, Specific definitions related to passive movements, Principles of giving passive movements, Indications, contraindications, effects of uses, Techniques of giving passive movements.
5. **Active Movements**

- a. Definition of strength, power & work, endurance, muscle actions.
  - b. Physiology of muscle performance: structure of skeletal muscle, chemical & mechanical events during contraction & relaxation, muscle fiber type, motor unit, force gradation.
  - c. Causes of decreased muscle performance
  - d. Physiologic adaptation to training: Strength & Power, Endurance.
  - e. Types of active movements
6. **Free exercise:** Classification, principles, techniques, indications, contraindications, effects and uses
  7. **Active Assisted Exercise:** principles, techniques, indications, contraindications, effects and uses  
**Assisted-Resisted Exercise:** principles, techniques, indications, contraindications, effects and uses  
**Resisted Exercise:** Definition, principles, indications, contraindications, precautions & techniques, effects and uses
  8. **Types of resisted exercises:** Manual and Mechanical resistance exercise, Isometric exercise, Dynamic exercise: Concentric and Eccentric, Dynamic exercise: Constant versus variable resistance, Isokinetic exercise, Open-Chain and Closed-Chain exercise.

## **THERAPEUTIC MASSAGE**

**SUBJECT DESCRIPTION-** The students will be able to understand the concepts, different types and application of massage on patients during clinical practice.

### **THEORY**

1. History and Classification of Massage Technique
2. Principles, Indications and Contraindications
3. Technique of Massage Manipulations
4. Physiological and Therapeutic Uses of Specific Manipulations

### **PRACTICAL**

1. Different test methods
2. Demonstrate relaxation techniques.
3. Demonstrate to apply the technique of passive movements
4. Demonstrate various techniques of Active movements
5. Demonstrate massage technique application according to body parts.

7. **Quality assurance and management** - The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system.
- Concepts of Quality of Care
  - Quality Improvement Approaches
  - Standards and Norms
  - Quality Improvement Tools
  - Introduction to NABH guidelines
8. **Basics of emergency care and life support skills** - Basic life support (BLS) is the foundation for saving lives following cardiac arrest. Fundamental aspects of BLS include immediate recognition of sudden cardiac arrest (SCA) and activation of the emergency response system, early cardiopulmonary resuscitation (CPR), and rapid defibrillation with an automated external defibrillator (AED). Initial recognition and response to heart attack and stroke are also considered part of BLS. The student is also expected to learn about basic emergency care including first aid and triage. Topics to be covered under the subject are as follows:
- Vital signs and primary assessment
  - Basic emergency care – first aid and triage
  - Ventilations including use of bag-valve-masks (BVMs)
  - Choking, rescue breathing methods
  - One- and Two-rescuer CPR
  - Using an AED (Automated external defibrillator).
  - Managing an emergency including moving a patient

At the end of this topic, focus should be to teach the students to perform the maneuvers in simulation lab and to test their skills with focus on airways management and chest compressions. At the end of the foundation course, each student should be able to perform and execute/operate on the above-mentioned modalities.

9. **Bio medical waste management and environment safety**- The aim of this section will be to help prevent harm to workers, property, the environment and the general public. Topics to be covered under the subject are as follows:
- Definition of Biomedical Waste
  - Waste minimization
  - BMW – Segregation, collection, transportation, treatment and disposal (including color coding)
  - Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste
  - BMW Management & methods of disinfection
  - Modern technology for handling BMW
  - Use of Personal protective equipment (PPE)
  - Monitoring & controlling of cross infection (Protective devices)

10. **Infection prevention and control** - The objective of this section will be to provide a broad understanding of the core subject areas of infection prevention and control and to equip

AHPs with the fundamental skills required to reduce the incidence of hospital acquired infections and improve health outcomes. Concepts taught should include –

- a. Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],
- b. Prevention & control of common healthcare associated infections,
- c. Components of an effective infection control program, and
- d. Guidelines (NABH and JCI) for Hospital Infection Control

#### 11. Antibiotic Resistance-

- a. History of Antibiotics
- b. How Resistance Happens and Spreads
- c. Types of resistance- Intrinsic, Acquired, Passive
- d. Trends in Drug Resistance
- e. Actions to Fight Resistance
- f. Bacterial persistence
- g. Antibiotic sensitivity
- h. Consequences of antibiotic resistance
- i. Antimicrobial Stewardship- Barriers and opportunities, Tools and models in hospitals

#### 12. Disaster preparedness and management- The objective of this section will be to provide knowledge on the principles of on-site disaster management. Concepts to be taught should include-

- a. Fundamentals of emergency management,
- b. Psychological impact management,
- c. Resource management,
- d. Preparedness and risk reduction,
- e. Key response functions (including public health, logistics and governance, recovery, rehabilitation and reconstruction), information management, incident command and institutional mechanisms.

**SUBJECT DESCRIPTION-** After the course on exercise therapy student will be able to understand the different types of exercise for the benefit of patient in different situations and conditions both in health and disease or disorder.

**1. Specific exercise regimens**

- a. Isotonic: de Lormes, Oxford, MacQueen, Circuit weight training
- b. Isometric: BRIME (Brief Resisted Isometric Exercise), Multiple Angle
- c. Isometrics Isokinetic regimens

**2. Proprioceptive Neuromuscular Facilitation**

- a. Definitions & goals
- b. Basic neurophysiologic principles of PNF: Muscular activity, Diagonals patterns of movement: upper limb, lower limb
- c. Procedure: components of PNF
- d. Techniques of facilitation
- e. Mobility: Contract relax, Hold relaxes, Rhythmic initiation
- f. Strengthening: Slow reversals, repeated contractions, timing for emphasis, rhythmic stabilization Stability: Alternating isometric, rhythmic stabilization
- g. Skill: timing for emphasis, resisted progression Endurance: slow reversals, agonist reversal

**3. Suspension Therapy**

- a. Definition, principles, equipment's & accessories, Indications & contraindications, Benefits of suspension therapy
- b. Types of suspension therapy: axial, vertical, pendular Techniques of suspension therapy for upper limb Techniques of suspension therapy for lower limb

**4. Functional Re-education**

- a. Lying to sitting: Activities on the Mat/Bed, Movement and stability at floor level; Sitting activities and gait; Lower limb and Upper limb activities.

**5. Aerobic Exercise**

- a. Definition and key terms; Physiological response to aerobic exercise, Examination and evaluation of aerobic capacity – Exercise Testing, Determinants of an Exercise Program, The Exercise Program, Normal and abnormal response to acute aerobic exercise, Physiological changes that occur with training, Application of Principles of an Aerobic conditioning program for patients – types and phases of aerobic training.

**6. Stretching**

- a. Definition of terms related to stretching; Tissue response towards immobilization and elongation, Determinants of stretching exercise, Effects of stretching, Inhibition and relaxation procedures, Precautions and contraindications of stretching, Techniques of stretching.

**7. Manual Therapy & Peripheral Joint Mobilization**

- a. Schools of Manual Therapy, Principles, Grades, Indications and Contraindications, Effects and uses – Maitland, Kaltenborn, Mulligan
- b. Biomechanical basis for mobilization, Effects of joint mobilisation, Indications and

contraindications, Grades of mobilization, Principles of mobilization, Techniques of mobilization for upper limb, lower limb, Precautions.

8. Balance - Definition

- a. Physiology of balance: contributions of sensory systems, processing sensory information, generating motor output
- b. Components of balance (sensory, musculoskeletal, biomechanical)
- c. Causes of impaired balance, Examination & evaluation of impaired balance, Activities for treating impaired balance: mode, posture, movement, Precautions & contraindications, Types Balance retraining.

9. Co-ordination Exercise

- a. Anatomy & Physiology of cerebellum with its pathways Definitions: Co-ordination, Inco-ordination
- b. Causes for Inco-ordination, Test for co-ordination: equilibrium test, non-equilibrium test Principles of co-ordination exercise.
- c. Frenkel's Exercise: uses of Frenkel's exercise, technique of Frenkel's exercise, progression, home exercise.

10. Posture

- a. Definition, Active and Inactive Postures, Postural Mechanism, Patterns of Posture, Principles of re-education: corrective methods and techniques, Patient education.

11. Walking Aids

- a. Types: Crutches, Canes, Frames; Principles and training with walking aids

12. Basics in Manual Therapy & Applications with Clinical reasoning

- a. Examination of joint integrity
  - i. Contractile tissues
  - ii. Non contractile tissues
- b. Mobility- assessment of accessory movement & End feel
- c. Assessment of articular & extra-articular of tissue status
  - i. Myofascial assessment
  - iii. Tightness
  - ii. Acute & Chronic muscle hold
  - iv. Pain-original & referred
- d. Basic principles, Indications & Contra-Indications of mobilization skills for joints & soft tissues.
  - i. Maitland
  - ii. Mulligan
  - iii. Mckenzie
  - iv. Muscle Energy Technique
  - i. Myofascial stretching
  - ii. Cyriax
  - iii. Neuro Dynamic Testing

13. Hydrotherapy

- a. Definitions, Goals and Indications, Precautions and Contraindications, Properties of water, Use of special equipment, techniques, Effects and uses, merits and demerits

14. Individual and Group Exercises

- a. Advantages and Disadvantages, Organization of Group exercises, Recreational Activities and Sports

15. Introduction to Yoga

- a. Asanas - Principles and elements;
- b. Pranayama's - Principles, Methods and Techniques

## PRACTICAL

The students of exercise therapy are to be trained in Practical Laboratory work for all the topics discussed in theory. The student must be able to evaluate and apply judiciously the different methods of exercise therapy techniques on the patients. They must be able to

1. Demonstrate the technique of measuring using goniometry
2. Demonstrate muscle strength using the principles and technique of MMT
3. Demonstrate the techniques for muscle strengthening based on MMT grading
4. Demonstrate the PNF techniques
5. Demonstrate exercises for training co-ordination – Frenkel's exercise
6. Demonstrate the techniques of massage manipulations
7. Demonstrate techniques for functional re-education
8. Assess and train for using walking aids
9. Demonstrate mobilization of individual joint regions
10. Demonstrate to use the technique of suspension therapy for mobilizing and strengthening joints and muscles
11. Demonstrate the techniques for muscle stretching
12. Assess and evaluate posture and gait
13. Demonstrate techniques of strengthening muscles using resisted exercises
14. Demonstrate techniques for measuring limb length and body circumference.

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**SUBJECT DESCRIPTION** - To understand the concept and basic principles to know electrotherapy equipment's is given under this topic. The student will be taught about physics related to electrotherapy and application on human body tissues.

1. Physical principles

- a. Structure and properties of matter -solids, liquids and gases, adhesion, surface tension, viscosity, density and elasticity.
- b. Structure of atom, molecules, elements and compound
- c. Electricity: Definition and types. Therapeutic uses. Basic physics of construction. Working
- d. Importance of currents in treatment.
- e. Static Electricity: Production of electric charge. Characteristic of a charged body.
- f. Characteristics of lines of forces. Potential energy and factors on which it depends. Potential difference and EMF.
- g. Current Electricity: Units of Electricity: farad, Volt, Ampere, Coulomb, Watt
- h. Condensers: Definition, principle, Types- construction and working, capacity & uses.
- i. Magnetism: Definition. Properties of magnets. Electromagnetic induction. Transmission by contact. Magnetic field and magnetic forces. Magnetic effects of an electric field.
- j. Conductors, Insulators, Potential difference, Resistance and intensity
- k. Ohm's law and its application to DC and AC currents. Fuse: construction, working and application.
- l. Transmission of electrical energy through solids, liquids, gases and vacuum.
- m. Rectifying Devices-Thermionic valves, Semiconductors, Transistors, Amplifiers, transducer and Oscillator circuits.
- n. Display devices and indicators-analogue and digital.
- o. Transformer: Definition, Types, Principle, Construction, Eddy current, working uses
- p. Chokes: Principle, Construction and working, Uses

2. Effects of Current Electricity

- a. Chemical effects-Ions and electrolytes, Ionisation, Production of an EMF by chemical actions.
- b. Ionization: Principles, effects of various technique of medical ionization.
- c. Electromagnetic Induction.
- d. Electromagnetic spectrum.

3. Electrical Supply

- a. Brief outline of main supply of electric current
- b. Dangers-short circuit, electric shocks: Micro/ Macro shocks
- c. Precaution-safety devices, earthing, fuses etc.
- d. First aid and initial management of electric shock
- e. Burns: electrical & chemical burns, prevention and management

4. Various agents

- a. Thermal agents: Physical Principles of cold, Superficial and deep heat.
- b. Ultrasound: Physical Principles of Sound
- c. Electro- magnetic Radiation: Physical Principles and their Relevance to Physiotherapy Practice
- d. Electric Currents: Physical Principles and their Relevance to Physiotherapy Practice.

5. Section II - Therapeutic Electricity

**SUBJECT DESCRIPTION** - In this course the student will learn the Principles, Techniques, Effects, Indication, Contra-Indication and the dosage parameter for various indications of electro therapeutic modalities in the restoration of physical function. The objective of this course is that after 240hrs of lectures, demonstration, practical and clinics the student will be able to list the indications, contra indications, dosages of electro therapy modalities, demonstrates the different techniques, and describe their effects on various conditions.

**THEORY****Section II A - Low frequency Currents**

1. Basic types of current
  - a. Direct Current: types, physiological & therapeutic effects.
  - b. Alternating Current
2. Types of Current used in Therapeutics
  - a. Modified D.C
    - i. Faradic Current
    - ii. Galvanic Current
  - b. Modified A.C
    - i. Sinusoidal Current
    - ii. Diadynamic Current.
3. Faradic Current: Definition, Modifications, Techniques of Application of Individual, Muscle and Group Muscle stimulation, Physiological & Therapeutic effects of Faradic Current, Precautions, Indications & Contra-Indications, Dangers.
4. Galvanic Current: Definition, Modifications, Physiological & Therapeutic effects of Galvanic Current, Indications & Contra-Indications, Dangers, Effect of interrupted galvanic current on normally innervated and denervated muscles and partially denervated muscles.
5. Sinusoidal Current & Diadynamic Current in Brief.
6. HVPGS – Parameters & its uses
7. Ionization / Iontophoresis: Techniques of Application of Iontophoresis, Indications, Selection of Current, commonly used Ions (Drugs) for pain, hyperhydrosis, wound healing.
8. Cathodal / Anodal galvanism.
9. Micro Current & Macro Current
10. Types of Electrical Stimulators
  - a. NMES- Construction component.
  - b. Neuro muscular diagnostic stimulator- construction component.
  - c. Components and working Principles
11. Principles of Application: Electrode tissue interface, Tissue Impedance, Types of Electrodes, Size & Placement of Electrode – Waterbath, Unipolar, Bi-polar, Electrode coupling, Current flow in tissues, Lowering of Skin Resistance.
12. Nerve Muscle Physiology: Action Potential, Resting membrane potential, Propagation of Action Potential, Motor unit, synapse, Accommodation, Stimulation of Healthy Muscle, Stimulation of Denervated Muscle, Stimulation for Tissue Repair.
13. TENS: Define TENS, Types of TENS, Conventional TENS, Acupuncture TENS, Burst TENS, Brief & Intense TENS, Modulated TENS. Types of Electrodes & Placements of Electrodes, Dosage parameters, Physiological & Therapeutic effects, Indications & Contraindications.
14. Pain: Define Pain, Theories of Pain (Outline only), Pain Gate Control theory in detail. [2 Hours]

## **Section II B - Electro-diagnosis**

1. FG Test
2. SD Curve: Methods of Plotting SD Curve, Apparatus selection, Characters of Normally innervated Muscle, Characters of Partially Denervated Muscle, Characters of Completely denervated Muscle, Chronaxie & Rheobase.
3. Nerve conduction velocity studies
4. EMG: Construction of EMG equipment.
5. Bio-feedback.

