



**MANAV RACHNA INTERNATIONAL INSTITUTE OF  
RESEARCH AND STUDIES  
(Deemed to be University under section 3 of the UGC  
Act, 1956)**

**FACULTY OF ALLIED HEALTH SCIENCES**

**CURRICULUM BOOKLET**

**(BACHELOR OF PHYSIOTHERAPY)**

**ACADEMIC SESSION: 2021-25**

## **FOREWORD**

This is to certify that this booklet contains the Curriculum and Scheme of Examination of Bachelors of Physiotherapy (BPT) 1<sup>st</sup> year and 2<sup>nd</sup> Year being offered at Faculty of Allied Health Sciences of this University. This has been duly vetted and finally approved by 40<sup>th</sup> and 41<sup>th</sup> Academic Council of the University vide 10<sup>th</sup> May 2022 and 30<sup>th</sup> August 2022 respectively and changes, if any deemed appropriate, shall be duly incorporated after the necessary approval by the Academic Council.

This Curriculum and Scheme of Examination of BPT shall be implemented w.e.f. AY 2021-22.

**Date:**

**Prof. (Dr.) Naresh Grover**  
**Dean-Academics, MRIIRS**

MRIIRS

## **PREAMBLE**

Our changing technology – with all its advantages and benefits – has begun to take a strain to our bodies. Musculoskeletal issues such as back pain, knee pain, and neck strains are becoming common problems. Neurological and cardiorespiratory issues are on the rise in our culture. Physiotherapy is one of the most common courses in modern medicine in the world, which sees human movements as fundamental to the health and well-being of individuals. Physiotherapists are qualified specialists who assist their patients with various physical conditions to achieve the highest physical function and their role in preserving and restoring physical function and health to the person in order to enhance their physical function. Physiotherapists are therefore responsible for promoting fitness, diet, quality of life and the avoidance of physical dysfunction and disability. In particular, their function is to improve performance or rehabilitate athletes to succeed in and out of the field in the best possible way. This systematic approach involves a wide variety of physical and physiological rehabilitation treatments and aids. The key skills used in physiotherapy includes physical therapy, therapeutic exercise the application of electrotherapeutic modalities.

Specifically, physiotherapists enhance the quality of life of the client by:

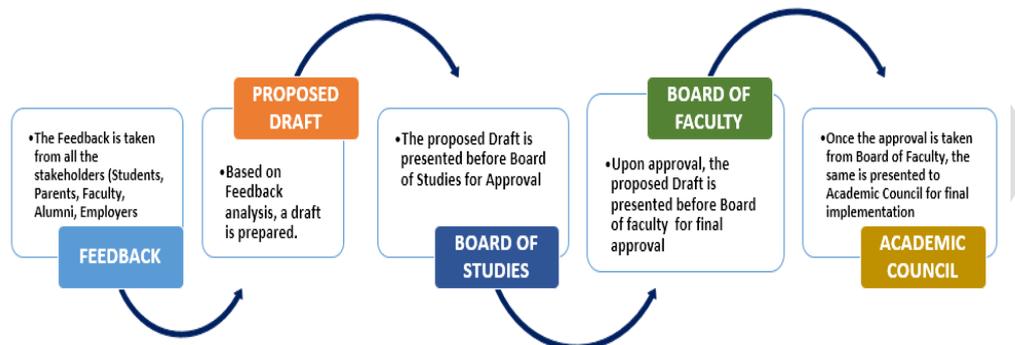
- Promoting maximum mobility, physical activity and good health and wellness;
- Avoiding sickness, accident and disability;
- Attachment to geriatric treatment & rehabilitation;
- Balancing acute and chronic conditions, limits of operation and involvement
- Improving and preserving maximum functional freedom and physical performance;
- Rehabilitation of injury and illness or impairment effects through corrective exercise services and other interventions;
- Educating and planning maintenance and support services to avoid re-emergence, re-injury or functional deterioration.

Students studying Physiotherapy learn about basic sciences such as Anatomy, Physiology, Microbiology, Biochemistry, Pharmacology, etc. as well as clinical sciences such as Orthopedics, Neurology, Cardiopulmonary, General Surgery, General Medicine, etc. In addition, they learn about the Basics of Physiotherapy, Biomechanics, Exercise Therapy, Electrotherapy, etc. methods used to treat patients with the following treatments. They learn to diagnose patients based on findings and personal histories. They also learn how to work with patients and family members to create a treatment plan that will be successful for everyone concerned. In addition to clinical practice, other practices in the field of physical therapy include research, education, consulting and administration. At present, very few universities in our country are developing health professionals specializing in physiotherapy.

The Bachelor of Physiotherapy (BPT) program launched by Manav Rachna International Institute of Research and Studies promises to generate professionals with comprehensive and sophisticated knowledge in the field of physiotherapy. At Manav Rachna International Institute of Research and Studies, Practice training for students is taught at the state-of-the-art Department of Physiotherapy, the

Allied Health Sciences Faculty, various Delhi and NCR Hospitals and a sports center where students undergo practical training under the expert faculty. Students extend their clinical and rehabilitative principles horizons by participating in community-based recovery services and other outreach programs. Thus, students have the advantage of excellent clinical training, in addition to the highest degree of academic activity, which bridges the gap between theoretical knowledge and its practical application.

### Structure of Program Implementation



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**VISION**

To impart latest knowledge and skills so as to kindle innovation & creativity among students, to develop and sustain a culture of research while promoting values, ethics and responsible professionalism, leading to a progressive career in industry & academia globally.

**MISSION**

- To engage modern education aids, laboratories and competent faculty ensuring effective teaching learning process to meet the ever growing and changing industrial and business environment.
- To continuously challenge the young minds with ideas so as to carry out innovative research through interaction with the research organizations & industry and to provide them avenues for recognition by participation in challenging platforms.
- To develop responsible citizens and professional leaders with high ethical and moral values, who contribute in dissemination of universal science and technology?

## **ABOUT THE DEPARTMENT**

The Department of Physiotherapy is committed to accomplish the students with thorough knowledge on the subjects to meet the need – based demand of the 21st century. The department has set a benchmark in the academics, clinical practice and research in Physiotherapy for past eleven years. The programs aim at facilitating personal and professional growth of students so that they can develop their knowledge, skills and attitudes needed for the effective management and care of patients and to become competent practitioners of physiotherapy. It prides itself on creating an environment of substantial academic freedom overlaid by rigorous, self-imposed standards of excellence and socially responsive practices. The department of physiotherapy willingly submits itself to a unique, rigorous, open, and continuous process of appraisal and feedback from the students. The faculty plays a hands-on role in the governance of the teaching methodology and assumes total ownership of collective decisions, and keeps itself abreast of current developments in the related fields of Physiotherapy.

The under Graduate programme in Physiotherapy is four and half year program. The program provide in-depth study and comprehensive practical as well as professional knowledge of immense value in view of global acceptance. The programme boasts of practical based curriculum, backed by state-of-the-art laboratories, sound infrastructure as well as innovative & interesting learning procedures.

The intellectual capital at the department is highly qualified, well experienced and research oriented. The faculty members actively participate in academic activities other than teaching and research engagements and extend every support in organizing academic and professional activities of high credentials from time to time. The department of Physiotherapy maintains active interface with the public and private entrepreneurs of health industry and other promotional organizations to understand the future needs and demands.

## **PROGRAM EDUCATION OBJECTIVES:**

The Department of Physiotherapy keeping in view interests of all their stakeholders have designed the Program Educational Objectives (PEO's) that are comprehensive statements describing the career and professional accomplishments that the program is preparing the learner for.

## **PEO'S FOR BACHELOR OF PHYSIOTHERAPY ARE:**

**PEO1: Communication-** Effective communication and interpersonal skill which are adapted to meet the needs of diverse individuals and groups.

**PEO2: Ethical and Legal Standards-** Adherence to safe, ethical and legal standards of current practice (as identified by professional organizations, federal and state law and accrediting bodies).

**PEO3: Diagnosis and plan of care-** Development of physiotherapy diagnoses and an individualized plan of care for the management and prevention of movement dysfunction across the life span.

Demonstrate effective physiotherapy screening of the following systems for keep-refer decisions: Musculoskeletal; Neuromuscular; Cardiovascular and Pulmonary; Integumentary.

Demonstrate effective history taking, examination, evaluation, and re-evaluation that leads to an appropriate physiotherapy diagnosis and prognosis for patients with disorder of the following systems: Musculoskeletal; Neuromuscular; Cardiovascular and Pulmonary; Integumentary

Develop an appropriate plan of care and intervention for patients with disorders of the following systems: Musculoskeletal; Neuromuscular; Cardiovascular and Pulmonary; Integumentary.

Assess and address needs of individuals and communities for health promotion and prevention of movement dysfunction.

**PEO4: Team Member-** Effective participation as an intra- and inter-professional team member.

**PEO5: Practice Management-** Effective clinical practice management for delivery of physiotherapy services in diverse settings.

**PEO6: Teaching and Learning Practices-** Application of teaching and learning principles in educational, practice, and community settings.

**PEO7: Evidence Based Practice-** Application of principles of critical thinking and clinical reasoning to evidence- based physiotherapist practice.

**PEO8: Professional responsibility and Commitment-** Responsibility and commitment to the profession and society through life -long learning and involvement in activities beyond the job responsibilities.

## **PROGRAM OUTCOMES (POs) / PROGRAM SPECIFIC OUTCOMES (PSOs)**

Program Outcomes / Program Specific Outcomes describe graduate attributes i.e. what students are expected to know or will be able to do when they graduate from a program.

### **The POs / PSOs of Bachelor of Physiotherapy are:**

**PO1: Disciplinary Knowledge-** Integrate concepts from the biological, physical, behavioural, and clinical sciences into physical therapy services

**PO2: Professional Ethics-** Exhibit professional conduct and behaviours that are consistent with the legal and ethical practice of physical therapy

**PO3: Patient Care-** Demonstrate compassion, caring, integrity, and respect for differences, values, and preferences in all interactions with patients/clients, family members, health care providers, students, other consumers, and payers

**PO4: Communication Skills-** Demonstrate culturally sensitive verbal, nonverbal, and written communications that are effective, accurate, and timely

**PO5: Research related Skills-** Collect and critically evaluate data and published literature to apply in the delivery of care, practice management, and to examine the theoretical and scientific basis for physical therapy

**PO6: Analytical Skills-** Complete a patient/client examination/ re-examination and evaluate and interpret the examination data to determine a physical therapy diagnosis and prognosis

**PO7: Community Health-** Provide services and information related to health promotion, fitness, wellness, health risks, and disease prevention within the scope of physical therapy practice.

**PO8: Leadership skills-** Employ effective leadership skills in the context of supervising, delegating, and mentoring within the profession

### **Program Specific Objectives:**

**PSO1: Problem Solving-** Screen patients/clients to determine if they are candidates for physical therapy services or if a referral to, or consultation with, another health care professional or agency is warranted

**PSO2: Critical Thinking-** Employ critical thinking, self-reflection, and evidence-based practice to make clinical decisions about physical therapy services

**PSO3: Collaboration-** Collaborate with patients/clients, caregivers, and other health care providers to develop and implement an evidence-based plan of care that coordinates human and financial resources

**PSO4: Legal Issues-** Advocate for patient/client and profession

**PSO5: Health Delivery-** Provide consultative services and education to patients/clients, caregivers, health care workers, and the public using culturally sensitive methods that are adapted to the learning needs, content, and context

### Mapping of PEOs with POs and PSOs

PEO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
PEO-1	-	-	1	3	1	2	3	2	1	-	2	-	1
PEO-2	-	3	2	-	1	-	2	1	-	-	2	3	1
PEO-3	1	1	3	2	2	2	-	-	1	2	-	-	2
PEO-4	-	3	1	-	1	-	2	2	2	1	3	1	3
PEO-5	3	1	3	1	2	2	-	-	1	2	-	-	2
PEO-6	1	-	1	1	-	2	3	1	-	1	2	-	2
PEO-7	2	-	2	-	3	2	1	-	3	2	-	-	2
PEO-8	-	-	2	-	2	1	1	-	1	1	3	2	1

## **ORDINANCE AS PER HARYANA STATE COUNCIL OF PHYSIOTHERAPY**

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

- A candidate applying for the degree of B.P.T being eligible for admission to the Physiotherapy College affiliated to UGC recognized University must have passed the Higher Secondary(10+2)or equivalent examination recognized by any Indian University or a duly constituted Board and passed in Physics, Chemistry and Biology and English.  
Or
- Candidates who have studied abroad, have passed the equivalent examination as per the guidelines of the Association of Indian Universities to determine the eligibility, and must have passed in the subjects: Physics, Chemistry, Biology, and English up to 12<sup>th</sup> Standard level.
- Admission to Bachelor of Physiotherapy course shall be made based on 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.
  1. Entrance test, to be conducted by the university as per the syllabus under 10 +2 scheme
  2. Successful candidates based on written test will be called for counselling (s) nominated by the university or the board
  3. During subsequent counselling (s) the seat will be allotted as per the merit of the candidate depending on the availability of seats on that particular day.
  4. Candidate who fails to attend the Medical Examination on the notified dates(s) will forfeit the claim for admission and placement in the waiting list except permitted by the competent authority under special circumstances.
  5. The name of the student(s) who remain(s) absent from classes for more than 15 days at a stretch after joining the said course without giving any notice will be governed as per the respective University rules.
- He/She has attained the age of 17 years as on 31<sup>st</sup> December of concerned year.
- He/she should furnish at the time of submission of application form, a certificate of physical fitness from a registered medical practitioner that the candidate is physically fit to undergo Physiotherapy course.
- A candidate fulfilling above requirements will be provisionally admitted in the First Year of B.P.T Degree Programme, as per the rules of Admission Committee for Professional Medical Educational Courses of Haryana and/or Government of Haryana.

### **DURATION OF COURSE:**

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

**MEDIUM OF INSTRUCTION:**

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

**ADMISSION TO THE PROGRAMME:**

Admission granted by the Central Admission Committee appointed by the State Government to any student shall be provisional till the Enrollment/ Registration/ Enlistment is made by the University, and in case of admission is granted on the basis of provisional eligibility certificate, the condition & instruction given by the University should be complied within the time limit fixed by the University, otherwise term kept and fees paid by such a student will be forfeited and fees will not be refundable in any conditions.

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

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

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

**COMMENCEMENT OF THE COURSE-**

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

Duration of first term – \_\_\_\_\_

Duration of second term– \_\_\_\_\_

**SCHEDULE OF EXAMINATION–**

The scheme of examination for the B.P.T course shall be divided into 4 professional examinations; each examination will be held at the end of each respective Academic year. There will be one internal examination (optional) after completion of 4 months of onset of Academic year. There will be one Internal/Preliminary exam (compulsory) before university exam. Internal evaluation is based on continuous assessment, for 20% of the marks of the subject. There will be University examination through written paper and/or practical examination for 80% of the marks of the subject at the end of every Academic year. University has to conduct supplementary exam for failed students after 4 months and before 6monthsfrom previous exam.

## **ELIGIBILITY CRITERIA TO APPEAR IN UNIVERSITY EXAMINATION**

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

- A candidate is required to attend at least 75% of the total classes conducted in a year in all subjects prescribed for that year (separately), in theory and practical/ clinical to become eligible to appear for the University examination.
- No relaxation, whatsoever, will be permissible to this rule under any ground including in disposition etc.

**Filling of University examination form:** Candidates desirous of appearing for University examination must forward their applications in the prescribed form to the registrar through the Principal of the Institution so nor before the date prescribed for the purpose.

### **STUDENTS'ASSESSMENT:**

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

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

### **COMPULSORY ROTATORY INTERNSHIP**

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

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

### **DRESSCODE:**

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

**MIGRATION/TRANSFER OF CANDIDATES:**

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

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FACULTY OF ALLIED HEALTH SCIENCES														
DEPARTMENT OF PHYSIOTHERAPY														
BPT														
Year-I														
Course Type	Course Code	Title of Course	Periods/Week				Marks			Total (L+P)	Hours	Duration of Exam	Credits	
			L	T	P	Total	Cont. Eval	End Sem Exam	Total					
<b>Compulsory Courses</b>														
Foundation	BPT 101	Anatomy	BPT 101 (T)	3	1	0	8	20	80	100	200	320	3	8
			BPT 101 (P)	0	0	4		20	80	100			—	4
	BPT 102	Physiology	BPT 102 (T)	3	1	0	7	20	80	100	200	280	3	8
			BPT 102 (P)	0	0	3		20	80	100			—	3
	BPT 103	Biochemistry	BPT 103 (T)	2	1	0	3	20	80	100	100	120	3	6
	BPT 106	Environmental studies	BPT 106 (T)	2	0	0	2	100*	—	100	100	50	3	4
Core	BPT 104	Electrotherapy-I	BPT 104 (T)	2	1	0	5	20	80	100	200	200	3	6
			BPT 104 (P)	0	0	2		20	80	100			—	2
	BPT 105	Exercise therapy-I	BPT 105 (T)	2	1	0	5	20	80	100	200	200	3	6
			BPT 105 (P)	0	0	2		20	80	100			—	2
<b>Total</b>						<b>30</b>				<b>1000</b>	<b>1170</b>		<b>49</b>	

\*EVS will be conducted As Internal Examination for 100 Marks

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

(Deemed to be University under section 3 of the UGC Act 1956)

**FACULTY OF ALLIED HEALTH SCIENCES**

**DEPARTMENT OF PHYSIOTHERAPY**

**BPT**

**YEAR-II**

Course Type	Course Code	Title of Course	Periods/Week				Marks			Total Marks (T+P)	Hours	Duration of Exam	Credits	
			L	T	P	Total	Cont. Eval	End Sem Exam	Total					
<b>Audit Pass Course</b>														
Audit Pass Course	BPT-AP-001		Research Innovation Catalyst-I	0	0	1	1	50	-	50	50	40	-	0
<b>Compulsory Courses</b>														
Foundation	BPT 201	BPT 201 (T)	Pathology and Microbiology	2	1	0	3	20	80	100	100	120	3	6
	BPT 202	BPT 202 (T)	Pharmacology	1	1	0	2	20	80	100	100	80	3	4
Core	BPT 203	BPT 203 (T)	Electrotherapy-II	2	1	0	5	20	80	100	200	200	3	6
		BPT 203 (P)		0	0	2		20	80	100		-	2	
	BPT 204	BPT 204 (T)	Exercise Therapy-II	2	1	0	5	20	80	100	200	200	3	6
		BPT 204 (P)		0	0	2		20	80	100		-	2	
	BPT 205	BPT 205 (T)	Biomechanics	1	1	0	4	20	80	100	200	120	3	4
		BPT 205 (P)		0	0	2		20	80	100		-	2	
BPT 206	BPT 206 (T)	Sociology & Psychology	4	1	0	5	20	80	100	100	200	3	10	
Skill enhancement course	BPT 207	BPT 207 (P)	Computer Application	0	0	2	2	20	80	100	100	80	-	2
	BPT 208	BPT 208 (P)	Clinical Training-I*	0	0	10	10 (For 32 weeks)	20	80	100	100	320	-	3
<b>Total</b>							<b>37</b>			<b>1150</b>	<b>1100</b>	<b>1320</b>		<b>47</b>

\* Clinical Training credit is calculated as 135 hrs =1 Credit, for clinical training the student shall be required to put clinical posting /training at Clinics/ Hospitals/ Sports Academy beyond institutional working hours, for which he/she shall be submitting weekly progress report to his/her assigned faculty supervisor.

Note-As per HSCP ordinance, every student will be given two attempts as reappear for passing a course. Thereafter, he/she will have to repeat the whole course irrespective of whether he/she passed in either of theory or practical. As per HSCP ordinance, single code is proposed for both theory and practical. However, since the passing percentage for both theory and practical is 50%, we are suggesting to have a separate code for both theory and practical. For example, BPT 101 code given by HSCP for Anatomy (Th + Pr) can be recoded to BPT 101(T) and BPT 101(P).