## **Section II C - Medium Frequency**

1. Interferential Therapy: Define IFT, Principle of Production of IFT, Static Interference System, Dynamic Interference system, Dosage Parameters for IFT, Electrode placement in IFT, Physiological & Therapeutic effects, Indications & Contraindications.
2. Russian Current
3. Rebox type Current

## **Section III - Thermo & Actinotherapy (High Frequency Currents)**

1. Electro Magnetic Spectrum.
2. SWD: Define short wave, Frequency & Wavelength of SWD, Principle of Production of SWD, Circuit diagram & Production of SWD, Methods of Heat Production by SWD treatment, Types of SWD Electrode, Placement & Spacing of Electrodes, Tuning, Testing of SWD Apparatus, Physiological & Therapeutic effects, Indications & Contraindications, Dangers, Dosage parameters.
3. Pulsed Electro Magnetic Energy: Principles, Production & Parameters of PEME, Uses of PEME.
4. Micro Wave Diathermy: Define Microwave, Wave length & Frequency, Production of MW, Applicators, Dosage Parameters, Physiological & Therapeutic effects, Indications & Contraindications, Dangers of MWD. [2 Hours]
5. Ultrasound: Define Ultrasound, Frequency, Piezo Electric effects: Direct, Reverse, Production of US, Treatment Dosage parameters: Continuous & Pulsed mode, Intensity, US Fields: Near field, Far field, Half value distance, Attenuation, Coupling Media, Thermal effects, Non-thermal effects, Principles & Application of US: Direct contact, Water bag, Water bath, Solid sterile gel pack method for wound. Uses of US, Indications & Contraindications, Dangers of Ultrasound. Phonophoresis: Define Phonophoresis, Methods of application, commonly used drugs, Uses. Dosages of US. [8 Hours]
6. IRR: Define IRR, wavelength & parameters, Types of IR generators, Production of IR, Physiological & Therapeutic effects, Duration & frequency of treatment, Indication & Contraindication. [2 Hours]
7. UVR: Define UVR, Types of UVR, UVR generators: High pressure mercury vapour lamp, Water cooled mercury vapour lamp, Kromayer lamp, Fluorescent tube, Theraktin tunnel, PUVA apparatus. Physiological & Therapeutic effects. Sensitizers & Filters. Test dosage calculation. Calculation of E1, E2, E3, E4 doses. Indications, contraindications. Dangers. Dosages for different therapeutic effects, Distance in UVR lamp [8Hours]
8. LASER: Define LASER. Types of LASER. Principles of Production. Production of LASER by various methods. Methods of application of LASER. Dosage of LASER. Physiological & Therapeutic effects of LASER. Safety precautions of LASER. Classifications of LASER. Energy density & power density [8 Hours]

#### **Section IV – Superficial heating Modalities**

1. Wax Therapy: Principle of Wax Therapy application – latent Heat, Composition of Wax Bath Therapy unit, Methods of application of Wax, Physiological & Therapeutic effects, Indications & Contraindication, Dangers.
2. Contrast Bath: Methods of application, Therapeutic uses, Indications & Contraindications.
3. Moist Heat Therapy: Hydro collator packs – in brief, Methods of applications, Therapeutic uses, Indications & Contraindications.
4. Cyclotherm: Principles of production, Therapeutic uses, Indications & Contraindications.
5. Fluidotherapy: Construction, Method of application, Therapeutic uses, Indications & Contraindications.
6. Whirl Pool Bath: Construction, Method of Application, Therapeutic Uses, Indications & Contraindications.
7. Magnetic Stimulation, Principles, Therapeutic uses, Indications & contraindication.
8. Cryotherapy: Define- Cryotherapy, Principle- Latent heat of fusion, Physiological & Therapeutics effects, Techniques of Applications, Indications & Contraindications, Dangers, Methods of application with dosages.

#### **PRACTICAL**

The student of Electrotherapy must be able to demonstrate the use of electrotherapy modalities applying the principles of electrotherapy with proper techniques, choice of dosage parameters and safety precautions.

1. Demonstrate the technique for patient evaluation – receiving the patient and positioning the patient for treatment using electrotherapy.
2. Collection of materials required for treatment using electrotherapy modalities and testing of the apparatus.
3. Demonstrate placement of electrodes for various electrotherapymodalities
4. Electrical stimulation for the muscles supplied by the peripheral nerves
5. Faradism under Pressure for UL and LL
6. Plotting of SD curve with chronaxie and rheobase
7. Demonstrate FG test
8. Application of Ultrasound for different regions-various methods of application
9. Demonstrate treatment techniques using SWD, IRR and Microwave diathermy
10. Demonstrate the technique of UVR exposure for various conditions – calculation of test dose
11. Demonstrate treatment method using IFT for various regions
12. Calculation of dosage and technique of application of LASER
13. Technique of treatment and application of Hydrocollator packs, cryotherapy, contrast bath, wax therapy
14. Demonstrate the treatment method using whirl pool bath
15. Winding up procedure after any electrotherapy treatment method.

#### **Equipment care -**

- |   |  |
|---|--|
| 1. Checking of equipments   | equipment.                                       |
| 2. Arrangement of exercise therapy and electro therapy equipment. | 5. Safety handling of equipments.                |
| 3. Calibration of equipment                                       | 6. Research lab equipment maintenance.           |
| 4. Purchase, billing, document of                                 | 7. Stock register, movement register maintenance |

Legal and ethical considerations are firmly believed to be an integral part of medical practice in planning patient care. Advances in medical sciences, growing sophistication of the modern society's legal framework, increasing awareness of human rights and changing moral principles of the community at large, now result in frequent occurrences of healthcare professionals being caught in dilemmas over aspects arising from daily practice.

Medical/ Physiotherapy ethics has developed into a well based discipline which acts as a "bridge" between theoretical bioethics and the bedside. The goal is "to improve the quality of patient care by identifying, analyzing, and attempting to resolve the ethical problems that arise in practice". Doctors are bound by, not just moral obligations, but also by laws and official regulations that form the legal framework to regulate medical practice. Hence, it is now a universal consensus that legal and ethical considerations are inherent and inseparable parts of good medical practice across the whole spectrum. Few of the important and relevant topics that need to focus on are as follows:

1. Medical ethics versus medical law - Definition - Goal -Scope
2. Introduction to Code of conduct
3. Basic principles of medical ethics – Confidentiality
4. Malpractice and negligence - Rational and irrational drug therapy
5. Autonomy and informed consent - Right of patients
6. Care of the terminally ill- Euthanasia
7. Organ transplantation
8. Medical diagnosis versus physiotherapy diagnosis.
9. Medico legal aspects of medical records – Medico legal case and type- Records and document related to MLC - ownership of medical records - Confidentiality Privilege communication - Release of medical information - Unauthorized disclosure - retention of medical records - other various aspects.
10. Professional Indemnity insurance policy
11. Development of standardized protocol to avoid near miss or sentinel events
12. Obtaining an informed consent.
13. Biomedical ethical principles
14. Code of ethics for physiotherapists
15. Ethics documents for physiotherapists
16. Laws affecting physiotherapy practice

**SUBJECT DESCRIPTION** - This subject follows the basic science subjects to provide the knowledge about Orthopedic conditions the therapist would encounter in their practice. The objective of this course is that after completion of the lectures and discussion the student will be able to demonstrate an understanding of orthopedic conditions causing disability, list the etiology, clinical features and methods of investigations and management.

1. Introduction
  - a. Introduction to orthopaedics.
  - b. Clinical examination in an Orthopedic patient.
  - c. Common investigative procedures.
  - d. Radiological and Imaging techniques in Orthopaedics.
  - e. Inflammation and repair, Soft tissue healing.
2. Traumatology
  - a. Fracture: definition, types, signs and symptoms.
  - b. Fracture healing.
  - c. Complications of fractures.
  - d. Conservative and surgical approaches.
  - e. Principles of management – reduction (open/closed, immobilization etc).
  - f. Subluxation/ dislocations – definition, signs and symptoms, management (conservative and operative).
3. Fractures and Dislocations of Upper Limb
  - a. Fractures of Upper Limb - causes, clinical features, mechanism of injury, complications, conservative and surgical management of the following fractures:
    - i. Fractures of clavicle and scapula.
    - ii. Fractures of greater tuberosity and neck of humerus.
    - iii. Fracture shaft of humerus.
    - iv. Supracondylar fracture of humerus.
    - v. Fractures of capitulum, radial head, olecranon, coronoid, and epicondyles.
    - vi. Side swipe injury of elbow.
    - vii. Both bone fractures of ulna and radius.
    - viii. Fracture of forearm – Monteggia, Galeazzi fracture – dislocation.
    - ix. Chauffeur's fracture.
    - x. Colle's fracture.
    - xi. Smith's fracture.
    - xii. Scaphoid fracture.
    - xiii. Fracture of the metacarpals.
    - xiv. Bennett's fracture.
    - xv. Fracture of the phalanges. (Proximal and middle.)
  - b. Dislocations of Upper Limb –
    - i. Anterior dislocation of shoulder – mechanism of injury, clinical feature, complications, conservative management (Kocher's and Hippocrates maneuver), surgical management

- (putti plat, bankart's) etc.
- ii. Recurrent dislocation of shoulder.
  - iii. Posterior dislocation of shoulder – mechanism of injury, clinical features and management.
  - iv. Posterior dislocation of elbow – mechanism of injury, clinical feature, complications & management.
4. Fracture of Spine
- a. Fracture of Cervical Spine - Mechanism of injury, clinical feature, complications (quadriplegia); Management- immobilization (collar, cast, brace, traction); Management for stabilization, management of complication (bladder and bowel, quadriplegia).
    - i. Clay shoveller's fracture.
    - ii. Hangman's fracture.
    - iii. Fracture odontoid.
    - iv. Fracture of atlas.
  - b. Fracture of Thoracic and Lumbar Regions - Mechanism of injury, clinical features, and management— conservative and surgical of common fractures around thoracic and lumbar regions.
  - c. Fracture of coccyx.
  - d. Fracture of Rib Cage - Mechanism of injury, clinical features, management for Fracture Ribs, Fracture of sternum.
5. Fractures and Dislocations of Lower Limb
- a. Fracture of Pelvis and Lower Limb - causes, clinical features, mechanism of injury, complications, conservative and surgical management of the following fractures:
    - i. Fracture of pelvis.
    - ii. Fracture neck of femur – classification, clinical features, complications, management - conservative and surgical.
    - iii. Fractures of trochanters.
    - iv. Fracture shaft femur—clinical features, mechanism of injury, complications, management-conservative and surgical.
    - v. Supracondylar fracture of femur.
    - vi. Fractures of the condyles of femur.
    - vii. Fracture patella.
    - viii. Fractures of tibial condyles.
    - ix. Both bones fracture of tibia and fibula.
    - x. Dupuytren's fracture
    - xi. Maisonneuve's fracture.
    - xii. Pott's fracture – mechanism of injury, management.
    - xiii. Bimalleolar fracture
    - xiv. Trimalleolar fracture
    - xv. Fracture calcaneum – mechanism of injury, complications and management.
    - xvi. Fracture of talus.
    - xvii. Fracture of metatarsals—stress fractures jone's fracture.
    - xviii. Fracture of phalanges.
  - b. Dislocations of Lower Limb - mechanism of injury, clinical features, complications, management of the following dislocations of lower limb.

- i. Anterior dislocation of hip.
  - ii. Posterior dislocation of hip.
  - iii. Central dislocation of hip.
  - iv. Dislocation of patella.
  - v. Recurrent dislocation of patella.
- 6. Soft Tissue Injuries - Define terms such as sprains, strains, contusion, tendinitis, rupture, tenosynovitis, tendinosis, bursitis.
  - a. Mechanism of injury of each, clinical features, managements- conservative and surgical of the following soft tissue injuries:
    - i. Meniscal injuries of knee.
    - ii. Cruciate injuries of knee.
    - iii. Medial and lateral collateral injuries of knee.
    - iv. Lateral ligament of ankle.
    - v. Wrist sprains.
    - vi. Strains- quadriceps, hamstrings, calf, biceps, triceps etc.
    - vii. Contusions- quadriceps, gluteal, calf, deltoid etc.
    - viii. Tendon ruptures- Achilles, rotator cuff muscles, biceps, pectorals etc.
- 7. Hand Injuries - mechanism of injury, clinical features, and management of the following -
  - a. Crush injuries.
  - b. Flexor and extensor injuries.
  - c. Burn injuries of hand.
- 8. Amputations - Definition, levels of amputation of both lower and upper limbs, indications, complications.
- 9. Traumatic Spinal Cord Injuries - Clinical features, complications, medical and surgical management of Paraplegia and Quadriplegia.
- 10. Deformities- clinical features, complications, medical and surgical management of the following Congenital and Acquired deformities.
  - a. Congenital Deformities -
    - i. CTEV.
    - ii. CDH.
    - iii. Torticollis.
    - iv. Scoliosis.
    - v. Flat foot.
    - vi. Vertical talus.
    - vii. Hand anomalies- syndactyly, polydactyly and ectrodactyly. Arthrogryposis multiplex congenita (amyoplasia congenita).
    - viii. Limb deficiencies- Amelia and Phocomelia. Klippel feil syndrome. Osteogenesis imperfect (fragile ossium).
    - ix. Cervical rib.
  - b. Acquired Deformities -
    - i. Acquired Torticollis.
    - ii. Scoliosis.
    - iii. Kyphosis.
    - iv. Lordosis.
    - v. Genu varum.
    - vi. Genu valgum.
    - vii. Genu recurvatum.
    - viii. Coxa vara.
    - ix. Pes cavus.
    - x. Hallux rigidus.
    - xi. Hallux valgus.
    - xii. Hammer toe.
    - xiii. Metatarsalgia.

11. Disease of Bones and Joints: Causes, Clinical features, Complications, Management- medical and surgical of the following conditions:

- a. Infective conditions: Osteomyelitis (Acute / chronic). Brodie's abscess. TB spine and major joints like shoulder, hip, knee, ankle, elbow etc.
- b. Arthritic conditions: Pyogenic arthritis. Septic arthritis. Syphilitic infection of joints.