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

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**BPT 101(T): ANATOMY (THEORY)**

<b>Periods/week</b>	<b>Credits</b>	<b>Max. Marks: 100</b>
<b>L: 3 T: 1</b>	<b>8</b>	<b>Continuous Evaluation: 20</b>
<b>Duration of Examination: 3 Hrs</b>		<b>End Term Examination: 80</b>

**Pre-requisite:** Nil

**Course Type:** Foundation

**Course Outcomes:**

**Student will be able to**

**BPT 101(T).1 Recall** the cell structure and basic histology.

**BPT 101(T).2 Identify** the planes, structures and functions of various systems of the body.

**BPT 101(T).3 Understand** the attachment, innervation and function of muscles in the body.

**BPT 101(T).4 Classify** the different types of bone and joints in the human body.

**BPT 101(T).5 Describe** anatomical features of various systems, with special reference to Musculoskeletal, Cardiorespiratory, digestive function, & alterations in function with aging

**BPT 101(T).6 Interpret** the clinical aspect of each anatomical structure in the body.

**PART A**

**UNIT 1: GENERAL ANATOMY**

**1.1 INTRODUCTION**

1.1.1 Define anatomy and mention its subdivisions.

1.1.2 Name regions, cavities and systems of the body.

1.1.3 Define anatomical positions and anatomical terms.

**1.2 CELL**

1.2.1 Define a cell.

1.2.2 Mention the shape, size and parts of a cell.

1.2.3 Name and functions of cell organs. Names of cell bodies.

1.2.4 Define chromosomes, genes.

1.2.5 Review mitosis and meiosis, mention the main events, but stages are not necessary.

### **1.3 TISSUES**

1.3.1 Classify tissues.

1.3.2 Classify and mention the microscopic structure, types of tissues such as epithelial, connective, muscular and nervous tissues. Give examples for each type of tissue.

### **1.4 INTRODUCTION TO BONE**

1.4.1 Define the skeleton.

1.4.2 Mention the subdivision of skeleton. Name the bones in each subdivision. Know the number of bone in each subdivision and total number of bones.

1.4.3 Classify the bones and give examples.

1.4.4 Enumerate the common surface feature of bones.

1.4.5 Define ossification. Explain the type of ossification and give examples.

1.4.6 Define ossification center. Explain the growth of long bone in length and width.

When regional anatomy is taught.

- Identify the name and correctly orientate the bone.
- Identify the surface, border and all other surface features.
- Mark and indicate the muscular and ligamentous attachment on the bones.

### **1.5 INTRODUCTION TO JOINTS (Anthology)**

1.5.1 Define a joint or articulation.

1.5.2 Classify the joints and give example for each type of joint. Define each type of joint.

1.5.3 Mention the basic feature of a synovial joint.

1.5.4 Define the axis & movements possible in a synovial joint.

1.5.5 Define the range of movement and limiting factor.

1.5.6 Indicate the blood supply and nerve supply in general.

1.5.7 Define the stability of a joint.

1.5.8 Demonstrate common movements.

When regional anatomy is taught: -

- Mention the type, the articular surface, ligament, movement, axis of movement, chief muscles producing. The movement, limiting factors and nerve supply and blood supply of all individual joints.
- Mention the factors for stability.
- Articulate the bones correctly.
- Indicate applied anatomy for all joints.

## **1.6 INTRODUCTION TO MUSCLES (SKELETAL MUSCLE)**

1.6.1 Define a skeletal muscle.

1.6.2 Define fasciae, tendon aponeurosis.

1.6.3 Classify the skeletal muscles by shapes etc. and give examples.

1.6.4 Define origin, insertion, muscle work (contraction), types of muscle work, range of muscle work, group action- agonist, antagonist, synergist and fixator, shunt and spurt muscle, type of levers with examples.

When the regional anatomy is taught:

- Mention the position, origin, insertion, nerve supply and action of the skeletal muscles. (For the skeletal muscles of soft palate, pharynx and larynx: Position, action & nerve supply may be sufficient).
- Indicate group of muscles by position and action, group action and nerve supply of group of muscles.
- Indicate segment innervation of muscles.
- Predict the result of paralysis of individual and group of muscles.

## **UNIT 2: UPPER EXTREMITY**

### **2.1 Pectoral region:**

2.1.1 Outline the features of the pectoral region.

2.1.2 Name, identify and correctly orientate the sternum , clavicle,

2.1.3 Scapula and humerus

2.1.4 Outline the main features of the bones of shoulder girdle.

2.1.5 Identify the parts, borders and surfaces of sternum mention its other features.

2.1.6 Identify the ends, surfaces, curvatures and other features of clavicle.

2.1.7 Identify the borders, angles, surface, processes, fossa and other features of scapula.

2.1.8 Identify the ends, head, greater and lesser tuberosities and anatomical and surgical necks of humerus: also the capitellum, trochlea and radial, coronoid and olecranon fossa and epicondyles.

2.1.9 Locate and identify the muscles of pectoral region and mention their origin, insertion, nerve supply and action.

### **2.2 Scapular region:**

2.2.1 Comprehend the main features of the muscles in the scapula region.

2.2.2 State the layer, arrangement, of the muscles of the back.

2.2.3 Name and identify the muscles of the scapular region. Mention their origin, insertion nerve supply and action.

2.2.4 Demonstrate the bony landmark of scapula, humerus and clavicle.

### **2.3 Axilla**

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

### **2.4 Shoulder girdle:**

- 2.4.1 Comprehend and apply the function, the main features of joints of the shoulder girdle.
- 2.4.2 Name the joints of shoulder girdle. Identify the articular surfaces and name ligaments and movements of sternoclavicular and acromioclavicular joints.
- 2.4.3 Mention the type of the joints.
- 2.4.4 Demonstrate and name the movement of scapula. Mention the chief muscles producing these movements.
- 2.4.5 Correlate movements of scapula.
- 2.4.6 Assign functional role of the articular disc and sterno clavicular joint and coraco-clavicular ligament.

### **2.5 Shoulder joint:**

- 2.5.1 Mention the type, articular surface and ligaments of the shoulder joint.
- 2.5.2 Define and demonstrate the movements of shoulder joint.
- 2.5.3 Name and identify the chief muscles producing these movements. Analyze these movements and mention limiting factors.
- 2.5.4 Mention the blood supply and nerve supply of this joint.
- 2.5.5 Analyze the associate movement of scapula and movement of the shoulder joint.
- 2.5.6 Mention the limiting factors and factors for its stability indicate applied anatomy.

### **2.6 Upper arm:**

- 2.6.1 Name and identify the muscles at the front and back of upper arm.
- 2.6.2 Name and identify the ends, borders, surfaces and features of the humerus.
- 2.6.3 Identify the head anatomical neck, tuberosities, surgical neck, bicipital groove, condyle, capitulum, trochlea, epicondyles, radial, coronoid and olecranon fossa.
- 2.6.4 Mention the origin, insertion, nerve supply and action of muscles of the front and back of upper arm.
- 2.6.5 Indicate the course, relation and distribution of radial and musculo- cutaneous nerves.

### **2.7 Elbow joint:**

- 2.7.1 Mention the type, articular surface and ligaments of elbow joint.
- 2.7.2 Define and demonstrate the movement possible and name the chief muscles producing this movement.

2.7.3 Mention the factors for stability and limiting factors.

2.7.4 Indicate the applied anatomy.

2.7.5 Mention the applied anatomy.

2.7.6 Explain the carrying angle

## **2.8 Forearm, wrist and hand:**

2.8.1 Mention the bones of forearm; identify the ends, borders, surfaces and features of radius and ulna.

2.8.2 Identify the head, neck, tuberosity and styloid process of radius. Identify the coronoid process, olecranon process, trochlear notch, tuberosity, head and styloid process of ulna. Also about the radial notch of ulna and ulnar notch of radius.

2.8.3 Name and identify the carpal bones, metacarpal bones and phalanges in an articulated hand.

2.8.4 Identify the muscles of front and back of the forearm.

2.8.5 Mention the position, insertion, nerve supply and action of these muscles.

2.8.6 Indicate the course, relations and distribution of median, ulnar and radial nerves.

2.8.7 Mention the type, articular surface and ligaments of radio ulnar joints. Define the movement of supination and pronation. Mention the axis and muscles producing these movements. Analyze these movements and apply its functional role in routine day-to-day actions.

2.8.8 Mention the position and distribution of ulnar and radial arteries and ulnar, median and radial nerves.

2.8.9 Name and locate the carpal bones. Mention the type, articular surface and ligaments of wrist joint.

2.8.10 Define and demonstrate the movements and mention the muscles producing them.

2.8.11 Mention the blood supply and nerve supply.

2.8.12 Mention the visible tendons around the wrist and their synovial sheaths.

2.8.13 Predict the result of paralysis of muscles of the forearm.

2.8.14 Mention the functional implication of prehension in the structure of hand.

2.8.15 Indicate the arrangement of tendons of the digits, retinacula, fibrous flexor sheaths, and synovial sheaths.

2.8.16 Evaluate the hinge type of interphalangeal joints, ellipsoid type of metacarpophalangeal joints and saddle type of carpometacarpal joint. Name and identify the small muscles of the hand. Mention their position, origin, insertion, nerve supply and action.

2.8.17 Mention the types of bones forming and ligaments of the joints of the hand. Define the movements and the muscles producing these movements. Predict the results of paralysis of the small muscles of hand.

2.8.18 Demonstrate the type of grip.

## **2.9 Nerves of upper limb.**

- 2.9.1 Comprehend and apply the knowledge of the position and distribution of blood vessels and lymph nodes.
- 2.9.2 Mention the root value of the nerves.
- 2.9.3 Identify the nerves and mentions the position, course, relations and distribution of nerves of upper limb.
- 2.9.4 Predict the result of injury to these nerves.

## **2.10 Blood vessels of upper limb:**

- 2.10.1 Comprehend and apply the knowledge of the position and distribution of blood vessels and lymph nodes.
- 2.10.2 Trace the main arteries and veins.
- 2.10.3 Indicate their position' and name the main branches of tributaries.
- 2.10.4 Name and locate the lymph nodes.

## **2.11 Cutaneous nerves of upper limb:**

- 2.11.1 Name the cutaneous nerves and illustrate the areas of their distribution.
- 2.11.2 Illustrate the dermatome.

## **UNIT 3: LOWER EXTREMITY**

### **3.1 Introduction**

- 3.1.1 Name, identification and orientation of hipbone, femur, tibia, fibula and patella.
- 3.1.2 Identify the component and features of hipbones identify the ends, borders, surfaces, head, neck, trochanters, condyles and epicondyles of femur and the features of the tibia and fibula.
- 3.1.3 Identify and mention the origin, insertion, nerve supply and action of the muscles in the front of thigh.
- 3.1.4 Mention the boundaries and contents of femoral triangle and subsartorial canal.
- 3.1.5 Indicate the position, course and distribution of femoral nerve.
- 3.1.6 Indicate the course and main branches of femoral artery and mention the blood supply of neck of femur.
- 3.1.7 Indicate the position of femoral vein.

### **3.2 Medial side of thigh:**

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

### **3.3 Back of thigh:**

**3.3.1** Identify and mention the position, origin, insertion, nerve supply and action of the hamstring muscles.

**3.3.2** Indicate the position, course, relation and distribution of sciatic nerve.

### **3.4 Gluteal region:**

3.4.1 Identify and mention the position, origin, insertion, nerve supply and action of the muscles.

3.4.2 Name and mention the position and course of the nerves found there and name the arteries there.

### **3.5 Hip joint:**

3.5.1 Mention the type, articular surface and ligaments.

3.5.2 Define the movements and name the chief muscles producing the movements.

3.5.3 Mention the blood supply, nerve supply, factor for stability and limiting factors.

3.5.4 Applied anatomy.

### **3.6 Knee joint:**

3.6.1 Mention the type, articular, surfaces and ligaments.

3.6.2 Define the movements and name the chief muscles for the movements.

3.6.3 Analyze the movements.

3.6.4 Know the blood supply and nerve supply.

3.6.5 Indicate applied anatomy.

3.6.6 Define locking and unlocking of the joint.

### **3.7 Popliteal fossa:**

3.7.1 Indicate the boundaries and contents.

3.7.2 Mention the position and branches of tibial and common peroneal nerves.

### **3.8 Front of leg and dorsum of foot:**

3.8.1 Name and identify the tarsal bones, metatarsal bones and phalanges in an articulated foot.

3.8.2 Name and identify the muscles.

3.8.3 Mention the positions, origin, insertion, nerve supply and action of the muscles.

3.8.4 Position and distribution of deep peroneal nerve.

3.8.5 Indicate the position and attachment of extensor retinacula.

3.8.6 Mention and identify the feature of the tibia and fibula.

### **3.9 Lateral side of leg**

- 3.9.1. Name and identify the muscles.
- 3.9.2 Mention the position, origin, insertion, nerve supply and action of muscles.
- 3.9.3 State the position, course and distribution of superficial peroneal nerve.
- 3.9.4 State the position and attachment of peroneal retinacula.

### **3.10 Back of leg and sole of foot.**

- 3.10.1 Name and identify the features of the bones of the foot.
- 3.10.2 Name and identify the muscles of back of leg.
- 3.10.3 Mention the position, arrangement, origin, insertion, nerve supply and action of the muscles.
- 3.10.4 State the position course and distribution of tibial artery.
- 3.10.5 State the position course and distribution of posterior tibial artery.
- 3.10.6 Mention the position, and attachment of flexor retinaculum.
- 3.10.7 Mention the arrangement, origin, insertion, nerve supply and action of muscles of the foot.
- 3.10.8 Indicate the type of formation and factors for the maintenance of the arch of foot.
- 3.10.9 Mention the type, articular surface, ligaments, movements chief muscles for the movement.  
Axis of movements and applied anatomy of tibiofibular joints, ankle joints, subtalar joints, M.P. joints, I.P. joints.
- 3.10.10 Palpate and identify the tendons around the ankle and dorsum of foot.

### **3.11 Nerves:**

- 3.11.1 indicate the position, formation and branches of lumbar and sacral plexuses.
- 3.11.2 Mention the root value of the nerves.
- 3.11.3 Mention the position, course, relation and distribution of nerves.
- 3.11.4 Predict the result of injury to the nerves.
- 3.11.5 Illustrate cutaneous innervation of dermatomes.

### **3.12 Blood vessels:**

- 3.12.1 Indicate the position of arteries and their main branches.
- 3.12.2 Indicate the position of veins and their main tributaries.
- 3.12.3 Indicate the position of lymph nodes.

## **PART B**

### **UNIT 4: CARDIO-VASCULAR & RESPIRATORY SYSTEM**

#### **4.1 HEART**

- 4.1.1 Comprehend the external and internal features of heart and their implications.
- 4.1.2 Mention position of heart.
- 4.1.3 Identify and name the chamber of the heart, surface and border of the heart.
- 4.1.4 Identify the venae cavae, pulmonary trunk and aorta.
- 4.1.5 Mention the internal features of the chambers of the heart.
- 4.1.6 State the basic features of the blood supply & nerve supply of the heart.
- 4.1.7 State the basic arrangement of the pericardium.
- 4.1.8 Identify the coronary artery and coronary sinus.
- 4.1.9 Name the parts of the conductive system of heart.
- 4.1.10 Mention the position and general distribution of major arteries and major veins, and name their main branches.
- 4.1.11 Name the types of arteries and veins; give examples and indicate a basic microscopic structure of type of blood vessels.

#### **4.2 LYMPHATIC SYSTEM**

- 4.2.1 Comprehend the general and regional arrangements of the lymphatic system.
- 4.2.2 Name the lymphatic organ and mention their location.
- 4.2.3 Illustrate the basic structural features of lymphatic vessels, lymph nodes, thymus, spleen and tonsils.
- 4.2.4 Assign functional role to the lymphatic system.
- 4.2.5 State the position and immediate relations of spleen.

#### **4.3 RESPIRATORY SYSTEM**

- 4.3.1 List the parts of the respiratory system.
- 4.3.2 Comprehend the functional anatomy of the parts of the respiratory system.
- 4.3.3 Mention the basic features of innervation of bronchi and lungs.
- 4.3.4 State the position, extent, and gross and microscopic structure of the parietal pleura.
- 4.3.5 Comprehend the arrangement of pleura, mention the parts, and position of the parietal pleura.
- 4.3.6 Name the recesses of pleura.
- 4.3.7 Identify the trachea and bronchi.
- 4.3.8 Identify the right lung and left lung.
- 4.3.9 Name the components of the hilum of lung.
- 4.3.10 Name the broncho pulmonary segments.
- 4.3.11 Illustrate the main features of the microscopic structure of lung.
- 4.3.12 Identify the borders and surfaces of the lung on the specimen.

## **UNIT 5: ADDITIONAL BODY SYSTEMS**

### **5.1 DIGESTIVE SYSTEM**

- 5.1.1 List the parts of the digestive system.
- 5.1.2 Mention the boundaries and features of the mouth.
- 5.1.3 Classify teeth.
- 5.1.4 Mention, position, extent, subdivision, communications, internal features and muscles of pharynx.
- 5.1.5 Name the tonsils and define fauces.
- 5.1.6 Identify internal features of the mouth and pharynx of the specimen.
- 5.1.7 State the position, course and extent of esophagus.
- 5.1.8 Identify esophagus of the specimen.
- 5.1.9 State the basic nerve supply.

### **5.2 STOMACH**

- 5.2.1 Mention the position and gross structure of the stomach.
- 5.2.2 Identify the stomach and its borders, surfaces and subdivisions.
- 5.2.3 Enumerate the immediate relations of the stomach.
- 5.2.4 State the basic nerve supply of the stomach.

### **5.3 INTESTINE**

- 5.3.1 Name the subdivision of the intestine and mention their positions.
- 5.3.2 Mention the difference between small and large intestine.
- 5.3.3 Name the arteries arising from the abdominal aorta. Name the organs supplied by these branches.
- 5.3.4 Awareness of the name and position of the principal autonomic visceral nerve plexus in the abdomen and pelvis and the organs supplied by them.

### **5.6 LIVER**

- 5.6.1 Mention the position and gross features of the liver and biliary system.

### **5.7 PANCREAS**

- 5.7.1 Name the position and subdivision of the pancreas.
- 5.7.2 Name the major salivary gland.
- 5.7.3 Indicate their positions.
- 5.7.4 Mention the site of opening of their ducts.

## **5.8 GENITO-URINARYSYSTEM (Details are not required)**

- 5.8.1 Comprehend the basic functional implication and the basic structure of the kidney and ureter.
- 5.8.2 Mention the position, size and shape of kidney,
- 5.8.3 Name the immediate relations of the kidney.
- 5.8.4 Indicate the cortex, medulla, pyramids, sinus, calyces, and pelvis of ureter in a macro section of the kidney.
- 5.8.5 Illustrate the structure of a nephron.
- 5.8.6 Identify the ureter and indicate the position of the ureter.
- 5.8.7 State the anatomy of the bladder and urethra.
- Mention the position, shape and size and surface of the bladder.
  - Indicate the immediate relations of the bladder and position,
  - Mention the basic innervation of the bladder.
  - Name and identify the subdivisions of the male urethra.
  - Mention the position, extent and immediate relations of male urethra.
  - Locate and identify the female urethra.
  - Mention extent and immediate relations of the female urethra.
  - Name the sphincters of the urethra.

## **5.8 Male Reproductive System**

- 5.8.1 List and locate the parts of the male reproductive system, state the anatomy and functional considerations of the testis, male accessory organs of reproduction and external organs.
- 5.8.2 Name the constitute structures of the spermatic cord.
- 5.8.3 Mention the position of the inguinal canal.
- 5.8.4 Name the component structures and parts of the penis.

## **5.9 Female Reproductive System**

- 5.9.1 List and locate the parts of female reproductive system, state the anatomy and functional considerations of ovary, uterine tubes, uterus, vagina and female external genitalia.
- 5.9.2 Mention the basic feature of parts of the female external genitalia.
- 5.9.3 Enumerate the factors responsible for the maintenance of the position of the uterus and anatomy of its prolepses.
- 5.9.4 Mention the position, extent and gross structure of the female breast.
- 5.9.5 Name the common, internal and external iliac arteries.

## **5.10 ENDOCRINE SYSTEM**

- 5.10.1 List the endocrine organs and mention their position.
- 5.10.2 Mention the hormones produced by each endocrine organ.

## **5.11 TRUNK- THORAX-ABDOMEN**

### **5.11.1 Vertebral column:**

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

### **5.11.2 THORAX:**

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

### **5.11.3 Abdomen:**

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

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

#### **5.11.4 PELVIS**

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

#### **5.11.5 EYE/EYE/NOSE:**

##### **EYE**

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

**NOSE:**

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

**EAR:**

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

**5.11.6 TEMPOROMANDIBULAR JOINT.**

- State the type, articular surface, ligaments, possible movements, muscles performing the movements and nerve supply of the Temporomandibular joint.
- Palpate and identify the joint and its articular surfaces.
- Identify and name the muscles of mastication. Mention their action and nerve supply.