- c. Bone Tumors: classification, clinical features, management - medical and surgical of the following tumors: Osteoma. Osteosarcoma, Osteochondroma. Enchondroma. Ewing's sarcoma. Giant cell tumor. Multiple myeloma. Metastatic tumors.
  - d. Perthes disease, Slipped Capital Femoral Epiphysis and Avascular Necrosis.
  - e. Metabolic Bone Diseases: Rickets. Osteomalacia, Osteopenia. Osteoporosis.
12. Inflammatory and Degenerative Conditions: causes, clinical feature, complications, deformities, radiological features, management- conservative and surgical for the following conditions:
- a. Osteoarthritis. Rheumatoid arthritis. Ankylosing spondylitis Gouty arthritis. Psoriatic arthritis. Hemophilic arthritis. Still's disease (juvenile rheumatoid arthritis). Charcot's joints.
13. Connective Tissue Disorders- Systemic Lupus Erythematosus, Scleroderma, Dermatomyositis, Poliomyelitis, Mixed connective tissue Disease (MCTD)
14. Syndromes: Causes, Clinical features, complications, management- conservative and surgical of the following:
- a. Cervico brachial syndrome. Thoracic outlet syndrome. Vertebro- basilar syndrome. Scalene syndrome. Costo clavicular syndrome. Levator scapulae syndrome. Piriformis syndrome.
15. Neuromuscular Disorders: Definition, causes, clinical feature, complications, management. (Multidisciplinary approach) medical and surgical of the following conditions:
- a. Cerebral palsy.
  - b. Poliomyelitis.
  - c. Spinal Dysraphism.
  - d. Leprosy.
16. Cervical and Lumbar Pathology: Causes, clinical feature, patho-physiology, investigations, management-Medical and surgical for the following:
- a. Prolapsed intervertebral disc (PID),
  - b. Spinal Canal Stenosis.
  - c. Spondylosis (cervical and lumbar)
  - d. Spondylolysis.
  - e. Spondylolisthesis.
  - f. Lumbago/ Lumbosacral strain.
  - g. Sacralisation.
  - h. Lumbarisation.
  - i. Coccydynia.
  - j. Hemivertebra.
17. Orthopedic Surgeries: Indications, Classification, Types, Principles of management of the following Surgeries:
- a. Arthrodesis.
  - b. Arthroplasty (partial and total replacement).
  - c. Osteotomy,
  - d. External fixators.
  - e. Spinal stabilization surgeries (Harrington's, Luque's, Steffi plating) etc ,
  - f. Limb re attachments.
18. Regional Conditions: Definition, Clinical features and management of the following regional conditions
- a. Shoulder: Periarthritic shoulder (adhesive capsulitis). Rotator cuff tendinitis. Supraspinatus Tendinitis. Infraspinatus Tendinitis. Bicipital Tendinitis. Subacromial Bursitis.
  - b. Elbow: Tennis Elbow. Golfer's Elbow. Olecranon Bursitis (student's elbow). Triceps Tendinitis.
  - c. Wrist and Hand: De Quervain's Tenosynovitis. Ganglion. Trigger Finger/ Thumb. Mallet Finger, Carpal Tunnel Syndrome, Dupuytren's Contracture.

- d. Pelvis and Hip: IT Band Syndrome. Piriformis Syndrome. Trochanteric Bursitis.
- e. Knee: Osteochondritis Dissecans. Prepatellar and Suprapatellar Bursitis. Popliteal Tendinitis. Patellar Tendinitis. Chondromalacia Patella. Plica Syndrome. Fat Pad Syndrome (Hoffa's syndrome).
- f. Ankle and Foot: Ankle Sprains. Plantar Fasciitis / Calcaneal Spur. Tarsal Tunnel Syndrome. Achilles Tendinitis. Metatarsalgia. Morton's Neuroma.

## **BPT312**

### **GENERAL SURGERY INCLUDING BURNS, PLASTIC SURGERY AND OBSTETRICS AND GYNECOLOGY**

**SUBJECT DESCRIPTION** - This subject follows the basic science subjects to provide the knowledge about relevant aspects of general surgery. The student will have a general understanding of the surgical conditions the therapist would encounter in their practice. The objective of this course is that after 60 hrs of lectures and discussion the student will be able to list the indications for surgery, etiology, clinical features and surgical methods for various conditions.

### **GENERAL SURGERY INCLUDING BURNS AND PLASTIC SURGERY**

1. Fluid, Electrolyte and Acid-Base disturbances – diagnosis and management; Nutrition in the surgical patient; Wound healing – basic process involved in wound repair, basic phases in the healing process, clinical management of wounds, factors affecting wound healing, Scars – types and treatment. Hemostasis – components, hemostatic disorders, factors affecting bleeding during surgery. Transfusion therapy in surgery – blood components, complications of transfusion; Surgical Infections; General Post – Operative Complications and its management.
2. Reasons for Surgery; Types of anaesthesia and its effects on the patient; Types of Incisions; Clips Ligatures and Sutures; General Thoracic Procedures – Radiologic Diagnostic procedures, Endoscopy – types, Biopsy – uses and types. Overview and Drainage systems and tubes used in Surgery.
3. Causes, Clinical Presentation, Diagnosis and treatment of the following Thoracic Trauma situations – Airway obstruction, Pneumothorax, Hemothorax, Cardiac Tamponade, Tracheobronchial disruption, Aortic disruption, Diaphragmatic disruption, Esophageal disruption, Cardiac and Pulmonary Contusions.
4. Surgical Oncology – Cancer – definition, types, clinical manifestations of cancer, Staging of Cancer, surgical procedures involved in the management of cancer.
5. Disorders of the Chest Wall, Lung and Mediastinum
6. Thoracic surgeries – Thoracotomy – Definition, Types of Incisions with emphasis to the site of incision, muscles cut and complications. Lung surgeries: Pneumectomy, Lobectomy, segmentectomy – Indications, Physiological changes and Complications; Thoracoplasty, Pleurectomy, Pleurodesis and Decortication of the Lung. Cardiac surgeries – An overview of the Cardio-Pulmonary Bypass Machine – Extracardiac Operations, Closed Heart surgery, Open Heart surgery. Transplant Surgery – Heart, Lung and Kidney – Indications, Physiological changes and Complications.
7. Diseases of the Arteries and Veins : Definition, Etiology, Clinical features, signs and symptoms, complications, management and treatment of following diseases : Arteriosclerosis,

Atherosclerosis, Aneurysm, Buerger's disease, Raynaud's Disease, Thrombophlebitis, Deep Vein Thrombosis, Pulmonary Embolism, Varicose Veins.

8. Definition, Indication, Incision, Physiological changes and Complications following Common operations like Cholecystectomy, Colostomy, Ileostomy, Gastrectomy, Hernias, Appendicectomy Mastectomy, Nephrectomy, Prostatectomy.
9. Burn: Definition, Classification, Causes, Prevention, Pathological changes, Complications, Clinical Features and Management. Skin Grafts – Types, Grafting Procedures, Survival of Skin Graft ; Flaps – Types and uses of Flaps.
10. ENT: Common problems of ear, otitis media, Otosclerosis, functional achonia and deafness, management facial palsy classification, medical and surgical management of lower motor neuron type of facial palsy.
11. Ophthalmology: Ophthalmologic surgical conditions, refraction's, conjunctivitis, glaucoma, corneal ulcer, iritis, cataract, retinitis, detachment of retina, defects of extra-ocular muscles- surgical management.

### **OBSTETRICS AND GYNECOLOGY**

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

1. Describe the normal and abnormal physiological events during the puberty, labor, puerperium, post – natal stage and menopause.
2. Discuss the various complications during pregnancy, labour, puerperium and post – natal stage, pre and post-menopausal stage and various aspects of urogenital dysfunction and their management in brief.
3. Acquire the skill of clinical examination of pelvic floor
4. Acquire the skill of clinical examination of pregnant woman.

### **THEORY**

1. Anatomy and physiology of the female reproductive organs. Puberty dynamics
2. Physiology of menstrual cycle –
  - a. ovulation cycle,
  - b. uterine cycle,
  - c. Cx cycle,
  - d. duration,
  - e. amount
  - f. Hormonal regulation of menstruation,
3. Hormonal disorders of females-obesity and female hormones
4. Pregnancy
  - a. Diagnosis of pregnancy
  - b. Abortion
  - c. Physiological changes during pregnancy
  - d. Importance of antenatal care exercise
  - e. High risk pregnancy, prenatal common complications – investigation and management
  - f. Musculoskeletal disorders during pregnancy
  - g. Multiple child birth
  - h. Normal labor
5. Child birth complications, investigation and management
6. Normal puerperium, lactation and importance of post-natal exercises
7. Family planning.

8. Medical termination of pregnancy
9. Infection of female genital tract including sexually transmitted diseases, low backache
10. Prolapse of uterus and vagina
11. Principle of common gynaecological operations – hysterectomy, D&C, D&E, Pap smear
12. Menopause: Its effect on emotions and musculoskeletal system
13. Urogenital dysfunction – pre and post-natal condition
14. Sterility: Pathophysiology, investigations, management, Malnutrition and deficiencies in females.
15. Surgical procedures involving child birth.
  - a. Definition, Indications and Management of the following surgical procedures – pelvic repair, caesarian section, nephrectomy, Hysterosalphyngography, Dilatation and Curettage, Laparoscopy, Colposcopy, Hysterectomy.
16. Carcinoma of female reproductive organs – surgical management in brief Mastectomy – Simple, radical. Hysterectomy.
17. Incontinence – Types, Causes, Assessment and Management.

### **BPT313      GENERAL MEDICINE INCLUDING PAEDIATRICS AND PSYCHIATRY -**

**SUBJECT DESCRIPTION** - This subject follows the basic science subjects to provide the knowledge about relevant aspects of general medicine. The student will have a general understanding of the diseases the therapist would encounter in their practice. The objective of this course is that discussion the student will be able to list the etiology, pathology, clinical features and treatment methods for various medical conditions.

1. Infection : Effects of Infection on the body – Pathology – source and spread of infection – vaccinations – generalized infections – rashes and infection – food poisoning and gastroenteritis  
– sexually transmitted diseases – HIV infections and Aids.
2. Poisoning: Clinical features – general management – common agents in poisoning – pharmaceutical agents – drugs of misuse – chemical pesticides – Envenomation.
3. Food and Nutrition: Assessment – Nutritional and Energy requirements; Deficiency diseases – clinical features and treatment; Protein – Energy Malnutrition: Clinical features and treatment; Obesity and its related disorders: Causes – Complications – benefits of weight loss – management of Obesity – diet, exercise and medications.
4. Endocrine diseases: Common presenting symptoms of Endocrine disease – common classical disease presentations, clinical features and its management; Diabetes Mellitus: Etiology and pathogenesis of diabetes – clinical manifestations of the disease – management of the disease – Complications of diabetes.
5. Diseases of the blood: Examinations of blood disorders – Clinical manifestations of blood disease; Anemia – signs and symptoms – types and management ; Hemophilia - Cause – clinical features severity of disease – management – complications due to repeated hemorrhages – complications due to therapy.
6. Diseases of the digestive system : Clinical manifestations of gastrointestinal disease – Etiology, clinical features, diagnosis, complications and treatment of the following conditions : Reflux Oesophagitis, Achlasia Cardia, Carcinoma of Oesophagus, GI bleeding, Peptic Ulcer disease, Carcinoma of Stomach, Pancreatitis, Malabsorption Syndrome, Ulcerative Colitis, Peritonitis,

Infections of Alimentary Tract ; Clinical manifestations of liver diseases - Aetiology, clinical features, diagnosis, complications and treatment of the following conditions : Viral Hepatitis, Wilson's Disease, Alpha1-antitrypsin deficiency, Tumors of the Liver, Gallstones, Cholecystitis.

7. Diseases of the Skin: Examination and clinical manifestations of skin diseases; Causes, clinical features and management of the following skin conditions: Leprosy, Psoriasis, Pigmentary Anomalies, Vasomotor disorders, Dermatitis, Coccal and Fungal Parasitic and Viral infections.
8. Pediatrics : Problems and management of LBW infants, Perinatal problems and management, Congenital abnormalities and management, Respiratory conditions of childhood, Cerebral Palsy  
– causes, complications, clinical manifestations, treatment ; Spina Bifida – management and treatment, Epilepsies – types, diagnosis and treatment; Recognizing developmental delay, common causes of delay ; Orthopedic and Neuromuscular disorders in childhood, clinical features and management ; Sensory disorders – problems resulting from loss of vision and hearing ; Learning and behavioural problems – Hyperactivity, Autism, Challenging behaviours, Educational delay, The Clumsy Child.
9. Psychiatric Disorders: Classifications, Causes, Clinical manifestations and treatment methods used in Psychiatry. Modalities of psychiatric treatment, Psychiatric illness and physiotherapy, Brief description of Etio-pathogenesis, manifestations, and management of psychiatric illnesses -. Anxiety neurosis, Depression, Obsessive compulsive neurosis, Psychosis, Maniac-depressive psychosis, Post-traumatic stress disorder, Psychosomatic reactions: Stress and Health, theories of Stress – Illness.  
Etio-pathogenesis, manifestations, and management of psychiatric illness
  - a. Drug dependence and alcoholism,
  - b. Somatoform and Dissociate Disorders – conversion reactions, Somatization, Dissociate Amnesia, and Dissociate Fugue,
  - c. Personality disorders
  - d. Child psychiatry - manifestations, and management of childhood disorders - attention deficit syndrome and behavioral disorders.
  - e. Geriatric psychiatry.

**SUBJECT DESCRIPTION** - This subject follows the basic science subjects to provide the knowledge about conditions the therapist would encounter in their practice in the community. The objective of this course is that after 60 hrs of lectures and discussion the student will be able to demonstrate an understanding of various aspects of health and disease list the methods of health administration, health education and disease preventive measures.

1. Health and Disease: Definitions, Concepts, Dimensions and Indicators of Health, Concept of well-being, Spectrum and Determinants of Health, Concept and natural history of Disease, Concepts of disease control and prevention, Modes of Intervention, Population Medicine, The role of socio-economic and cultural environment in health and disease.
2. Epidemiology, definition and scope. Principles of Epidemiology and Epidemiological methods: Components and Aims, Basic measurements, Methods, Uses of Epidemiology, Infectious disease epidemiology, Dynamics and modes of disease transmission, Host defenses and Immunizing agents, Hazards of Immunization, Disease prevention and control, Disinfection. Screening for Disease: Concept of screening, Aims and Objectives, Uses and types of screening.
3. Epidemiology of communicable disease: Respiratory infections, Intestinal infections, Arthropod-borne infections, Zoonoses, Surface infections, Hospital acquired infections Epidemiology of chronic non-communicable diseases and conditions: Cardio vascular diseases:  
Coronary heart disease, Hypertension, Stroke, Rheumatic heart disease, Cancer, Diabetes, Obesity, Blindness, Accidents and Injuries.
4. Public health administration- an overview of the health administration set up at Central and state levels. The national health programme-highlighting the role of social, economic and cultural factors in the implementation of the national programmes. Health problems of vulnerable groups- pregnant and lactating women, infants and pre-school children, occupational groups.
5. Health programmes in India: Vector borne disease control programme, National leprosy eradication programme, National tuberculosis programme, National AIDS control programme, National programme for control of blindness, Iodine deficiency disorders (IDD) programme, Universal Immunisation programme, Reproductive and child health programme, National cancer control programme, National mental health programme. National diabetes control programme, National family welfare programme, National sanitation and water supply programme, Minimum needs programme.
6. Demography and Family Planning: Demographic cycle, Fertility, Family planning-objectives of national family planning programme and family planning methods, A general idea of advantage and disadvantages of the methods.
7. Preventive Medicine in Obstetrics, Paediatrics and Geriatrics: MCH problems, Antenatal, Intranatal and post-natal care, Care of children, Child health problems, Rights of child and National policy for children, MCH services and indicators of MCH care, Social welfare programmes for women and children, Preventive medicine and geriatrics.
8. Nutrition and Health: Classification of foods, Nutritional profiles of principal foods, Nutritional problems in public health, Community nutrition programmes.
9. Environment and Health: Components of environment, Water and air pollution and public health: Pollution control, Disposal of waste, Medical entomology.
10. Hospital waste management: Sources of hospital waste, Health hazards, Waste management.

11. Disaster Management: Natural and man-made disasters, Disaster impact and response, Relief phase, Epidemiologic surveillance and disease control, Nutrition, Rehabilitation, Disaster preparedness.
12. Occupational Health: Occupational environment, Occupational hazards, Occupational diseases, Prevention of occupational diseases. Social security and other measures for the protection from occupational hazard accidents and diseases. Details of compensation acts.
13. Mental Health: Characteristics of a mentally healthy person, Types of mental illness, Causes of mental ill health, Prevention, Mental health services, Alcohol and drug dependence. Emphasis on community aspects of mental health. Role of Physiotherapist in mental health problems such as mental retardation.
14. Health Education: Concepts, aims and objectives, Approaches to health education, Models of health education, Contents of health education, Principles of health education, Practice of health education.

### **BPT315**

### **EVALUATION METHODS AND OUTCOME MEASURES**

Implement methods to assess individual and collective outcomes of patients/clients with disorders of the musculoskeletal, neuromuscular, cardiovascular-pulmonary and integumentary systems using valid and reliable measures that take into account the setting in which patients/clients receive services, the variables of cultural competence, and the effect of societal factors.

### **BPT316**

### **DIAGNOSTIC IMAGING FOR PHYSIOTHERAPIST**

**SUBJECT DESCRIPTION-** This course covers the study of common diagnostic and therapeutic imaging tests. At the end of the course students will be aware of the indications and implications of commonly used diagnostic imaging tests as they pertain to patient's management. The course will cover that how X-Ray, CT, MRI, Ultrasound and Other Medical Images are created and how they help the health professionals to save lives.

#### **1. IMAGE INTERPRETATION**

- |                                |                                     |
|--------------------------------|-------------------------------------|
| a. History                     | f. Fluoroscopy                      |
| b. A New Kind of Ray           | g. Computed Tomography (CT)         |
| c. How a Medical Image Helps   | h. Magnetic Resonance Imaging (MRI) |
| d. What Imaging Studies Reveal | i. Ultrasound                       |
| e. Radiography( x-rays )       | j. Endoscopy.                       |

#### **2. RADIOGRAPHY AND MAMMOGRAPHY**

- |   |                                       |
|---|---------------------------------------|
| a. Equipment components                     | c. Benefits versus Risks and Costs    |
| b. Procedures for Radiography & Mammography | d. Indications and contraindications. |

#### **3. FLUOROSCOPY**

- |                                      |                                     |
|--------------------------------------|-------------------------------------|
| a. What is Fluoroscopy?              | d. How it helps in diagnosis        |
| b. Equipment used for fluoroscopy    | e. The Findings in Fluoroscopy      |
| c. Indications and Contraindications | f. Benefits versus Risks and Costs. |

#### **4. COMPUTED TOMOGRAPHY (CT)**

- |   |  |
|---|--|
| a. What is Computed Tomography?           | d. How it helps in diagnosis           |
| b. Equipment used for Computed Tomography | e. The Findings in Computed Tomography |
| c. Indications and Contraindications      | f. Benefits versus Risks and Costs.    |

5. MAGNETIC RESONANCE IMAGING (MRI)

- a. What is MRI?
- b. Equipment used for MRI
- c. Indications and Contraindications
- d. How it helps in diagnosis

6. ULTRASOUND

- a. What is Ultrasound?
- b. Equipment used for Ultrasound
- c. Indications and Contraindications

7. ENDOSCOPY

- a. What is Endoscopy?
- b. Equipment used for Endoscopy
- c. Indications and Contraindications

8. NUCLEAR MEDICINE

- a. What is Nuclear Medicine?
- b. Equipment used for Nuclear Medicine

e. The Findings in MRI

f. Benefits versus Risks and Costs

g. Functional MRI.

d. How it helps in diagnosis

e. The Findings in Ultrasound

f. Benefits versus Risks and Costs.

d. How it helps in diagnosis

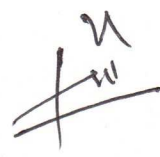
e. The Findings in Endoscopy

f. Benefits versus Risks and Costs.

c. Indications and Contraindications

d. How it helps in diagnosis.

e. Benefits versus Risks and Costs.



## SIXTH SEMESTER

BPT321

### PHYSIOTHERAPY IN ORTHOPEDICS & SPORTS

**SUBJECT DESCRIPTION** -The subject serves to integrate the knowledge gained by the students in orthopedics and traumatology with skills to apply these in clinical situations of dysfunction and musculoskeletal pathology. The objective of the course is that after the specified hours of lectures and demonstrations the student will be able to identify disabilities due to musculoskeletal dysfunction, plan and set treatment goals and apply the skills gained in exercise therapy and electrotherapy in these clinical situations to restore musculoskeletal function.

1. PT assessment for Orthopedic conditions - SOAP format. Subjective - history taking, informed consent, personal, past, medical and socioeconomic history, chief complaints, history of present illness. Pain assessment- intensity, character, aggravating and relieving factors, site and location. Objective- on observation - body built swelling, muscle atrophy, deformities, posture and gait. On palpation- tenderness-grades, muscle spasm, swelling-methods of swelling assessment, bony prominences, soft tissue texture and integrity, warmth and vasomotor disturbances. On examination - ROM - active and passive, resisted isometric tests, limb length-apparent, true and segmental, girth measurement, muscle length testing-tightness, contracture and flexibility, manual muscle testing, peripheral neurological examination- dermatomes, myotomes and reflexes, special tests and functional tests. Prescription of home program. Documentation of case records, and follow up.
2. Fractures - types, classification, signs and symptoms, complications. Fracture healing - factors affecting fracture healing. Principles of fracture management - reduction - open and closed, immobilization - sling, cast, brace, slab, traction - manual, mechanical, skin, skeletal, lumbar and Cervical traction, external fixation, functional cast bracing.

#### PT management in complications - early and late -

- shock,
  - compartment syndrome,
  - VIC,
  - fat embolism,
  - delayed and mal union,
  - RSD,
  - myositis ossificans,
  - AVN, pressure sores etc.
- Physiotherapy assessment in fracture cases. Aims of PT management in fracture cases - short- and long-term goals. Principles of PT management in fractures - Guidelines for fracture treatment during period of immobilization and guidelines for treatment after immobilization period.
3. Specific fractures and dislocations: PT assessment and management of upper limb fractures and dislocations. PT assessment and management of lower limb fractures and dislocations including pelvis. PT assessment and management spinal fractures.
  4. Selection and application of physiotherapeutic techniques, maneuver's, modalities for preventive, curative and rehabilitative means in all conditions.
  5. Principles of various schools of thought in manual therapy. (Briefly Maitland and McKenzie).
  6. Degenerative and inflammatory conditions: Definition, signs and symptoms, clinical features, path physiology, radiological features, deformities, medical, surgical management. Describe the PT assessment and management and home program for the following conditions -
    - Osteoarthritis - emphasis mainly on knee, hip and hand,

- Rheumatoid Arthritis,
- Ankylosing spondylitis,
- Gout,
- Perthes disease,
- Periarthritis shoulder.

7. Infective conditions: Definition, signs and symptoms, clinical features, pathophysiology, radiological features, medical, surgical management. Describe PT assessment and management for following conditions –

- Osteomyelitis – acute and chronic,
- Septic arthritis,
- pyogenic arthritis,
- TB spine and major joints - knee and hip.

Define, review the postural abnormalities of spinal column, clinical features, deformities, medical and surgical management. Describe PT assessment and management and home program.

8. Deformities: Review in detail the causes, signs and symptoms, radiological features, medical and surgical management. Describe the PT. assessment and management of the following conditions:

**Congenital:** CTEV, CDH, Torticollis, pes planus, pes cavus and other common deformities.

**Acquired:** scoliosis, kyphosis, coxavara, genuvarum, valgum and recurvatum.

9. Cerebral palsy: Definition, etiology, classification, clinical features, complications, deformities, medical and surgical management and home program with special emphasis on carrying techniques. PT management after surgical corrections.

10. Poliomyelitis: Definition, etiology, types, pathophysiology, clinical features, deformities, medical and surgical management. PT. assessment and management after surgical corrections and reconstructive surgeries - emphasis on tendon transfer and home program.

11. Leprosy: Definition, cause, clinical features, medical and surgical management. PT assessment, aims, and management after surgical procedures such as tendon transfer both pre and post operatively.

12. Amputations: Definition, levels, indications, types, PT assessment, aims, management pre and post operatively. PT management with emphasis on stump care and bandaging. Pre and post prosthetic training, checking out prosthesis, complications of amputations and its management.

13. Spinal conditions: Review the causes, signs and symptoms, investigations, radiological features, neurological signs. PT assessment, aims, and management and home program of the following conditions:

- Cervical spondylosis,
- Lumbar spondylosis,
- Spondylolisthesis,
- Spinal canal stenosis,

- Spondylolysis,
- Sacro-iliac joint dysfunction,
- Sacralisation,
- Lumbarisation,
- Intervertebral disc prolapses,
- Coccydynia,
- Spina bifida occulta.

14. Effects of spinal traction, types of traction, modes of application, indications for spinal traction, contraindications, precautions, limitations of traction.
15. Osteoporosis-causes, predisposing factors, investigations and treatment.
16. Orthopedic surgeries: Pre and post-operative PT assessment, goals, precautions and PT management of following surgeries such as : Arthrodesis, Osteotomy, Arthroplasty-partial and total - Excision arthroplasty, excision arthroplasty with implant, interpositional arthroplasty and total replacement; Tendon transplant, Soft tissue release- tenotomy, myotomy, lengthening; Arthroscopy, Spinal stabilization, Re-attachment of limbs, External fixators, Synovectomy.
17. Shoulder joint: Shoulder instabilities, TOS, RSD, Impingement syndrome - conservative and post-operative PT management. Total shoulder replacement and Hemi replacement. - Post operative PT management. AC joint injuries - rehabilitation. Rotator cuff tears-conservative and surgical repair. Subacromial decompression - Post operative PT management
18. Elbow and forearm: Excision of radial head - Post operative PT management. Total elbow arthroplasty- Post operative PT management.
19. Wrist and Hand: Total wrist arthroplasty. Repair of ruptured extensor tendons. Carpal tunnel syndrome. Flexor and extensor tendon lacerations - Post operative PT management.
20. Hip: Joint surgeries - hemi and total hip replacement - Post operative PT management Tendonitis and bursitis. - Management.
21. Knee: Lateral retinacular release, chondroplasty- Post operative management. Realignment of extensor mechanism. ACL and PCL reconstruction surgeries - Post operative rehabilitation. Meniscectomy and meniscal repair - Post operative management. Plica syndrome, patellar dysfunction and Hoffa's syndrome- conservative management. TKR- rehabilitation protocol. Patellar tendon ruptures and Patellectomy- rehabilitation.
22. Ankle and foot: Ankle instability. Ligamentous tears- Post operative management.

23. Introduction to Bio-Engineering; Classification of Orthoses and prostheses; Biomechanical principles of orthotic and prosthetic application; Designing of upper extremity, lower extremity and spinal orthosis, indications and check out; Designing of upper extremity and lower extremity prostheses, indications and check out; Psychological aspects of orthotic and prosthetic application; prescription and designing of footwear and modifications; Designing and construction of adaptive devises.
24. Sports Physiotherapy: Physical fitness. Stages of soft tissue healing. Treatment guidelines for soft tissue injuries- Acute, Sub acute and chronic stages. Repair of soft tissues- rupture of muscle, tendon and Ligamentous tears. Soft tissue injuries- prevention and rehabilitation of, Lateral ligament sprain of ankle. Rotator cuff injuries. Collateral and Cruciate injuries of knee. Meniscal injuries of knee. Supraspinatus and Bicipital tendonitis. Pre patellar and Sub-acromial bursitis. Tennis and Golfer's elbow. Hamstring strains, Quadriceps contusion, TA rupture. Dequervain's tenosynovitis. Trigger and Mallet finger. Plantar fasciitis. Wrist sprains.
25. Applied Yoga in orthopedic conditions.

**PRACTICAL** - Practical shall be conducted for all the relevant topics discussed in theory in the following forms:

1. Bedside case presentations and case discussions
2. Lab sessions consisting of evaluation and assessment methods on student models, treatment techniques and practice sessions.



**SUBJECT DESCRIPTION** -At the end of the course the candidate will be able to:

1. Identify discuss and analyze cardiovascular and pulmonary dysfunctions based on pathophysiological principles and arrive at appropriate functional diagnosis.
2. Acquire knowledge of rationals of basic investigative approaches in the medical system and surgical intervention, regimes in general surgeries (special emphasis on abdominal surgeries)
3. Execute effective physiotherapeutic measures (with appropriate clinical reasoning) and exercise, conditioning in general medical and surgical conditions.
4. Acquire knowledge of the overview of patient's care in the I.C.U. for bronchial hygiene and continuous monitoring of the patient in I.C.U.
5. Select strategies for cure, care and prevention, adopt restorative and rehabilitative measures for maximum possible functional independence of a patient at home, work and in community.
6. Acquire the knowledge of evaluation and physiotherapeutic treatment for obstetric and gynecological conditions
7. Acquire the knowledge of various conditions where physiotherapy plays a vital role in the rehabilitation (psychiatry, dermatology, geriatric and ENT conditions)
8. Evaluate, grade and treat non healing wounds.