**5.11.7 MOUTH**

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

**5.11. 8 PHARYNX:**

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

**5.11.9 LARYNX AND TRACHEA:**

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

## **UNIT 6: NERVOUS SYSTEM & HEAD AND NECK**

### **6.1 NERVOUS SYSTEM**

- 6.1.1 Define the subdivisions of the nervous system, define central, peripheral and autonomic nervous systems and name their subdivisions:- Comprehend the position and form of the spinal cord, its structure and function interims of neuronal connections.
- 6.1.2 Indicate the position and extent of the spinal cord.
- 6.1.3 Illustrate the principal features shown in a transverse section of the spinal cord.
- 6.1.4 Specify the basic features of mono and multi synaptic spinal reflex pathway.
- 6.1.5 Illustrate the white and gray matter, and anterior, lateral and posterior columns of the spinal cord.
- 6.1.6 Mention the origin, termination and position of important ascending and descending tracts, site of crossing of fiber of these tracts and functions of each tract.
- 6.1.7 State the main consequences of spinal cord transaction and hemi section, and explain the rationale of cordotomy.
- 6.1.8 Indicate the blood supply and meninges of spinal cord.

### **6.2 BRAIN AND ITS PARTS**

- 6.2.1 Name the subdivisions of the brain, identify and mention the external features of parts of the brain.
- 6.2.2 Mention the internal structure and basic features of parts of the brainstem, and name the nuclei and fiber tract with special emphasis of cranial nerve nuclei,
- 6.2.3 Identify and mention parts of the cerebellum.
- 6.2.4 Mention the external features and internal structure of the cerebellum and name its various afferent and efferent tracts and their termination.
- 6.2.5 Mention the features of the gross component of the cerebrum.
- 6.2.6 Mention & identify the location of gyri, sulci and cortical area.
- 6.2.7 State and identify – association, commissural and projection fibers.
- 6.2.8 Define and identify component of forebrain, including cerebral cortex, insula, olfactory bulb, olfactory tract, uncus, fornix, basal ganglia, thalamus, hypothalamus, internal capsule, corpus callosum etc.
- 6.2.9 Predict the result of damage to internal capsule.
- 6.2.10 Outline sensory and motor pathway and be able to trace these pathways
- 6.2.11 Name sensory and motor nerve endings with function.
- 6.2.12 Define pyramidal motor system and name its tracts
- 6.2.13 Define upper and lower motor neurons,

6.2.14 Name the parts and tracts of the extra pyramidal system and indicate the functions.

### **6.3 SENSORY ORGANS**

6.3.1 Outline the basic of structure of sensory organs: - Nose, tongue, eye, ear and skin.

### **6.4 MUSCLE TONE**

6.4.1 Briefly outline the nature and basis of muscle tone.

### **6.5 VENTRICLES**

6.5.1 Mention the anatomical pathway involved in the production and maintenance of muscle tone.

6.5.2 State the formation, circulation and drainage of CSF.

6.5.3 Locate & identify the ventricles.

6.5.4 Identify and name the meninges and space around and locate the cistern. .

6.5.5 Define lumbar puncture and cistern puncture.

6.5.6 State the features of the meninges.

6.5.7 Recognize the difference between extra dural, sub dural, subarachnoid hemorrhage.

### **6.6 SPINAL CORD**

6.6.1 Outline the arrangement of major blood vessels around the brain a spinal cord.

6.6.2 Mention the arteries forming the circle of Willis.

6.6.3 Name the branches of major arteries supplying the brain and spinal cord and mention the parts of brain they supply.

6.6.4 Predict the result of blockage or rupture of central deep branches.

6.6.5 Predict the result of occlusion of cerebral arteries.

6.6.6 Predict the result of occlusion of vertebral or basilar arteries.

6.6.7 Identify and mention the connection of dural venous sinuses.

6.6.8 Name and identify the parts of the limbic system and mention their function in emotion and behavior.

6.6.9 Anatomy of spinal cord review.

6.6.10 Name the group of spinal nerves.

6.6.11 Explain the formation and branches of the spinal nerves and distribution of anterior and posterior rami.

6.6.12 Locate & name the plexuses of nerves.

6.6.13 Indicate the course and distribution of branches of the plexuses & nerves.

### **6.7 AUTONOMIC NERVOUS SYSTEM**

6.7.1 Mention the position and structure of the autonomic nervous system.

6.7.2 Mention the site of origin and termination of the preganglionic and postganglionic sympathetic and parasympathetic fibers.

6.7.3 Name and locate the sympathetic and parasympathetic ganglia.

6.7.4 Summarize the functional difference between the sympathetic and parasympathetic system.

6.7.5 State the basic organization of the autonomic nervous system.

- State the sites of craniosacral and thoracolumbar outflow
- Define the mode of the distribution of pre and post. Ganglionic efferent neurons in sympathetic and parasympathetic nervous system.
- Name the cranial nerves containing para sympathetic system in relation to their function.
- Distinguish between sympathetic & parasympathetic system in relation to their function.

### **6.8 CRANIAL NERVES:**

6.8.1 Enumerate the cranial nerves in serial order.

6.8.2 Relate interpret the number to the name.

6.8.3 Indicate the nuclei of origin and of termination.

6.8.4 Mention the attachments of the cranial nerves in and at cranial exit.

6.8.5 State the sensory and motor distribution.

6.8.6 State the position and course of VII nerve.

6.8.7 Predict the sequel of lesion

- Enumerate the cranial nerves in serial order.
- Mention the nuclei of origin & termination and indicate the site of attachment to brain and brain stem.
- Explain the general distribution of the cranial nerves and the course of the VIIth nerve.
- Predict the result of injury to cranial nerves.

### **6.9 TRIANGLES OF NECK**

6.9.1 Musculo skeletal and neurovascular features:

- Identify the anterior and posterior triangles of neck. Name the subdivision. List the contents.
- State the main features of the skull and facial skeleton.
- Identify the large skull bones and their parts.
- Identify the cranial fossae and hypophyseal fossa.

6.9.2 Identify the internal and external auditory meatus, foramen magnum and stylo mastoid foramen and name the main structures passing through them.

6.9.3 Identify the name the main muscles of the face. Mention their nerve supply and action.

6.9.4 Predict the result of paralysis to the facial muscles and sequel of injury to the facial nerve.

6.9.5 Map the cutaneous distribution of the three divisions of the trigeminal nerve on the face.

## **6.10 CERVICAL VERTEBRAS**

- 6.10.1 Identify the general feature of a typical cervical vertebra, atlas, axis and seventh cervical vertebra.
- 6.10.2 Identify the erector spinae, sternomastoid and scalene muscles, geriohyoid. Mention their attachments, actions and nerve supply.
- 6.10.3 Identify the phrenic, accessory and vagus nerves. Mention their distribution.
- 6.10.4 Identify the state the position distribution and root value of the nerves, of cervical and brachial plexuses.
- 6.10.5 Demonstrate the action of sternomastoid.
- 6.10.6 Mention the type, articular surfaces, ligaments, movements and muscles producing these movements, at the atlantooccipital and atlanto- axial joints. Demonstrate these movements and the movements of the cervical part of vertebral column.

## **6.11 CIRCULATION OF HEAD, NECK**

- 6.11.1 Identify the sub clavian, vertebral and carotid arteries. Mentions the position and extent of these arteries.
- 6.11.2 Identify the components of the circle of willis, Mention the distribution of internal and external carotid and vertebral arteries. Predict the sequence of occlusion of these arteries.
- 6.11.3 Identify the internal jugular and subclavian veins. Mention their position, formation and termination.

### **Assessment Tools:**

- Assignment/Tutorials
- Sessional tests
- Preliminary Examination
- End Term Examination

### **Parameter of Continuous Evaluation:**

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

**Recommended/ Reference Books:**

1. Snell R.S. 2007. Clinical Anatomy by Regions. 9<sup>th</sup> edition. Wolter Klower Publication
2. Singh Inderbir. Text book of anatomy with colour atlas. 5<sup>th</sup> Edition. Jaypee Publication
3. Romanes G.J. 1986. Cunningham's Manual of Practical Anatomy-Vol-1, 2, 3. 15<sup>th</sup> Edition. Oxford Medical Publication.
4. Abrahams P.H., Mark's Jr S.C. and Hutchings R.T. 2002. McMinn's colour atlas of human anatomy. 8<sup>th</sup> Edition. Mosby Publication.
5. Drake R.L., Vogl A.W. and Mitchell A.W.M. 2014. Gray's Anatomy for Students. 3<sup>rd</sup> edition. Elsevier publication, Churchill Livingstone.
6. McDonald S.W. 1990. McMinn's Last's Anatomy-Regional & Applied. 8<sup>th</sup> edition. London: Churchill Livingstone.
- 7.

**COURSE ARTICULATION MATRIX:**

PO-CO Statement (BPT101(T))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT101(T).1	3	3	3	1	--	1	2	3	3	2	--	2	3
BPT 101(T).2	--	3	3	1	2	1	2	3	3	--	---	2	3
BPT101(T).3	1	2	3	1	2	1	2	3	3	2	3	---	3
BPT101(T).4	---	2	2	1	3	1	2	3	3	3	2	3	3
BPT 101(T).5	1	3	2	1	3	1	2	3	3	3	2	2	3
BPT 101(T).6	1	3	2	1	3	---	---	3	3	3	1	3	3

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

(Deemed to be University under section 3 of the UGC Act, 1956)

**BPT 101(P): ANATOMY (PRACTICAL)**

<b>Periods/week</b>	<b>Credits</b>	<b>Max. Marks: 100</b>
<b>P: 4</b>	<b>4</b>	<b>Continuous Evaluation: 20</b>
<b>Duration of Examination: 3 Hrs</b>		<b>End Term Examination: 80</b>

**Pre-requisite:** Nil

**Course Type:** Foundation

**Course Outcomes:**

**Student will be able to**

**BPT 101(P).1. Recall** the structure of bones, types of bone, type of human skeleton system, name of bones.

**BPT 101(P).2. Identify and localize the** structures, surface landmarks and features of all the bones and joints of upper extremities, lower extremities and trunk and thorax.

**BPT 101(P).3. Understand** the attachment, nerve supply and action of each muscle in upper extremities, lower extremities and trunk and thorax and understand and analyze movements.

**BPT 101(P).4. Ability** to know about the organization of Nervous system including Central Nervous System cranial nerve, peripheral nerve.

**BPT 101(P).5. Describe and recognize** anatomical features of various systems and organs.

**BPT 101(P).6. Understand and interpret** the clinical aspect of each anatomical structure related to various systems in the body including special senses.