### **THEORY**

1. Physiotherapy in mother and child care – ante and post-natal management, early intervention and stimulation therapy in child care (movement therapy)
2. Geriatrics – handling of old patients and their problems.
3. Complication common to all operations
4. Abdominal incisions.
5. Physiotherapy in pre and post-operative stages.
6. Operations on upper G.I.T.- oesophagus, stomach, duodenum
7. Operations on large and small intestine – Appendisectomy, cholecystectomy, partial colectomy, ileostomy, hernia and herniotomy, hernioraphy, hernioplasty.
8. Physiotherapy in dentistry
9. Burns and its treatment – physiotherapy in burns, skin grafts, and reconstructive surgeries.
10. Management of wound ulcers- Care of ulcers and wounds - Care of surgical scars-U.V.R and other electro therapeutics for healing of wounds, prevention of Hyper-granulated Scars Keloids, Electrotherapeutics measures for relief of pain during mobilization of scars tissues.
11. Physiotherapy intervention in the management of Medical, Surgical and Radiation Oncology Cases.

12. Physiotherapy in dermatology -Documentation of assessment, treatment and follow up skin conditions. U.V.R therapy in various skin conditions; Vitiligo; Hair loss; Pigmentation; Infected wounds ulcers. Faradic foot bath for Hyperhydrosis. Massage maneuvers for cosmetic purpose of skin; use of specific oil as medium; Care of anesthetic hand and foot; Evaluation, planning and management of leprosy-prescription, fitting and training with prosthetic and orthotic devices.
13. ENT – sinusitis, non-suppurative and chronic suppurative otitis media, osteosclerosis, labyrinthitis, mastoidectomy, chronic rhinitis, laryngectomy, pharyngeal – laryngectomy, facial palsy.

### **BPT323**

### **CLINICAL NEUROLOGY & NEUROSURGERY**

**SUBJECT DESCRIPTION-**This subject follows the basic science subjects to provide the knowledge about relevant aspects of neurology & neurosurgery. The student will have a general understanding of the diseases the therapist would encounter in their practice. The objective of this course is that after 60 hrs of lectures and discussion the student will be able to list the etiology, pathology, clinical features and treatment methods for various neurological conditions.

1. Disorders of function in the context of Pathophysiology, Anatomy in Neurology and Cortical Mapping.
2. Classification of neurological involvement depending on level of lesion.
3. Neurological assessment: Principles of clinical diagnosis, higher mental function, assessment of brain & spinal cord function, evaluation of cranial nerves and evaluation of autonomic nervous system.
4. Investigations: principles, methods, views, normal/abnormal values/features, types of following investigative procedures- skull x-ray, CT, MRI, evoked potentials, lumbar puncture, CSF examination, EMG, NCV.
5. Neuro-ophthalmology: Assessment of visual function – acuity, field, colour vision, Pupillary reflex, accommodation reflex, abnormalities of optic disc, disorders of optic nerve, tract, radiation, occipital pole, disorders of higher visual processing, disorders of pupil, disorders of eye movements, central disorders of eye movement.
6. Deafness, vertigo, and imbalance: Physiology of hearing, disorders of hearing, examination & investigations of hearing, tests of vestibular function, vertigo, peripheral vestibular disorders, central vestibular vertigo.
7. Lower cranial nerve paralysis – Etiology, clinical features, investigations, and management of following disorders - lesions in trigeminal nerve, trigeminal neuralgia, trigeminal sensory neuropathy, lesions in facial nerve, facial palsy, Bell's palsy, hemi facial spasm, Glossopharyngeal

neuralgia, lesions of Vagus nerve, lesions of spinal accessory nerve, lesions of hypoglossal nerve. Dysphagia – swallowing mechanisms, causes of dysphagia, symptoms, examination, and management of dysphagia.

8. Cerebro-vascular diseases: Define stroke, TIA, RIA, stroke in evolution, multi infarct dementia and Lacunar infarct. Classification of stroke – Ischemic, hemorrhagic, venous infarcts. Risk factors, cause of ischemic stroke, causes of hemorrhagic stroke. Classification of hemorrhagic stroke, classification of stroke based on symptoms, stroke syndrome, investigations, differential diagnosis, medical and surgical management.
9. Head injury: Etiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications.
10. Higher cortical, neuro psychological and neurobehavioral disorders: Causes of blackouts, physiological nature of Epilepsy, classification, clinical features, investigations, medical & surgical management of following disorders – non-epileptic attacks of childhood, Epilepsy in childhood, Seizures, and Epilepsy syndromes in adult. Classification and clinical features of Dyssomnias, Parasomnias, Dementia, Obsessive-compulsive disorders. Neural basis of consciousness, causes & investigations of Coma, criteria for diagnosis of Brain death. Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, management of Perceptual disorders and Speech disorders.
11. Movement disorders: Definition, etiology, risk factors, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications of following disorders – Parkinson's disease, Dystonia, Chorea, Ballism, Athetosis, Tics, Myoclonus and Wilson's disease.
12. Cerebellar and coordination disorders: Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, management of Congenital ataxia, Friedreich's ataxia, Ataxia telangiectasia, Metabolic ataxia, Hereditary cerebellar ataxia, Tabes dorsalis and Syphilis.
13. Spinal cord disorders: Functions of tracts, definition, etiology, risk factors, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications of following disorders – Spinal cord injury, Compression by IVD prolapse, Spinal epidural abscess, Transverse myelitis, Viral myelitis, Syringomyelia, Spina bifida, Sub acute combined degeneration of the cord, Hereditary spastic paraplegia, Radiation myelopathy, Progressive encephalomyelitis, Conus medullaris syndrome, Bladder & bowel dysfunction, and Sarcoidosis.
14. Brain tumors and spinal tumors: Classification, clinical features, investigations, medical and surgical management.
15. Infections of brain and spinal cord: Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications of following disorders – Meningitis, Encephalitis, Poliomyelitis and Post-polio syndrome. Complications of systemic infections on nervous system – Septic encephalopathy, AIDS, Rheumatic fever, Brucellosis, Tetanus, and Pertussis.
16. Motor neuron diseases: - Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, and complications of following disorders - Amyotrophic lateral sclerosis, Spinal muscular atrophy, Hereditary bulbar palsy, Neuromyotonia and Post-irradiation lumbosacral polyradiculopathy.
17. Multiple sclerosis - Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, and complications.
18. Disorders of neuromuscular junction - Etiology, classification, signs & symptoms,

investigations, management, of following disorders Myasthenia gravis, Eaton-Lambert syndrome, and Botulism.

19. Muscle diseases: Classification, investigations, imaging methods, Muscle biopsy, management of muscle diseases, genetic counselling. Classification, etiology, signs & symptoms of following disorders– Muscular dystrophy, Myotonic dystrophy, myopathy, non-dystrophic myotonia.
20. Polyneuropathy – Classification of Polyneuropathies, Hereditary motor sensory neuropathy, hereditary sensory and Autonomic neuropathies, Amyloid neuropathy, acute idiopathic Polyneuropathies. Guillain-Barre syndrome – Causes, clinical features, management of GBS, Chronic Idiopathic Polyneuropathies, diagnosis of polyneuropathy, nerve biopsy.
21. Focal peripheral neuropathy: Clinical diagnosis of focal neuropathy, neurotmesis, Axonotmesis, Neuropraxia. Etiology, risk factors, classification, neurological signs & symptoms, investigations, management, of following disorders – RSD, Nerve tumors, Brachial plexus palsy, Thoracic outlet syndrome, Lumbosacral plexus lesions, Phrenic & Intercostal nerve lesions, Median nerve palsy, Ulnar nerve palsy, Radial nerve palsy, Musculocutaneous nerve palsy, Anterior & Posterior interosseous nerve palsy, Axillary nerve palsy, Long thoracic nerve palsy, Suprascapular nerve palsy, Sciatic nerve palsy, Tibial nerve palsy, Common peroneal nerve palsy, Femoral nerve palsy, Obturator nerve palsy, Pudental nerve palsy.
22. Paediatric neurology: Neural development, Etiology, pathophysiology, classification, clinical signs & symptoms, investigations, differential diagnosis, medical management, surgical management and complications of following disorders - Cerebral palsy, Hydrocephalus, Arnold-chiari malformation, Basilar impression, Klippel-Feil syndrome, Achondroplasia, Cerebral malformations, Autism, Dandy walker syndrome and Down's syndrome.
23. Toxic, metabolic and environmental disorders: Etiology, risk factors, classification, neurological signs & symptoms, investigations, management, of following disorders – Encephalopathy, Alcohol toxicity, Recreational drug abuse, Toxic gases & Asphyxia, Therapeutic & diagnostic agent toxicity, Metal toxicity, Pesticide poisoning, Environmental & physical insults, Pant & Fungal poisoning, Animal poisons, & Complications of organ transplantation.
24. Introduction, Indications and Complications of following Neuro surgeries: Craniotomy, Cranioplasty, Stereotactic surgery, Deep brain stimulation, Burr-hole, Shunting, Laminectomy, Hemilaminectomy, Rhizotomy, Microvascular decompression surgery, Endarterectomy, Embolization, Pituitary surgery, Ablative surgery - Thalamotomy and Pallidotomy, Coiling of aneurysm, Clipping of aneurysm, and Neural implantation.

The module on professionalism will deliver the concept of what it means to be a professional and how physiotherapy profession is different from a usual vocation. It also explains how relevant is professionalism in terms of healthcare system and how it affects the overall patient environment.

1. Professional values- Integrity, Objectivity, Professional competence and due care, Confidentiality. Core values- Accountability, Altruism, Compassion/ caring, excellence, integrity, professional duties, social responsibility.
2. Personal values- ethical or moral values
3. Attitude and behavior- professional behavior, treating people equally
4. Code of conduct, professional accountability and responsibility, misconduct
5. Differences between professions and importance of team efforts
6. Cultural issues in the healthcare environment
7. Entry level health care practitioner, direct access, autonomy in profession, practitioner of practice and evidence-based practice.

### **The five roles of the Physiotherapist -**

#### **1. The Physiotherapist as Patient/Client manager**

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|---|---|
| <ol style="list-style-type: none"> <li>a. Evaluation and diagnosis</li> <li>b. Diagnosis as clinical decision making</li> <li>c. Prognosis</li> <li>d. Discharge planning and discontinuance of care</li> <li>e. Discontinuance of care</li> <li>f. Outcomes</li> </ol> | <ol style="list-style-type: none"> <li>g. Clinical decision making</li> <li>h. Referral relationships</li> <li>i. Interpersonal relationships</li> <li>j. Ethical and legal issues</li> <li>k. Informed consent</li> <li>l. Managed care and fidelity.</li> </ol> |
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#### **2. The Physiotherapist as Consultant**

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|---|---|
| <ol style="list-style-type: none"> <li>a. Physiotherapy consultation</li> <li>b. Building a consulting business</li> <li>c. The consulting process</li> <li>d. The skills of a good consultant</li> </ol> | <ol style="list-style-type: none"> <li>e. Trust in the consultant/client relationship</li> <li>f. Ethical and legal issues in consultation</li> <li>g. Components of a consulting agreement.</li> </ol> |
|---|---|

#### **3. The Physiotherapist as Critical Inquirer**

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|--|---|
| <ol style="list-style-type: none"> <li>a. History of critical inquiry</li> <li>b. Evidence-based practice</li> <li>c. Outcomes research</li> <li>d. Whose responsibility is research?</li> <li>e. Roles of the staff physiotherapist in</li> </ol> | <ol style="list-style-type: none"> <li>critical inquiry</li> <li>f. Collaboration in clinical research</li> <li>g. Ethical and legal issues in critical inquiry.</li> </ol> |
|--|---|

#### **4. The Physiotherapist as Administrator**

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|--|--|
| <ol style="list-style-type: none"> <li>a. History of physiotherapy administration</li> <li>b. Contemporary physiotherapy administration</li> <li>c. Patient/client management</li> <li>d. First-line management</li> </ol> | <ol style="list-style-type: none"> <li>e. Midlevel managers and chief executive officers</li> <li>f. Leadership</li> <li>g. Ethical and legal issues.</li> </ol> |
|--|--|

#### **5. The Physiotherapist as Educator**

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|--|---|
| <ol style="list-style-type: none"> <li>a. History of physiotherapy education</li> <li>b. Contemporary educational roles of the physiotherapist</li> <li>c. Teaching opportunities in continuing education</li> </ol> | <ol style="list-style-type: none"> <li>d. Academic teaching opportunities</li> <li>e. Theories of teaching and learning in professional education</li> <li>f. Ethical and legal issues in physiotherapy education.</li> </ol> |
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## SEVENTH SEMESTER

BPT411

### PHYSIOTHERAPY IN NEUROLOGY & PSYCHOSOMATIC DISORDER

**SUBJECT DESCRIPTION** - The subject serves to integrate the knowledge gained by the students in neurology and neurosurgery with skills to apply these in clinical situations of dysfunction and neurological pathology. The objective of the course is that after the specified hours of lectures and demonstrations the student will be able to identify disabilities due to neurological dysfunction, plan and set treatment goals and apply the skills gained in exercise therapy and electrotherapy in these clinical situations to restore neurological function.

1. **Neurological Assessment:** Required materials for examination, Chief complaints, History taking – Present, Past, medical, familial, personal histories, Observation, Palpation, Higher mental function – Consciousness, Orientation, Wakefulness, memory, Speech, Reading, Language, Writing, Calculations, Perception, Left right confusion, Reasoning, and Judgment, Motor Examination – Muscle power, Muscle tone, Spasticity, Flaccidity, Reflexes – Developmental reflexes, deep tendon reflexes, Superficial reflexes, Sensory examination – Superficial, Deep and Cortical sensations, Special tests – Romberg's, Kernig's sign, Brudzinski sign, Tinel's sign, Slum test, Lehermitte's sign, Bells Phenomenon, Gower's sign, Sun set sign, Battle's sign, Glabellar tap sign, etc, Balance examination, coordination examination, Gait analysis – Kinetics & Kinematics (Quantitative & Qualitative analysis), Functional Analysis, Assessment tools & Scales – Modified Ashworth scale, Berg balance scale, FIM, Barthel index, Glasgow coma scale, Mini mental state examination, Rancho Los Amigos Scale for Head injury, APGAR score, ASIA scale, Reflex Grading. Differential diagnosis.
2. **Neuro physiological Techniques** – Concepts, Principles, Techniques, Effects of following Neurophysiological techniques: NDT, PNF, Vojta therapy, Rood's Sensory motor Approach, Sensory Integration Approach, Brunnstorm movement therapy, Motor relearning program, Contemporary task-oriented approach, Muscle re-education approach and Constraint induced movement therapy.
3. **Paediatric Neurology:** Paediatric Examination, Developmental milestones, developmental reflexes, Neuro developmental screening tests. Evaluation & Management - History, Observation, Palpation, Milestone Examination, developmental reflex Examination, Higher mental function, Cranial nerve examination, Motor & Sensory examination, Reflex testing, differential Diagnosis, Balance & Coordination examination, Gait analysis, Functional analysis, List of Problems & Complications, short & Long Term goals, Management of systemic complications, Management of Mechanical Complications, Use of various Neurophysiological approaches & Modalities in Risk babies, Minimum brain damage, Developmental disorders, Cerebral palsy, Autism, Down's Syndrome, Hydrocephalus, Chorea, Spina bifida, and syringomyelia.
4. **Evaluation and Management of Brain and Spinal Cord Disorders** : History, Observation, Palpation, Higher mental function, Cranial nerve examination, Motor & Sensory examination, Reflex testing, differential Diagnosis, Balance & Coordination examination, Gait analysis, Functional analysis, List of Problems & Complications, short & Long Term goals, Management of systemic complications, Management of Mechanical Complications, Use of various Neurophysiological approaches & Modalities in Cerebro vascular Accident, Meningitis, Encephalitis, Head Injury, Brain Tumors, Perceptual disorders, Amyotrophic lateral sclerosis, and Multiple sclerosis.

5. Evaluation and Management of Cerebellar, Spinal Cord and Muscle Disorders : History, Observation, Palpation, Motor & Sensory examination, Reflex testing, differential Diagnosis, Balance & Coordination examination, Gait analysis, Functional analysis, List of Problems & Complications, short & Long Term goals, Management of systemic complications, Management of Mechanical Complications, Use of various Neurophysiological approaches& Modalities in Ataxia, Sensory Ataxia, Parkinson's disease, Muscular dystrophy (DMD), Myasthenia Gravis, Eaton-Lambert Syndrome, Spinal tumors, Spinal cord injury, Transverse myelitis, Bladder & Bowel Dysfunction, Spinal muscular atrophies, Poliomyelitis, Post-Polio Syndrome.
6. Evaluation and Management of Peripheral Nerve Injuries and Disorders : History, Observation, Palpation, Motor & Sensory examination, Reflex testing, differential Diagnosis, Balance & Coordination examination, Gait analysis, Functional analysis, List of Problems & Complications, short & Long Term goals, Management of systemic complications, Management of Mechanical Complications, Use of various Neurophysiological approaches& Modalities in Hereditary motor sensory neuropathy, Guillain-Barre syndrome, Brachial plexus palsy, Thoracic outlet syndrome, Lumbosacral plexus lesions, Phrenic & intercostals nerve lesions, Median nerve palsy, Ulnar nerve palsy, Radial nerve palsy, Musculocutaneous nerve palsy, Anterior & Posterior interosseous nerve palsy, Axillary nerve palsy, Long thoracic nerve palsy, Suprascapular nerve palsy, sciatic nerve palsy, Tibial nerve palsy, Common peroneal nerve palsy, Femoral nerve palsy, Obturator nerve palsy, and Pudental nerve palsy.
7. Assessment and management of Neurological gaits: Quantitative and Qualitative (Kinetic & Kinematics) analysis, List of Problems, short & Long Term goals, Management of following Neurological Gaits - Hemiplegic gait, Parkinson gait, High step gait, Hyperkinetic gait, Hypokinetic gait, Waddling gait, Scissoring gait, Spastic gait, Choreaform Gait, Diplegic Gait, and Myopathic Gait.
8. Pre and post-surgical assessment and treatment following conditions - Spinal disc herniation, Spinal stenosis, Spinal cord trauma, Head trauma, Brain tumors, Tumors of the spine, Spinal cord and peripheral nerves, Cerebral aneurysms, Subarachnoid hemorrhages, epilepsy, Parkinson's disease, Chorea, Hemiballism, Psychiatric disorders, Malformations of the nervous system, Carotid artery stenosis , Arteriovenous malformations, and Spina bifida.
9. Applied Yoga in Neurological conditions.

**PRACTICAL:** Practical shall be conducted for all the relevant topics discussed in theory in the following forms:

1. Bedside case presentations and case discussions
2. Lab sessions consisting of evaluation and assessment methods on student models, treatment techniques and practice sessions.

The objective of this module is to help the students understand the basic principles of research and methods applied to draw inferences from the research findings.

**RESEARCH METHODOLOGY**

1. Introduction to Research methodology: Meaning of research, objectives of research, Motivation in research, Types of research & research approaches, Research methods vs methodology, Criteria for good research, Problems encountered by researchers in India.
2. Research problem: Statement of research problem., Statement of purpose and objectives of research problem, Necessity of defining the problem
3. Research design: Meaning of research design, Need for research design, Features for good design, Different research designs, Basic principles of research design
4. Sampling Design: Criteria for selecting sampling procedure, Implications for sample design, steps in sampling design, characteristics of good sample design, Different types of sample design
5. Measurement & scaling techniques: Measurement in research- Measurement scales, sources of error in measurement, Technique of developing measurement tools, Meaning of scaling, its classification. Important scaling techniques.
6. Methods of data collection: collection of primary data, collection data through questionnaires & schedules, Difference between questionnaires & schedules.
7. Sampling fundamentals, need for sampling & some fundamental definitions, important sampling distributions.
8. Processing & analysis of data: Processing operations, problems in processing, Types of analysis, Statistics in research, Measures of central tendency, Dispersion, Asymmetry, relationship.
9. Testing of hypothesis: What is hypothesis? Basic concepts concerning testing of hypothesis, Procedure of hypothesis testing, measuring the power of hypothesis test, Tests of hypothesis, limitations of the tests of hypothesis
10. Computer technology: Introduction to Computers, computer application in research, computers & researcher.

**BIostatISTICS**

1. Introduction: Meaning, definition, characteristics of statistics., Importance of the study of statistics, Branches of statistics, Statistics and health science including physiotherapy, Parameters and Estimates, Descriptive and inferential statistics, Variables and their types, Measurement scales.
2. Tabulation of Data: Basic principles of graphical representation, Types of diagrams – histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, Normal probability curve.
3. Measure of Central Tendency: Need for measures of central Tendency, Definition and calculation of mean – ungrouped and grouped, Meaning, interpretation and calculation of median ungrouped and grouped., Meaning and calculation of mode, Comparison of the mean, median and mode, Guidelines for the use of various measures of central tendency.
4. Probability and Standard Distributions: Meaning of probability of standard distribution, the binominal distribution, the normal distribution, Divergence from normality – skew ness, kurtosis.
5. Sampling techniques: Need for sampling - Criteria for good samples, Application of sampling in community, Procedures of sampling and sampling designs errors, Sampling variation and tests

of significance.

6. Analysis of variance & covariance: Analysis of variance (ANOVA), what is ANOVA? Basic principle of ANOVA, ANOVA technique, Analysis of Co variance (ANACOVA).
7. Format of scientific documents. (Structure of protocols, formats reporting in scientific journals, systematic reviews and meta-analysis).

## **BPT413**

## **HEALTH PROMOTION, FITNESS AND WELLNESS**

**SUBJECT DESCRIPTION** - This course includes discussion on the theories of health and wellness, including motivational theory, locus of control, public health initiative, and psycho-Social, spiritual and cultural consideration. Health risks, screening, and assessment considering epidemiological principles are emphasized. Risk reduction strategies for primary and secondary prevention, including programs for special populations are covered.

1. Prevention practice: a holistic perspective for physiotherapy
  - a. Defining Health
  - b. Predictions of Health Care
  - c. Comparing Holistic Medicine and Conventional Medicine
  - d. Distinguishing Three Types of Prevention Practice.
2. Healthy People
  - a. Definition of healthy people
  - b. Health education Resources
  - c. Physiotherapist role for a healthy community.
3. Key concepts of fitness
  - a. Defining & Measuring Fitness
  - b. Assessment of Stress with a Survey
  - c. Visualizing Fitness
  - d. Screening for Mental and Physical Fitness
  - e. Body Mass Index calculations.
4. Fitness training
  - a. Physical Activities Readiness Questionnaire
  - b. Physical Activities Pyramid
  - c. Exercise Programs
  - d. Evidence-Based Practice.
5. Health, fitness, and wellness issues during childhood and adolescence
6. Health, fitness, and wellness during adulthood
7. Women's health issues: focus on pregnancy:
8. Prevention practice for older adults
9. Resources to optimize health and wellness
10. Health protection.
11. Prevention practice for musculoskeletal conditions
12. Prevention practice for cardiopulmonary conditions
13. Prevention practice for neuromuscular conditions
14. Prevention practice for integumentary disorders
15. Prevention practice for individuals with developmental disabilities
16. Marketing health and wellness.

**SUBJECT DESCRIPTION** - Following the basic science and clinical science course, this course introduces the student in cardio-thoracic conditions which commonly cause disability.

The objective of this course is that after lectures and demonstration in addition to clinics the student will be able to demonstrate an understanding of Cardio-thoracic conditions causing disability and their management. 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 cardiovascular pathology on the functioning of the individual.

1. Anatomy and Physiology

a. Respiratory system

- i. Upper respiratory tract
- ii. Lower respiratory tract – Trachea, Bronchial tree, Bronchopulmonary segments
- iii. Respiratory unit, hilum of lung.
- iv. Muscles of respiration
- v. Pleura, intra pleural space, intra pleural pressure, surfactant
- vi. Mechanics of respiration – Chest wall movements, lung & chest wall compliance
- vii. V/Q relationship, airway resistance
- viii. Respiratory centre, Neural & chemical regulation of respiration
- ix. Lung volumes and lung capacities, Spiro meter, lung function test
- x. Pulmonary circulation, Lung sounds, cough reflex cardiovascular systems
- i. Chambers of heart, semi lunar and atria ventricular valves
- ii. Coronary circulation, conductive system of heart
- iii. Cardiac cycle, ECG, Heart sounds
- iv. Blood pressure, pulse, cardiac output

2. Cardio Vascular system

Define, etiology, pathogenesis, clinical features, complications, b. Conservative and surgical management of the following conditions

- i. Ischemia heart disease
- ii. Myocardial infarction
- iii. Heart failure
- iv. Cardiac arrest
- v. Rheumatic fever
- vi. Hypertension
- vii. Infective endocarditis

viii. Myocarditis & cardiomyopathy

- c. Cardiovascular Disease : Examination of the Cardiovascular System Investigations : ECG, Exercise Stress Testing, Radiology ; Clinical manifestations of Cardiovascular disease ; Definition, Etiology, Clinical features, signs and symptoms, complications, management and treatment of following diseases and disorders of the heart : Pericarditis, Myocarditis, Endocarditis, Rheumatic Fever– resulting in valve disorders, Ischemic Heart Disease, Coronary Valve Disease, Congenital disorders of the Heart, Cardiac Arrest ; Examination and Investigations of diseases of arteries and veins ;

Hypertension : Definition, causes, classification, types, assessment, investigations and management.

- d. Disorders of the Heart – Definition, Clinical features, diagnosis and choice of management for the following disorders : Congenital Heart diseases – Acyanotic congenital heart disease & Cyanotic congenital heart disease : Patent Ductus Arteriosus, Coarctation of Aorta, Atrial Septal Defect, Ventricular Septal Defect, Tetralogy of Fallot, Transposition of Great Vessels ; Acquired Heart Disease – Mitral Stenosis & Insufficiency, Aortic Stenosis and Insufficiency, Ischemic Heart Disease – Coronary Artery Disease, Cardiac tumors.
3. Respiratory System
- a. Respiratory Disease : Examination of the Respiratory System – Investigations : Chest Radiographs, Pulmonary Function Testing, Arterial Blood Gas Analysis ; Clinical manifestations of Lung disease ; Patterns of lung disease – Chronic Obstructive Lung Disease and Restrictive Lung Disease ; Definition, Etiology, Clinical features, signs and symptoms, complications, management and treatment of following lung diseases : Chronic Bronchitis, Emphysema, Asthma, Bronchiectasis, Cystic Fibrosis, Upper Respiratory Tract Infections, Pneumonia, Tuberculosis, Fungal Diseases, Interstitial Lung Diseases, Diseases of the pleura, diaphragm and chest wall ; Respiratory failure – Definition, types, causes, clinical features, diagnosis and management.
  - b. Chest wall disorders-Definition, Clinical features, diagnosis and choice of management for the following disorders – chest wall deformities, chest wall tumors, Spontaneous Pneumothorax, Pleural Effusion, Empyema Thoracis, Lung abscess, Bronchiectasis, Tuberculosis, Bronchogenic Carcinoma, Bronchial Adenomas, Metastatic tumors of the Lung, tracheal Stenosis, Congenital tracheomalacia, Neoplasms of the trachea, Lesions of the Mediastinum. Carcinoma of the female breast.

### **BPT415**

### **PRINCIPLES OF MANAGEMENT**

The course is intended to provide a knowledge about the basic principles of Management.

1. Introduction to management
2. Strategic Management
3. Foundations of Planning
4. Planning Tools and Techniques
5. Decision Making, conflict and stress management
6. Managing Change and Innovation
7. Understanding Groups and Teams
8. Leadership
9. Time Management
10. Cost and efficiency

### **BPT416**

### **CRITIQUE ENQUIRY, CASE PRESENTATION AND CASE DISCUSSION**

## EIGHTH SEMESTER

### BPT421

### PHYSIOTHERAPY IN CARDIO VASCULAR PULMONARY AND INTENSIVE CARE -

**SUBJECT DESCRIPTION** - The subject is designed to provide knowledge in assessing and planning physiotherapy interventions for various General, Medical and Surgical conditions. The student must be able to reassess the patient as necessary, to monitor the patient in regard to treatment, to monitor the patient's vital signs, student must know emergency drugs indication and contra-indication, care in intensive care unit (ICU) and to provide appropriate interventions to the patient.

#### **THEORY -**

1. Anatomical and Physiological differences between the Adult and Pediatric lung.
2. Bedside assessment of the patient-Adult & Pediatric.
3. Investigations and tests - Exercise tolerance Testing - Cardiac & Pulmonary, Radiographs, PFT, ABG, ECG, Hematological and Biochemical Tests.
4. Physiotherapy techniques to increase lung volume - controlled mobilization, positioning, breathing exercises, Neurophysiological Facilitation of Respiration, Mechanical aids - Incentive Spirometry, CPAP, IPPB.
5. Physiotherapy techniques to decrease the work of breathing - Measures to optimize the balance between energy supply and demand, positioning, Breathing re-education - Breathing control techniques, mechanical aids - IPPB, CPAP, BiPAP.
6. Physiotherapy techniques to clear secretions - Hydration, Humidification & Nebulisation, Mobilisation and Breathing exercises, Postural Drainage, Manual techniques - Percussion, Vibration and Shaking, Rib Springing, ACBT, Autogenic Drainage, Mechanical Aids - PEP, Flutter, IPPB, Facilitation of Cough and Huff, Nasopharyngeal Suctioning.
7. Drug therapy - Drugs to prevent and treat inflammation, Drugs to treat Bronchospasm, Drugs to treat Breathlessness, Drugs to help sputum clearance, Drugs to inhibit coughing, Drugs to improve ventilation, Drugs to reduce pulmonary hypertension, Drug delivery doses, Inhalers and Nebulisers.
8. Neonatal and Pediatric Physiotherapy - Chest physiotherapy for children, The neonatal unit, Modifications of chest physiotherapy for specific neonatal disorders, Emergencies in the neonatal unit.
9. Physiotherapy in Obstructive lung conditions.
10. Physiotherapy in Restrictive lung conditions.
11. Management of breathlessness.
12. Pulmonary Rehabilitation.
13. Physiotherapy following Lung surgeries
14. Respiratory failure - Oxygen Therapy and Mechanical Ventilation.
15. Introduction to ICU: ICU monitoring -Apparatus, Airways and Tubes used in the ICU - Physiotherapy in the ICU - Common conditions in the ICU - Tetanus, Head Injury, Lung Disease, Pulmonary Oedema, Multiple Organ Failure, Neuromuscular Disease, Smoke Inhalation, Poisoning, Aspiration, Near Drowning, ARDS, Shock; Dealing with an Emergency Situation in the ICU.
16. Physiotherapy management following cardiac surgeries.
17. Cardiac Rehabilitation.