**PART A**

**UNIT 1: GENERAL ANATOMY**

**1.1 INTRODUCTION**

1.1.1 Demonstrate anatomical positions and anatomical terms..

1.1.2 Name regions, cavities and systems of the body.

1.1.3 Classify tissues and View of all the tissues under microscope (epithelial, connective, muscular and nervous tissues).

1.1.4 Demonstrate various types of bones in human skeleton system.

1.1.5 Demonstrate the parts of bone (macroscopic structure).

1.1.6 Enumerate the common identifying feature of bones.

- 1.1.7. Identify the name and demonstrating the bones in anatomical position.
- 1.1.8. Identify the surface, border and all other surface features. Mark and indicate the muscular and ligamentous attachment on the bones.

## **1.2 INTRODUCTION TO JOINTS (Anthology)**

- 1.2.1 Identifying various types of joints with example.
- 1.2.2 Demonstrate the axis & movements possible in a synovial joint.
- 1.2.3 Demonstrate the range of movement and limiting factor.
- 1.2.4 Demonstrate common movements.

## **1.3 INTRODUCTION TO MUSCLES (SKELETAL MUSCLE)**

- 1.3.1 Mention the position, origin, insertion, nerve supply and action of the skeletal muscles. (for the skeletal muscles of soft palate, pharynx and larynx: Position, action & nerve supply may be sufficient).
- 1.3.2 Indicate group of muscles by position and action, group action and nerve supply of group of muscles.
- 1.3.3 Indicate segment innervation of muscles.
- 1.3.4 Predict the result of paralysis of individual and group of muscles.

## **UNIT 2: UPPER EXTREMITY**

### **2.1 Pectoral region:**

- 2.1.1. Outline the features of the pectoral region.
- 2.1.2. Name, identify and correctly orientate the sternum , clavicle,
- 2.1.3. Scapula and humerus
- 2.1.4. Identify the parts, borders and surfaces of sternum mention its other features.
- 2.1.5. Identify the ends, surfaces, curvatures and other features of clavicle.
- 2.1.6. Identify the ends, surfaces, curvatures and other features of radius and ulna.
- 2.1.7. Locate and identify the muscles of pectoral region and mention their origin, insertion, nerve supply and action.

### **2.2 Scapular region:**

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

### **2.3 Shoulder girdle:**

- 2.3.1 Comprehend and apply the function, the main features of joints of the shoulder girdle.
- 2.3.2 Name the joints of shoulder girdle. Identify the articular surfaces and name ligaments and movements of sternoclavicular and acromioclavicular joints.
- 2.3.3 Mention the type of the joints.
- 2.3.4 Demonstrate and name the movement of scapula. Mention the chief muscles producing these movements.
- 2.3.5 Correlate movements of scapula.
- 2.3.6 Assign functional role of the articular disc and sterno-clavicular joint and coraco-clavicular ligament.
- 2.3.7 Indicate the course, relation and distribution of radial and musculo-cutaneous nerves.

### **2.4 Elbow joint:**

- 2.4.1. Mention the type, articular surface and ligaments of elbow joint.
- 2.4.2. Define and demonstrate the movement possible and name the chief muscles producing this movement.
- 2.4.3. Mention the factors for stability and limiting factors.
- 2.4.4. Explain the carrying angle

### **2.5 Forearm, wrist and hand:**

- 2.5.1. Mention the bones of forearm, identify the ends, borders, surfaces and features of radius and ulna.
- 2.5.2. Identify the head, neck, tuberosity and styloid process of radius. Identify the coronoid process, olecranon process, trochlear notch, tuberosity, head and styloid process of ulna. Also about the radial notch of ulna and ulnar notch of radius.
- 2.5.3. Name and identify the carpal bones, metacarpal bones and phalanges in an articulated hand.
- 2.5.4. Identify the muscles of front and back of the forearm.
- 2.5.5. Mention the position, insertion, nerve supply and action of these muscles.
- 2.5.6. Indicate the course, relations and distribution of median, ulnar and radial nerves.
- 2.5.7. Mention the type, articular surface and ligaments of radio ulnar joints. Define the movement of supination and pronation. Mention the axis and muscles producing these movements. Analyze these movements and apply its functional role in routine day to day actions.
- 2.5.8. Mention the position and distribution of ulnar and radial arteries and lunar, median and radial nerves.
- 2.5.9. Define and demonstrate the movements and mention the muscles producing them.
- 2.5.10. Mention the blood supply and nerve supply.
- 2.5.11. Mention the functional implication of prehension in the structure of hand.

2.5.12. Evaluate the hinge type of interphalangeal joints, ellipsoid type of metacarpophalangeal joints and saddle type of carpometacarpal joint. Name and identify the small muscles of the hand. Mention their position, origin, insertion, nerve supply and action.

2.5.13. Demonstrate the type of grip.

### **UNIT 3: LOWER EXTREMITY**

#### **3.1 Introduction**

3.1.1. Name, identification and orientation of hip bone, femur, tibia, fibula and patella.

3.1.2. Identify the component and features of hip bones identify the ends, borders, surfaces, head, neck, trochanters, condyles and epicondyles of femur and the features of the tibia and fibula.

3.1.3. Identify and mention the origin, insertion, nerve supply and action of the muscles in the front of thigh.

3.1.4. Mention the boundaries and contents of femoral triangle and subsartorial canal.

3.1.5. Indicate the position, course and distribution of femoral nerve.

3.1.6. Indicate the course and main branches of femoral artery and mention the blood supply of neck of femur.

3.1.7. Indicate the position of femoral vein.

#### **3.2 Medial side of thigh:**

3.2.1 Name and identify the muscles of the medial side of thigh. Mention their origin, insertion, nerve supply and action.

3.2.2 Indicate the course, relations and distribution of obturator nerve.

#### **3.3 Back of thigh:**

3.3.1 Identify and mention the position, origin, insertion, nerve supply and action of the hamstring muscles.

3.3.2 Indicate the position, course, relation and distribution of sciatic nerve.

#### **3.4 Gluteal region:**

3.4.1 Identify and mention the position, origin, insertion, nerve supply and action of the muscles.

3.4.2 Name and mention the position and course of the nerves found there and name the arteries there.

#### **3.5 Hip joint:**

3.5.1 Mention the type, articular surface and ligaments.

3.5.2 Define the movements and name the chief muscles producing the movements.

3.5.3 Mention the blood supply, nerve supply, factor for stability and limiting factors.

3.5.4 Applied anatomy.

### **3.6 Knee joint:**

- 3.6.1 Mention the type, articular, surfaces and ligaments.
- 3.6.2 Define the movements and name the chief muscles for the movements.
- 3.6.3 Analyze the movements.
- 3.6.4 Know the blood supply and nerve supply.
- 3.6.5 Indicate applied anatomy.
- 3.6.6 Define locking and unlocking of the joint.

### **3.7 Popliteal fossa:**

- 3.7.1 Indicate the boundaries and contents.
- 3.7.2 Mention the position and branches of tibial and common peroneal nerves.

### **3.8 Front of leg and dorsum of foot:**

- 3.8.1 Name and identify the tarsal bones, metatarsal bones and phalanges in an articulated foot.
- 3.8.2 Name and identify the muscles.
- 3.8.3 Mention the positions, origin, insertion, nerve supply and action of the muscles.
- 3.8.4 Position and distribution of deep peroneal nerve.
- 3.8.5 Indicate the position and attachment of extensor retinacula.
- 3.8.6 Mention and identify the feature of the tibia and fibula.

### **3.9 Lateral side of leg**

- 3.9.1. Name and identify the muscles.
- 3.9.2. Mention the position, origin, insertion, never supply and action of muscles.
- 3.9.3. State the position, course and distribution of superficial peroneal nerve.
- 3.9.4. State the position and attachment of peroneal retinacula.

### **3.10 Back of leg and sole of foot.**

- 3.10.1 Name and identify the features of the bones of the foot.
- 3.10.2 Name and identify the muscles of back of leg.
- 3.10.3 Mention the position, arrangement, origin, insertion, nerve supply and action of the muscles.
- 3.10.4 State the position course and distribution of tibial artery.
- 3.10.5 State the position course and distribution of posterior tibial artery.
- 3.10.6 Mention the position, and attachment of flexor retinaculum.
- 3.10.7 Mention the arrangement, origin, insertion, nerve supply and action of muscles of the foot.
- 3.10.8 Indicate the type of formation and factors for the maintenance of the arch of foot.

- 3.10.9 Mention the type, articular surface, ligaments, movements chief muscles for the movement.  
Axis of movements and applied anatomy of tibiofibular joints, ankle joints, subtalarjoints, M.P. joints, I.P. joints.
- 3.10.10 Palpate and identify the tendons around the ankle and dorsum of foot.

## **PART B**

### **UNIT 4: CARDIO-VASCULAR & RESPIRATORY SYSTEM**

#### **4.1 HEART**

- 4.1.1 Comprehend the external and' internal features of heart and their implications.
- 4.1.2 Mention position of heart.
- 4.1.3 Identify and name the chamber of the heart, surface and border of the heart.
- 4.1.4 Demonstration of site of palpation of heart beat.
- 4.1.5 Surface landmarks for the large vessels of body

#### **4.2 LYMPHATIC SYSTEM**

- 4.2.1 Illustrate the basic structural features of lymphatic vessels, lymph nodes, thymus, spleen and tonsils.
- 4.2.2 Assign functional role to the lymphatic system.
- 4.2.3 State the position and immediate relations of spleen.

#### **4.4 RESPIRATORY SYSTEM**

- 4.4.1 List the parts of the respiratory system.
- 4.4.2 Comprehend the functional anatomy of the parts of the respiratory system.
- 4.4.3 Mention the basic features of innervation of bronchi and lungs.
- 4.4.4 State the position, extent, and gross and microscopic structure of the parietal pleura.
- 4.4.5 Identify the trachea and bronchi.
- 4.4.6 Identify the right lung and left lung.
- 4.4.7 Name the components of the hilum of lung.
- 4.4.8 Identify the borders and surfaces of the lung on the specimen.

### **UNIT 5: ADDITIONAL BODY SYSTEMS**

#### **5.1 DIGESTIVE SYSTEM** (NB: details are not required)

- 5.1.1 Illustrate the abdominal quadrants.
- 5.1.2 Mention the boundaries and features of the mouth.
- 5.1.3 State the position, course and extent of esophagus.