18. Physiotherapy management following PVD.
19. Abdominal Surgeries- Management of Pulmonary Restorative Dysfunction following surgical procedures on Abdomen and Thorax.
20. Management of Amputations following Diabetes, PVD - Prosthesis in amputations of lower limbs following ulcers and gangrenes.
21. Home program and education of family members in patient care.
22. Treatment, Response to exercise and Implications of Physiotherapy in the following disease conditions: Hypertension, Diabetes, Renal Failure and Obesity.

### **PRACTICAL:**

Practical shall be conducted for all the relevant topics discussed in theory in the following forms:

1. Bedside case presentations and case discussions
2. Lab sessions consisting of evaluation and assessment methods on student models, treatment techniques and practice sessions.

### **BPT422**

### **COMMUNITY PHYSIOTHERAPY**

**SUBJECT DESCRIPTION** - The subject serves to integrate the knowledge gained by the students in community medicine and other areas with skills to apply these in clinical situations of health and disease and its prevention. The objective of the course is that after the specified hours of lectures and demonstrations the student will be able to identify rehabilitation methods to prevent disabilities and dysfunctions due to various disease conditions and plan and set treatment goals and apply the skills gained in rehabilitating and restoring functions.

1. Rehabilitation: Definition, Types.
2. Community: Definition of Community, Multiplicity of Communities, The Community based approach, Community Entry strategies, CBR and Community development, Community initiated versus community-oriented programme, Community participation and mobilization.
3. Introduction to Community Based Rehabilitation: Definition, Historical review, Concept of CBR, Need for CBR, Difference between Institution based and Community based Rehabilitation, Objectives of CBR, Scope of CBR, Members of CBR team, Models of CBR.
4. Principles of Community based Rehabilitation. W.H.O.'s policies-about rural health care-concept of primary /tertiary health centers-district hospitals etc-Role of P.T.-Principles of a team work of Medical person/P.T./O.T. audiologist/speech therapist /P.&O./vocational guide in C.B.R. of physically handicapped person , Agencies involved in rehabilitation of physical handicapped - Legislation for physically handicapped. Concept of multipurpose health worker. Role of family members in the rehabilitation of a physically handicapped.
5. Planning and management of CBR Programmes, CBR Programmed planning and management, Ownership and Governance, Decentralization and CBR, Management of CBR,
6. Programmed sustainability, Communication and Coordination, Community participation, mobilization and awareness, CBR programme influence on promoting and developing public policies.
7. Disability: Definition of Impairment, Handicap and Disability, Difference between impairment, handicap and disability, Causes of disability, Types of disability, Prevention of disability, Disability in developed countries, Disability in developing countries. Disability Surveys: Demography. Screening: Early detection of disabilities and developmental disorders, Prevention of disabilities- Types and levels.

8. Disability Evaluation: Introduction, What, Why and How to evaluate, Quantitative versus Qualitative data, Uses of evaluation findings.
9. Role of Government in CBR: Laws, Policies, Programmes, Human Rights Policy, Present rehabilitation services, Legal aspects of rehabilitation.
10. Role of Social work in CBR: Definition of social work, Methods of social work, History of social work, Role of social worker in rehabilitation.
11. Role of voluntary Organizations in CBR: Charitable Organizations, Voluntary health agencies
  - National level and International NGO's, Multilateral and Bilateral agencies. International Health Organizations: WHO, UNICEF, UNDP, UNFPA, FAO, ILO, World bank, USAID, SIDA, DANIDA, Rockefeller, Ford foundation, CARE, REDCROSS.
12. National District Level Rehabilitation Programme: Primary rehabilitation unit, Regional training center, District rehabilitation center, Primary Health center, Village rehabilitation worker, Anganwadi worker
13. Role of Physiotherapy in CBR: Screening for disabilities, Prescribing exercise programme, Prescribing and devising low cost locally available assistive aids, Modifications physical and architectural barriers for disabled, Disability prevention, Strategies to improve ADL, Rehabilitation programmes for various neuro-musculoskeletal and cardiothoracic disabilities.
14. Screening and rehabilitation of paediatric disorders in the community: Early detection of high risk babies, Maternal nutrition and education, Rehabilitation of Cerebral Palsy, Polio, Downs Syndrome, Muscular Dystrophies etc., Prevention and rehabilitation of mental retardation and Behavioural disorders, Immunization programmes, Early intervention in high risk babies, Genetic counselling.
15. Extension services and mobile units: Introduction, Need, Camp approach.
16. Vocational training in rehabilitation: Introduction, Need, Vocational evaluation, Vocational rehabilitation services.
17. Geriatrics- Physiology of Aging /degenerative changes-Musculoskeletal /Neuromotor /cardio respiratory-/Metabolic, Endocrine, Cognitive, Immune systems. Role of Physio Therapy in Hospital based care, Half-way homes, Residential homes, Meals on wheels etc. Home for the aged, Institution based Geriatric Rehabilitation. Few conditions:- Alzheimer's disease, Dementia, Parkinson's Disease, Incontinence, Iatrogenic drug reactions, etc. Ethics of Geriatric Rehabilitation.
18. Industrial Health & Ergonomics [10 hours] - Occupational Hazards in the industrial area- Accidents due to
  - a. Physical agents-e.g.-Heat/cold, light, noise, Vibration, U.V. radiation, Ionizing radiation,
  - b. Chemical agents-Inhalation, local action, ingestion,
  - c. Mechanical hazards-overuse/fatigue injuries due to ergonomic alteration & ergonomic evaluation of work place-mechanical stresses per hierarchy-
    - i. sedentary table work –executives, clerk,
    - ii. inappropriate seating arrangement- vehicle drivers
    - iii. constant standing- watchman- Defense forces, surgeons,
    - iv. Over-exertion in laborers,-common accidents –Role of P.T.-Stress management.
  - d. Psychological hazards- e.g.-executives, monotonicity & dissatisfaction in job, anxiety of work completion with quality, Role of P.T. in Industrial setup & Stress management-relaxation modes.

e. Biological Hazards

**PRACTICAL:** This will consist of Field visits to urban and rural PHC's., Visits to regional rehabilitation training center, Regular mobile camps, Disability surveys in villages, Disability screening, Demonstration of Evaluation and Physiotherapy prescription techniques for musculoskeletal, neuromuscular, cardio- respiratory, paediatric, gynecological and geriatric problems in community, Demonstration of evaluation and prescription techniques for ambulatory and assistive devices, Fabrication of low cost assistive devices with locally available materials.

**BPT423**

**CLINICAL REASONING AND EVIDENCE BASED PHYSIOTHERAPY PRACTICE -**

1. Introduction to Evidence Based Practice: Definitions, Evidence Based Practice,
2. Concepts of Evidence based Physiotherapy: Awareness, Consultation, Judgement, and Creativity
3. Development of Evidence based knowledge, The Individual Professional, Professionals within a discipline, and Professionals across disciplines
4. Evidence Based Practitioner: The Reflective Practitioner, The E Model, Using the E Model
5. Finding the Evidence: Measuring outcomes in Evidence Based Practice, Measuring Health Outcomes, Measuring clinical outcomes, Inferential statistics and Causation
6. Searching for the Evidence: Asking Questions, Identifying different sources of evidence, Electronic Bibliographic databases and World Wide Web, Conducting a literature search. Step by-step search for evidence
7. Assessing the Evidence: Evaluating the evidence; Levels of evidence in research using quantitative methods, Levels of evidence classification system, Outcome Measurement, Biostatistics, The critical review of research using qualitative methods
8. Systematically reviewing the evidence: Stages of systematic reviews, Meta-analysis, The Cochrane collaboration
9. Economic evaluation of the evidence: Types of economic evaluation, conducting economic evaluation, critically reviewing economic evaluation, locating economic evaluation in the literature
10. Using the evidence: Building evidence in practice; Critically Appraised Topics (CATs), CAT format, Using CATs, Drawbacks of CATs
11. Practice guidelines, algorithms, and clinical pathways: Recent trends in health care, Clinical Practice Guidelines (CPG), Algorithms, Clinical pathways, Legal implications in clinical pathways and CPG, Comparison of CPGs, Algorithms and Clinical Pathways
12. Communicating evidence to clients, managers and funders: Effectively communicating evidence, Evidence based communication in the face of uncertainty; Evidence based communication opportunities in everyday practice
13. Research dissemination and transfer of knowledge: Models of research transfer, Concrete research transfer strategies, Evidence based policy

**BPT424**

**ADMINISTRATION AND TEACHING SKILLS**

1. Introduction:

- a. Branches of administration, Nature and scope of administration, How to be an effective administrator, Planning hospital administration as part of a balanced health care program.
- b. Principles of hospital administration and its applications to physiotherapy.

- c. Planning and organization: Planning cycle, Principles of organizational charts, Resource and quality management, planning change -innovation
  - d. Financial issues including budget and income generation
  - e. Hospital administration: Organization, Staffing, Information, Communication, Coordination, Cost of services, Monitoring and evaluation.
  - f. Organization of physiotherapy department: Planning, Space, Manpower, Other basic resources.
  - g. Organizing meetings, committees, and negotiations
  - h. Personnel management: Personnel performance appraisal system, Quality care delivery from the staff.
2. Aims of physiotherapy education
- a. Concepts of teaching and learning
  - b. Curriculum development
  - c. Principles and methods of academic and clinical teaching
  - d. Measurement and evaluation
  - e. Guidance and counseling
  - f. Faculty development program
  - g. Administration in clinical setting
  - h. Use of A-V aids in teaching
  - i. Taxonomy of education

## **BPT425**

## **RESEARCH PROJECT-**

The project may be a case study or of recent technique or literature reviews and etc. to make the student to have research mind and to facilitate for higher studies.

## **BPT425**

## **CLINICAL EDUCATION-**

Students will be posted in rotation in the following areas/wards. The students will be clinically trained to provide physiotherapy care for the patients under supervision. They will be trained on bed side approach, patient assessment, performing special tests, identifying indications for treatment, ruling out contraindications, decision on treatment parameters, dosage and use relevant outcome measures under supervision. Evidence based practice will be part of training.

1. Physiotherapy OPD
2. Neurology, Neurosurgery & Neuro ICU
3. Community-PHC
4. Orthopedics
5. General Medicine & MICU
6. General Surgery & CTS ICU
7. Developmental Pediatrics & Child Guidance Clinic
8. OBG
9. Geriatric – Old Age Homes
10. Industrial Visits – Ergonomics

## NINTH SEMESTER

### BPT511

### INTERNSHIP -

The internship time period provides the students the opportunity to continue to develop confidence and increased skill in simulation and treatment delivery. Students will demonstrate competence in beginning, intermediate, and advanced procedures in both areas. Students will participate in advanced and specialized treatment procedures. The student will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The students are expected to work for minimum 8 hours per day.

**1. Initial Assessment Documentation:** Clinical staff must document the following information:

- a. Initial assessment documented based on SOAP format.
- b. Subjective examination (symptomatic)
- c. Objective examination (measureable, observable)
- d. Action/Analysis (interpretation of current condition/intervention provided)
- e. Plan of action
- f. Written or verbal feedback to the client or other relevant carers
- g. Discharge plan documented
- h. Agreement to treatment plan by patient or "person responsible"

**2. Progress Documentation:** Progress documentation may include the following information:

- a. Any individual intervention should be documented in SOAP format (including response to intervention/s using outcome measures)
- b. Oral consent obtained and documented when there is a significant change in treatment/treatment options/ status of patient's health.
- c. Written consent obtained for designated invasive procedures
- d. Change in status or events that may affect discharge plans/goals
- e. Documented consultation with key clinical team members

**INTERNSHIP APPRAISAL FORM**

NAME OF THE STUDENT :

SESSION :

ROLL NO:

UNIVERSITY REGISTRATION NO :

PERIOD OF TRAINING :

FROM.....TO.....

Sr. No.	PARTICULARS	Not Satisfactory	Satisfactory	More Than Satisfactory	Remarks
		1 2 3	4 5 6	7 8 9	
1.	Proficiency of Knowledge in Technique and Procedures				
2.	Competency & Skill in Physiotherapy				
3.	Recent Advances Learning				
4.	Responsibility, Punctuality, workup of Physiotherapeutic techniques, involvement in special procedures and preparation of reports.				
5.	Self Directed Learning				
6.	Interpersonal relationship i.e. Team work, behavior with colleagues, nursing staff and relationship with medical and paramedical staffs				
7.	External & Outreach activities i.e. Seminar, Symposium, Workshop etc				
8	Logbook Maintenance				
9	Research Aptitude				

REMARKS\* \_\_\_\_\_

**\*REMARKS:**

- Any significant positive or negative attributes of a student to be mentioned.
- For score less than 4 in any category, remediation must be suggested.
- Individual feedback to student is strongly recommended.


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SKILLS BASED OUTCOMES AND MONITORABLE INDICATORS FOR BACHELOR OF  
PHYSIOTHERAPY

**BACHELOR OF PHYSIOTHERAPY**

**COMPETENCY STATEMENTS**

1. Consults with the client to obtain information about his/her health, associated history, previous health interventions, and associated outcomes.
2. Collects assessment data relevant to the client's needs and physiotherapy practice.
3. Be able to conduct the patient evaluation and assessment as per condition.
4. Analyzing Assessment findings & Establish a physiotherapy diagnosis and prognosis.
5. Develops and Recommends an intervention strategy.
6. Be able to prepare the patient (physically and emotionally) and as well as the equipment to be used as per treatment plan
7. Implements intervention.
8. Be able to accurately explain the treatment plans and able to demonstrate and teach self exercises
9. Advise patient on appropriate nutrition, exercises, rest, relaxation other issues
10. Evaluates the effectiveness of interventions.
11. Be able to complete accurate treatment documentation.
12. Develops, builds, and maintains rapport, trust, and ethical professional relationships through effective communication.
13. Establishes and maintains inter professional relationships, which foster effective client-centered collaboration.
14. Understand the principles of continuous quality improvement.
15. Be able to carry out the daily/weekly Quality Control (QC) checks.
16. Be able to review the literature.
17. Be able to suggest implementation of research findings.
18. Be able to suggest/ initiate topics for physiotherapy research
19. Be able to interpret, apply and disseminate information as a member of the physiotherapy team.