## **5.2 STOMACH**

5.2.1 Surface marking of the stomach

## **5.3 INTESTINE**

5.3.1 Name the subdivision of the intestine and mention their positions.

5.3.2 Mention the difference between small and large intestine.

## **5.4 LIVER**

5.4.1 Mention the position and gross features of the liver and biliary system.

## **5.5 GENITO-URINARYSYSTEM (Details are not required)**

5.8.1 Identify the muscles of pelvic floor.

5.8.2 Demonstrate the origin, insertion, action and nerve supply of pelvic floor muscles

## **5.6 TRUNK- THORAX-ABDOMEN**

### **5.6.1 Vertebral column:**

- Identify the parts of typical vertebra, identify and state the main features of typical vertebra of each group of vertebra Identify a typical vertebrae.
- State the form, structure and movements of joints of vertebral column. Mention the movements and the muscles producing them.
- Name and identify the curvatures of the vertebral column and indicate deformities.
- State the contents of vertebral canal.

### **5.6.2 THORAX:**

- State the main features of the bones and joints of thoracic cage. Mention the boundaries.
- State the parts and features of sternum.
- Define true, false and floating ribs. Mention the parts of features of typical ribs. Know the main features of typical ribs.
- Mention the type and formation the joint between rib and vertebra, between costal cartilage and sternum and between costal cartilages.
- Analyze pump-handle and bucket handle movement of ribs.
- Palpate bony land marks such as jugular notch, sternal angle, xiphisternum and spine of thoracic vertebral.
- Name the structures passing through the diaphragm and mention the orifices in the diaphragm.
- Define the boundaries, and subdivisions of the mediastinum and list the contents. Identify the contents.

### **5.6.3 Abdomen:**

- Mention the main features of lumbar vertebra, sacrum and coccyx.
- Mention the formation and subdivisions of bony pelvis list the features of the female bony pelvis and their role.
- Mention the type, articular surface, ligaments and movements of the joints of pelvis.
- List the layers of anterior abdominal wall. Name and mention the origin, insertion, nerve supply and action of the muscles and the features of these muscles.
- Define inguinal canal and know its position, extent, formation and contents. Indicate its clinical importance. Define inguinal hernia.
- Name and identify the muscles of posterior abdominal wall. Give their origin, insertion, and action. List the organ on the posterior abdominal wall. Name the blood vessels on the posterior wall.
- State the anatomy of lumbar region. Understand the disposition of muscles of the layers. Mention the arrangement of lumbar fascia, identify the muscles in lumbar region. Understand the lumbar routes to abdomen. Identify and mention the attachment and action of the large muscles of back. (At least ones ending capitals)

### **5.6.4 PELVIS**

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

### **5.6.5 EYE/EYE/NOSE:**

#### **EYE**

- State the position of the lacrimal apparatus, the functional, implication of structure of the eye and the lacrimal apparatus.
- Has a basic understanding of the light and accommodation reflex (omitting pathway)
- Mention the distribution of the three divisions of trigeminal nerve.
- Name and state the nerve supply and simple actions of the extra ocular muscles.
- Predict the result of lesions of 3rd,4th and 6<sup>th</sup> cranial nerves.

#### **NOSE:**

- Name the bony component of the nose.
- Mention the parts and boundaries of the nose.

**EAR:**

- State the basic structure of the organs of hearing and equilibrium.
- Mention the three subdivisions of the ear.
- Demonstrate the mechanism for hearing and equilibrium.

**5.6.6 TEMPOROMANDIBULAR JOINT.**

- State the type, articular surface, ligaments, possible movements, muscles performing the movements and nerve supply of the Temporomandibular joint.
- Palpate and identify the joint and its articular surfaces.
- Identify and name the muscles of mastication. Mention their action and nerve supply.

**5.6.6 LARYNX AND TRACHEA:**

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

**UNIT 6: NERVOUS SYSTEM & HEAD AND NECK****6.1 NERVOUS SYSTEM**

6.1.1 Indicate the position and extent of the spinal cord.

6.1.2 Mention the origin, termination and position of important ascending and descending tracts, site of crossing of fiber of these tracts and functions of each tract.

6.1.3 State the main consequences of spinal cord transaction and hemi section, and explain the rationale of cordotomy.

**6.2 BRAIN AND ITS PARTS**

6.2.1 Name the subdivisions of the brain, identify and mention the external features of parts of the brain.

6.2.2 Mention the internal structure and basic features of parts of the brainstem, and name the nuclei and fiber tract with special emphasis of cranial nerve nuclei,

6.2.3 Identify and mention parts of the cerebellum.

6.2.4 Mention the features of the gross component of the cerebrum

6.2.5 State and identify – association, commissural and projection fibers.

6.2.7 Define pyramidal motor system and name its tracts

6.2.7 Define upper and lower motor neurons.

6.2.8 Name the parts and tracts of the extra pyramidal system and indicate the functions.

**CRANIAL NERVES:** Demonstrate the testing of cranial nerve.

**6.4. TRIANGLES OF NECK:** Palpation of the triangles of neck

### **6.5 CERVICAL VERTEBRAS**

6.5.1 Identify the general feature of a typical cervical vertebra, atlas, axis and seventh cervical vertebra.

6.5.2 Identify the erector spinae, sternomastoid and scalene muscles, geniohyoid. Mention their attachments, actions and nerve supply.

6.5.3 Demonstrate the action of sternomastoid.

#### **Recommended / Reference Books:**

1. S.Kakar and A.Tuli and S.Raheja, 2021, The Practice Manual of Illustrative Anatomy 4<sup>th</sup> Edition, Jaypee Brothers Medical Publishers
2. Jutta Hochschild, 2016, Functional Anatomy for Physical Therapists .1<sup>st</sup> Edition. Thieme Publishers
3. R.L. Drake, A.W. Vogl and A.W.M. Mitchell, 2014, Gray`s Anatomy for Students. 3<sup>rd</sup> edition. Elsevier publication, Churchill Livingstone.
4. G.J Romanes ,1996, Cunningham manual of practical anatomy: upper and lower limb. Oxford Medical Publication. 15 edition, Vol 3.

#### **Assessment Tools:**

- Practical Viva (I and II)
- Preliminary
- File/Log Book
- End Term Examination

#### **Parameter of Continuous Evaluation:**

<b>Viva - I</b>	<b>25%</b>
<b>Viva - II</b>	<b>25%</b>
<b>Preliminary Viva</b>	<b>35%</b>
<b>File/ Log Book</b>	<b>15%</b>

### Course Outcome Matrix

PO-CO Statement (BPT- 101(P))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 101(P).1	3	3	3	1	--	1	2	3	3	2	--	2	3
BPT 101(P).2	--	3	3	1	2	1	2	3	3	--	---	2	3
BPT 101(P).3	1	2	3	1	2	1	2	3	3	2	3	---	3
BPT 101(P).4	---	2	2	1	3	1	2	3	3	3	2	3	3
BPT 101(P).5	1	3	2	1	3	1	2	3	3	3	2	2	3
BPT 101(P).6	1	3	2	1	3	---	---	3	3	3	1	3	3

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

(Deemed to be University under section 3 of the UGC Act, 1956)

**BPT 102(T): PHYSIOLOGY (THEORY)**

<b>Periods/week:</b>	<b>Credits</b>	<b>Max. Mark 100</b>
<b>L: 3, T: 1</b>	<b>8</b>	<b>Continuous Evaluation: 20</b>
<b>Duration of Examination: 3 Hrs</b>		<b>End Term Examination: 80</b>

**Pre-requisite:** Nil

**Course Type:** Foundation

**Course Outcomes:**

**Student will be able to**

**BPT 102(T).1. Describe** the structures and functions of cell and different tissues various systems of the body.

**BPT 102(T).2. Acquire** the knowledge of the relative contribution of each organ system in maintenance of the milieu interior (Homeostasis).

**BPT 102(T).3. Understand** the role of hormones, enzymes and other different types of cells of human body.

**BPT 102(T).4. Analyze** physiological response & adaptation to environmental stresses.

**BPT 102(T).5. Application** of the human physiology into various diseases

**BPT 102(T).6. Describe** the effect of external stimulus on various body systems

**PART-A**

**Unit 1: General Physiology**

**1.1 CELL**

1.1.1 Cell Physiology,

1.1.2 Cell structures, functions. and homeostasis.

1.1.3 Cell membrane permeability and transport mechanisms.

1.1.4 Bio electric potentials.

**1.2 SKIN**

1.2.1 Structure, blood circulation, functions, temperature regulation-physical

**1.3 ENVIRONMENTAL PHYSIOLOGY:**

1.3.1. Altitude, space and underwater physiology.

## **1.4 Applied physiology**

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

## **Unit 2: MUSCULOSKELETAL AND NERVOUS SYSTEM**

### **2.1 Muscle Physiology**

- 2.1.1 General introduction types of responses by living organism, essentials of a system to produce movements, structure of neuron neuromuscular junction and synapse.
- 2.1.1 Electrophysiology of nerve and muscle, generation, conduction and transmission of nerve impulse.
- 2.1.2 Classification of nerve fibers.
- 2.1.3 Properties of nerve fibers, strength duration curve, accommodation.
- 2.1.4 Structure and properties of different types of muscle.
- 2.1.5 Physiology of neuromuscular transmission, site and mode of action of blocking substances of neuromuscular transmission, excitation- contraction coupling and molecular basis of muscle contraction, mechanisms of muscle contraction, twitch summation, length tension relationships- isotonic and isometric contraction, factor affecting muscle tension, energetic of muscle contraction.
- 2.1.6 Degeneration and regeneration of nerves, lower motor neuron and its lesions, nutrition of muscle and effect of training, electromyography, path physiology paralysis, paresis, peripheral neuritis, defects of neuromuscular transmission.

### **2.2 Autonomic nervous system.**

- 2.2.1 Autonomic nervous system.
- 2.2.2 Sympathetic and parasympathetic
- 2.2.3 Transmission at ganglia and postganglionic terminals and autonomic reflexes.

### **2.3 Nervous system.**

#### **2.3.1 General**

- Functional organization of nervous system, encephalization and role in homeostasis.
- C.S.F.-Site and mechanism of formation, circulation, functions and blood brain barriers-clinical significance.
- Synapse-properties, neurotransmitters, pre and postsynaptic events.

#### **2.3.2 Sensory**

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

- Specific sensations, sensory and other ascending pathways, somesthetic sensations, proprioceptions and kinesthesia, path physiology of pain and headache.
- Thalamus- organization, connections, role in sensory functions, motor co-ordinations, autonomic and emotional behavior, sleep consciousness and thalamic syndrome.
- Cerebral cortex-sensory and motor organization, somatotopic representation, tactile localization and discrimination, stereognosis.