Sl. No.	Learning Outcomes	Knowledge/ Comprehension	Application/Synthesis/ Evaluation
1.	Consults with the client to obtain information about his/her health, associated history, previous health interventions, and associated outcomes	<ul style="list-style-type: none"> <li>• Able to Collect and review background information relevant to the client's health.</li> <li>• Understands the client's expectations related to physiotherapy services.</li> <li>• Able to Collect and review health information about the client from other sources (e.g., other sources may include previous health records, other health care practitioners, professional colleagues, or family).</li> <li>• Identify client's prior functional abilities, physical performance, and participation.</li> </ul> <p>Identifies the client's personal and environmental factors affecting his/her functional abilities, physical performance, and participation.</p>	<ul style="list-style-type: none"> <li>• Develop rapport to obtain history and current health status</li> <li>• Use interviewing skills appropriate to the patient/ client</li> <li>• Obtain a relevant history and current health status.</li> <li>• Interpret the patient's/ client's verbal and non-verbal responses.</li> <li>• Determine the personality traits.</li> <li>• Analyze how the differences in personality influence approach</li> </ul>
2.	Collects assessment data relevant to the client's needs and physiotherapy practice.	<ul style="list-style-type: none"> <li>• Informs the client of the nature and purpose of assessment as well as any associated significant risk.</li> </ul>	<ul style="list-style-type: none"> <li>• Perform patient assessment technique which includes to know the condition and to gather information about his/her ailment.</li> <li>• Monitors the client's health status for significant changes during the course of assessment and takes appropriate actions as required.</li> <li>• Perform assessment procedure safely and accurately, taking into account client consent, known indications, guidelines, limitations and risk-benefit considerations.</li> </ul>
3.	Be able to conduct the patient evaluation and assessment as per condition.	<ul style="list-style-type: none"> <li>• Be familiar with different assessment techniques.</li> <li>• Able to examine higher motor functions, cranial nerves, ROM, MMT, Muscle tightness, muscle tone, myotome, sensory evaluation, balance, co-ordination, hand function, functional outcome measures, Physical fitness, cardio-respiratory evaluation, posture &amp; gait.</li> </ul>	<ul style="list-style-type: none"> <li>• Safely and accurately examines and re-examines a patient using standardized measures.</li> <li>• Apply pertinent tests and measurements.</li> <li>• Interpret all assessment findings to allow for identification of the patients/ client's</li> </ul>

		<ul style="list-style-type: none"> <li>• Be familiar with special tests.</li> <li>• Basic knowledge on radiological findings &amp; other investigations.</li> <li>• Demonstrate clinical reasoning with choice of assessment and examination procedures</li> </ul>	impairments, activity limitations and participation restrictions.
4.	Analyzing assessment findings & Establish a physiotherapy diagnosis and prognosis.	<ul style="list-style-type: none"> <li>• Identifies the nature and extent of the client's impairments, activity limitations, and participation restrictions within the context of the client's needs.</li> <li>• Identifies environmental and personal supports and barriers relevant to the patients.</li> <li>• Determines the relationship among the assessment findings.</li> </ul>	<ul style="list-style-type: none"> <li>• Interpret findings and reach a differential diagnosis</li> <li>• Establishes a diagnosis for physiotherapy, identifies risks of care, and makes appropriate clinical decisions based upon the examination, evaluation and current available evidence.</li> <li>• Formulates a physiotherapy diagnosis based on the analysis of patients assessment findings.</li> <li>• Discusses physiotherapy diagnosis and prognosis with the patient &amp; care givers</li> </ul>
5.	Develops and recommends an intervention strategy.	<ul style="list-style-type: none"> <li>• Establishes and prioritizes, with the patient, expected outcomes based on the assessment findings and evidence-informed practice.</li> <li>• Recommends a service approach consistent with the client's needs, goals and all available resources.</li> <li>• Discuss the current patient condition among multidisciplinary team</li> </ul>	<ul style="list-style-type: none"> <li>• Establishes goals that are specific, measurable, action oriented, realistic, and time-specific.</li> <li>• Selects interventions that are evidence-based and consistent with the client's goals, general health status, functional needs, and assessment findings.</li> <li>• Identifies when physiotherapy services are not required or indicated and refers for other services as appropriate.</li> </ul>



6.	Be able to prepare the patient (physically and emotionally) and as well as the equipment to be used as per treatment plan	Know the patient mental and physical condition	Operate the most appropriate equipment for the individual patient within the context of the protocol.
7.	Implements intervention	<ul style="list-style-type: none"> <li>• Orients the client to the practice setting and provides information about relevant service/policies (e.g., location, duration, frequency, cost; introduce client to all staff involved in their care; expected completion of service).</li> </ul>	<ul style="list-style-type: none"> <li>• Performs physiotherapy interventions in accordance with client consent and in a safe and effective manner.</li> <li>• Educates the client about health promotion, self- management, and relevant services with respect to his/her unique condition.</li> </ul>
8.	Be able to accurately explain the treatment plans and able to demonstrate and teach self exercises	<ul style="list-style-type: none"> <li>• Discuss the importance of exercises and how it should be carried out</li> <li>• Be familiar with the treatment plans for all patients on the treatment unit</li> <li>• Identify the co-morbidities that will impact on patient condition</li> <li>• Recognize if any adverse reactions is occurring</li> </ul>	<ul style="list-style-type: none"> <li>• Interpret the treatment plan and use the equipment accordingly</li> <li>• Teach patients the exercise procedures and methods of doing them.</li> <li>• Evaluate the patient's general condition prior to commencing the exercises.</li> <li>• Analyze the information and integrate to define the optimal patient condition</li> </ul>
9.	Advise patient on appropriate nutrition, exercises, rest, relaxation other issues	<ul style="list-style-type: none"> <li>• Explain the impact of exercise and nutritional status of patient during treatment</li> </ul>	<ul style="list-style-type: none"> <li>• Assess the patient's status after exercise and proper diet.</li> </ul>

10.	Evaluates the effectiveness of interventions.	<ul style="list-style-type: none"> <li>• Discuss with the client, the nature, purpose and results of ongoing assessment and outcome evaluations.</li> <li>• Consults with the patient to redefine goals and modifies or discontinues intervention strategies as necessary.</li> </ul>	<ul style="list-style-type: none"> <li>• Monitors client responses and changes in status during the interventions and modifies intervention accordingly.</li> <li>• Evaluates effectiveness of the intervention strategy on an ongoing basis using appropriate outcome measures.</li> <li>• Assesses client status prior to the completion of physiotherapy service and compares with initial assessment findings.</li> <li>• Communicates with the client about service completion &amp; recommends self-management option.</li> </ul>
11.	Be able to complete accurate treatment Documentation.	<ul style="list-style-type: none"> <li>• Recognize the importance of accurate transfer of information to allow for accurate treatment set-up according to the treatment plan and prescription.</li> <li>• Know what should be included &amp; whom or where the documentation and information should be sent.</li> <li>• Be aware of the ethical issues relating to documentation</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that the ethical and legal requirements of documentation are completed.</li> <li>• Ensure legible, accurate and timely records are maintained.</li> <li>• Ensure statistical information is recorded and accessible.</li> </ul>
12.	Develops, builds, and maintains rapport, trust, and ethical professional relationships through effective communication.	<ul style="list-style-type: none"> <li>• Be familiar with the psychological status of the patient.</li> <li>• Knowledge of few counseling procedures.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrates sensitivity to the uniqueness of others.</li> <li>• Listens effectively and facilitates discussion to ensure reciprocal exchange of information.</li> <li>• Demonstrates an awareness of self behaviours and the responses of others and adapts communications appropriately.</li> <li>• Able to assess psychological status of patient.</li> </ul>

13.	Establishes and maintains inter professional relationships, which foster effective client-centered collaboration.	<ul style="list-style-type: none"> <li>Integrates knowledge and understanding of the physiotherapist role and the roles of others in providing client-centred care.</li> <li>Consults and shares relevant information with clients, other health professionals, and all relevant individuals or groups in a timely manner.</li> </ul>	<ul style="list-style-type: none"> <li>Demonstrates an understanding of and respects the roles, responsibilities and differing perspectives of team members.</li> <li>Practice in accordance with legislation regulations and ethical guidelines.</li> <li>Fosters collaboration with relevant others.</li> </ul>
14.	Understand the principles of continuous quality improvement	<ul style="list-style-type: none"> <li>Identify the components of a quality plan.</li> <li>Discuss the role of quality assurance such as principles of an accreditation/audit programme, Undertake peer review and self-evaluation</li> </ul>	<ul style="list-style-type: none"> <li>Modify and adapt professional practice in response to evaluation and/or feedback from the patient/client, peer, supervisor</li> <li>Contribute to in-service activities., Reflect on the outcomes of interventions and modify practice accordingly</li> </ul>
15.	Be able to carry out the daily/ weekly Quality Control (QC) checks	Explain Quality Management System (QMS), Quality Assurance (QA) and Quality Control	<ul style="list-style-type: none"> <li>Perform the daily/weekly/monthly QC procedures</li> </ul>
16.	Be able to review the literature	<ul style="list-style-type: none"> <li>Define search terms for specific treatment sites</li> </ul>	<ul style="list-style-type: none"> <li>Identify the appropriate literature in the area of interest.</li> <li>Identifying research gap.</li> </ul>
17.	Be able to suggest implementation of research findings	<ul style="list-style-type: none"> <li>Identify relevant sources of Research</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate research with respect to current departmental practice</li> </ul>
18.	Be able to suggest/ initiate topics for physiotherapy research	<ul style="list-style-type: none"> <li>Identify literature to support research proposal</li> <li>Define the necessary steps in preparing and carrying out research</li> </ul>	<ul style="list-style-type: none"> <li>Review the literature in the area.</li> <li>Formulate a research question.</li> <li>Conducts research systematically.</li> </ul>
19.	Be able to interpret, apply and disseminate information as a member of the physiotherapy team	<ul style="list-style-type: none"> <li>Define and explain the data that must be disseminated</li> </ul>	<ul style="list-style-type: none"> <li>Identify the appropriate personnel to whom specific information should be disseminated.</li> <li>Communicate the correct, relevant and appropriate information</li> </ul>

## CHAPTER 5:

### JOB DESCRIPTION

A brief overview of the proposed job description is mentioned below for various levels, however this may be customized based on different work settings.

#### Level 6

- Patient identification and verification of the patient and assisting in treatment implementation.
- Basic knowledge in Physiotherapy protocol
- Treatment preparation
- Data entry including treatment recording
- General knowledge pertaining to biomedical waste disposal
- Familiarization with physiotherapy equipment
- Knowledge of patient transport and physiotherapy equipment management.
- Physiotherapy Equipment preparation for the simulation and treatment
- Basic Knowledge of exercise therapy and electrotherapy and its implementation.
- Information management / communication for inter disciplinary
- Supervision of the physiotherapy procedure , health and safety
- Professional responsibility including quality check on treatment delivery, chart verification
- Special procedures for treatment and assessment including MMT, different mobilization etc.

#### Level 7

- Professional developmental skill
- Special manipulation treatment skill
- Ability to critically evaluate practice
- Verifies the accuracy of the patient physiotherapy procedure before and after the treatment
- Monitors the patients for clinical reaction for all the patients

#### Level 8

- Consult and discuss with appropriate health physicians when immediate clinical response is necessary based on emergency and for critical patient condition.

#### Level 9

- Standardizing the teaching skills and developing a curriculum for the teaching program.
- Involvement in research and development

#### Level 10

- Setting the guidelines
- Judgment on all aspects of physiotherapy work
- Protocol development on treatment delivery and Quality Assurance
- Involvement on departmental up gradation programme
- Assesses service procedure and environment to meet established guidelines for proper working and adjust the action plan as per clinical compliance

## ALLIED AND HEALTHCARE PROFESSIONS

Annex-2

The wide variation in the understanding of the concept of allied and healthcare professional, better known as 'paramedic', the nomenclature, and functions has led to the poor image of allied and healthcare sciences in India. The use of the word paramedic itself limits the activities of AHPs in the system. Hence, it is imperative to adequately compensate these professionals based on their qualifications and specialties. Despite a huge demand for services from this sector, allied and healthcare sciences is highly fragmented. As per the report 'From Paramedics to Allied Health Sciences', in total 138 courses of varied levels were identified during the process. Although it is estimated that there may be many more courses which are yet to be identified.

Considering the lack of regulatory mechanism following 15 core professional groups (accounting for around 44 professions) has been enlisted below **(The list is illustrative of the allied and healthcare professions. In future there may be addition or removal of certain professions based on the state of their regulation and standardization). It also needs a mention that most of these professions are not restricted to the professional groups under which they have been categorized, their role may extend to other professional services too. Similarly, the categorization is an indicative categorization, however this may evolve over time based on deeper understanding of the roles and responsibilities of each professional group:**

### **1. Healthcare Professions**

1. Optometry
2. Physiotherapy
3. Occupational Therapy
4. Nutrition Sciences
5. Physician Associate and Assistants

### **2. Allied Health Professions**

6. Cardiology, Vascular and Pulmonary Technology
7. Medical Laboratory Sciences
8. Medical Radiology and Imaging Technology
9. Neurosciences Technology
10. Non- direct and Administrative services
11. Primary Care and Community services
12. Radiation Therapy
13. Renal Technology
14. Surgical and Anesthesia related Technology
15. Trauma Care Services

The above mentioned groups account for over 44 job profiles in the allied and healthcare space, which are as follows-



## **A. Healthcare Professions**

1. Optometry
  - a. Optometrist
2. Physiotherapy
  - a. Physiotherapist
3. Occupational Therapy
  - a. Occupational Therapist
4. Nutrition Sciences
  - a. Nutritionist
  - b. Dietitian
5. Physician Associate and Assistants
  - a. Physician Associates and Assistants

## **B. Allied Health Professions**

6. Surgical and anesthesia related technology
  - a. Anesthesia Assistants and Technologist
  - b. OT Technologist
  - c. Endoscopy Technologist
7. Medical Laboratory Sciences
  - a. Cyto-Technologist
  - b. Dermatology/STD /Leprosy Lab Technologist
  - c. Forensic Technologist
  - d. Hemato-Technologist
  - e. Histopath-Technologist
  - f. Phlebotomist
  - g. Medical and Clinical Lab Technologist
8. Medical Radiology and Imaging Technology
  - a. Radiographer
  - b. Radiologic /Imaging Technologist
  - c. Diagnostic Medical Sonographer
9. Renal Technology
  - a. Urology Technologist
  - b. Dialysis Therapy Technologist
10. Radiation Therapy
  - a. Radiotherapy Technologist
  - b. Medical Dosimetrist
  - c. Nuclear Medicine Technologist
11. Trauma Care Services
  - a. Emergency Medical Technologist (paramedic)
  - b. Critical Care/ICU Technologist
12. Neurosciences Technology
  - a. EEG/END Technologist
  - b. EMG Technologist