### **2.3.3 Motor**

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

### **2.3.4 Higher Nervous Function**

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

### **Unit 3: BLOOD AND ITS PROPERTIES**

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

### **Unit 4: RESPIRATORY AND CIRCULATORY SYSTEM**

#### **4.1 Respiratory system.**

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

#### **4.2 Cardiovascular system**

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

## **Unit 5: GASTRO INTESTINAL AND EXCRETORY SYSTEM**

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

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

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

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

## **Unit 6: ENDOCRINE AND REPRODUCTIVE SYSTEM**

### **6.1 Endocrinology**

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

### **6.2 Reproduction**

- 6.2.1 Introduction, an overview of preservation of species as against preservation of self, puberty, sex drive, menopause, cyclic activities in females, spermatogenesis, ovulation, fertilization, implantation, pregnancy, lactation, parental behavior.
- 6.2.2 Reproduction in males, testes structure, spermatogenesis, seminal fluid, ejaculation. Testicular hormones- functions and regulation, hyper and hypoactive states of male gonad.
- 6.2.3 Ovarian function-structure, oogenesis follicular growth, ovulation, function of corpus luteum, Female sex hormone, function and regulation, menstrual cycle, neurohormonal basis, hypothalamic hypophyseal, gonadal axis, changes accessory organs, effect on behavior.

6.2.4 Fertilization, implantation, functions of placenta. Physiology of pregnancy and parturition, changes in reproductive organs and different systems of the body.

6.2.5 Physiology of lactation, mammogenesis, galactopoietic, secretion and ejection of milk, lactation, amenorrhea, fetal and placental circulation.

#### **Recommended / Reference Books:**

1. C.C.Chatterjee. 2017. Medical Physiology Vol-I & II. 11<sup>th</sup> Edition. CBS
2. R.L.Bijlani and S.Manjunatha. 2010. Understanding Medical Physiology: A textbook for medical students. 4<sup>th</sup> Edition. Jaypee Brothers Medical Publishers
3. A.k. Jain.2018. Manual of Practical Physiology for MBBS. 5<sup>th</sup> Edition. Arya Publications.
4. S.K. Anand and S.K. Manchanda. Textbook of Physiology. 2<sup>nd</sup> Edition. Tata McGraw-Hill Publishing.
5. S.K.Chaudhari.2011. Concise Medical Physiology. 2<sup>nd</sup> edition. New Central Book Agency.
6. V.P.Varshney and M.Bedi. 2018. Textbook of Practical Physiology. 9<sup>th</sup> Edition. Jaypee Brothers Medical Publishers.
7. K.E. Barrett et al. 2019. Ganong's Review of Medical Physiology. 26<sup>th</sup> Edition. Cengage Publisher Services.
8. K.Sembulingam. 2006. Essentials of Human Physiology. 4<sup>th</sup> Edition. Jaypee Brothers Medical Publishers.
9. J.E.Hall 2015. Guyton and Hall Textbook of Medical Physiology. 13<sup>th</sup> Edition. Saunders Publication.
10. G.J. Toratora et al. 1993. Principles of Anatomy & Physiology. 7<sup>th</sup> Edition. John Wiley & Sons Inc.

#### **Assessment Tools:**

- Assignment/Tutorials
- Sessional tests
- Preliminary Examination
- End Term Examination

#### **Parameter of Continuous Evaluation:**

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

### Course Outcome Matrix

PO-CO Statement (BPT 102(T))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 102(T).1	3	3	--	1	--	1	2	3	3	2	--	2	3
BPT 102(T).2	--	3	3	1	2	1	2	3	3	--	---	2	1
BPT 102(T).3	1	--	3	1	2	--	--	3	3	2	3	---	3
BPT 102(T).4	---	2	2	1	3	1	2	3	3	3	2	3	3
BPT 102(T).5	1	3	--	--	--	1	2	3	3	3	--	--	3
BPT 102(T).6	1	3	2	1	3	---	---	3	3	3	1	--	--

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

(Deemed to be University under section 3 of the UGC Act, 1956)

**BPT 102(P): PHYSIOLOGY (PRACTICAL)**

<b>Periods/week</b>	<b>Credits</b>	<b>Max. Marks: 100</b>
<b>P: 3 T: 0</b>	<b>3</b>	<b>Continuous Evaluation: 80</b>
		<b>End Term Examination: 20</b>

**Pre-requisite:** Nil

**Course Type:** Foundation

**Course Outcomes:**

**Student will be able to**

**BPT 102(P).1. Identify and utilize** laboratory equipment, such as microscopes, dissection tools, general lab ware, physiology data acquisition systems, and virtual simulations.

**BPT 102(P).2. Illustrate and conduct** experiments.

**BPT 102(P).3. Demonstrate** the steps involved in the scientific method and **interpret** the results of scientific investigations, analyze data and formulate conclusions

**BPT 102(P).4. Critical thinking** and scientific problem-solving skills, including, but not limited to, inferring, integrating, synthesizing, and summarizing, to make decisions, recommendations and predictions.

**BPT 102(P).5. Describe** the physiology and mechanism of respiration and control of respiration application of respiratory system to reduce the issues in emergencies.

**BPT 102(P).6. Demonstration and describing** the physiology of nervous system, describe physiology of nerve stimulus, reflexes, brain, cranial and spinal nerves

**Unit 1: General Physiology**

**1.1 CELL**

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

**1.2 SKIN**

Explain using, charts films of Structure, blood circulation, functions, temperature regulation-physical

**1.3 ENVIRONMENTAL PHYSIOLOGY:**

Explain using, charts films of Altitude, space and underwater physiology.

#### **1.4. Applied physiology**

- 1.4.1. Effects of heat and cold (localized and generalized)
- 1.4.2. Effect of local and general exercise, compensation and training in nervous system.

### **Unit 2: MUSCULOSKELETAL AND NERVOUS SYSTEM**

#### **2.1. Muscle Physiology**

- 2.1.1. Electrophysiology of nerve and muscle, generation, conduction and transmission of nerve impulse.
- 2.1.2. Structure and properties of different types of muscle.
- 2.1.3. Physiology of neuromuscular transmission, site and mode of action of blocking substances of neuromuscular transmission, excitation- contraction coupling and molecular basis of muscle contraction, mechanisms of muscle contraction, twitch summation, length tension relationships-isotonic and isometric contraction, factor affecting muscle tension, energetic of muscle contraction.
- 2.1.4. Degeneration and regeneration of nerves, lower motor neuron and its lesions, nutrition of muscle and effect of training, electromyography, path physiology paralysis, paresis, peripheral neuritis, defects of neuromuscular transmission.

#### **2.2. Autonomic nervous system.**

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

#### **2.3 Nervous system.**

##### **2.3.1 Sensory**

- Specific sensations, sensory and other ascending pathways, somesthetic sensations, proprioceptions and kinesthesia, path physiology of pain and headache.
- Thalamus- organization, connections, role in sensory functions, motor co-ordinations, autonomic and emotional behavior, sleep consciousness and thalamic syndrome.
- Cerebral cortex-sensory and motor organization, somatotopic representation, tactile localization and discrimination, stereognosis.

##### **2.3.2 Motor**

- Functional organization of motor system. Reflex action, properties and their significance, stretch reflex, muscle spindle, role of gamma motor neuron, static and dynamic responses, polysynaptic reflexes. Reciprocal innervations, crossed extensor reflex, positive and negative supporting reaction, cortical motor areas, pyramidal and extra pyramidal systems.

- Regulation of tone and posture -postural reflexes spinal decerebrate, thalamic and decorticate preparations.

### 2.3.3 Higher Nervous Function

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

## Unit 3: BLOOD AND ITS PROPERTIES

- 3.1 Hemoglobin function, abnormal hemoglobin, hemolysis and jaundice. Leucocytes, functions and leucopoiesis Platelets -role in haemostasis, coagulation of blood, anticoagulants and fibrinolytic system, bleeding disorders, thrombosis.
- 3.2 Blood groups and blood transfusion, Blood volume & methods of measurement.
- 3.3 Demonstrate the blood cell count Estimation of Hemoglobin determination of BT & CT, Blood grouping & ESR. W.B.C. count, RBC count & indices of Blood & DLC.

## Unit 4: RESPIRATORY AND CIRCULATORY SYSTEM

### 4.3 Respiratory system.

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

#### **4.4 Cardiovascular system,**

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

### **Unit 5: GASTRO INTESTINAL AND EXCRETORY SYSTEM**

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

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

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

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

## **Unit 6: ENDOCRINE AND REPRODUCTIVE SYSTEM**

### **6.3 Endocrinology**

6.3.1 Introduction, Hormone-definition.

6.3.2 Method of study.

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

### **6.4 Reproduction**

6.4.1 Introduction, an overview of preservation of species as against preservation of self, puberty, sex drive, menopause, cyclic activities in females, spermatogenesis, ovulation, fertilization, implantation, pregnancy, lactation, parental behavior.

6.4.2 Reproduction in males, testes structure, spermatogenesis, seminal fluid, ejaculation. Testicular hormones- functions and regulation, hyper and hypoactive states of male gonad.

6.4.3 Ovarian function-structure, oogenesis follicular growth, ovulation, function of corpus luteum, Female sex hormone, function and regulation, menstrual cycle, neurohormonal basis, hypothalamic hypophyseal, gonadal axis, changes accessory organs, effect on behavior.

6.4.4 Fertilization, implantation, functions of placenta. Physiology of pregnancy and parturition, changes in reproductive organs and different systems of the body.

6.4.5 Physiology of lactation, mammatogenesis, galactopoietic, secretion and ejection of milk, lactation, amenorrhea, fetal and placental circulation.

### **Recommended / Reference Books:**

1. C.C.Chatterjee. 2017. Medical Physiology Vol-I & II. 11<sup>th</sup> Edition. CBS
2. R.L.Bijlani and S.Manjunatha. 2010. Understanding Medical Physiology: A textbook for medical students. 4<sup>th</sup> Edition. Jaypee Brothers Medical Publishers
3. A.k. Jain.2018. Manual of Practical Physiology for MBBS. 5<sup>th</sup> Edition. Arya Publications.
4. S.K. Anand and S.K. Manchanda. Textbook of Physiology. 2<sup>nd</sup> Edition. Tata McGraw-Hill Publishing.
5. S.K.Chaudhari.2011. Concise Medical Physiology. 2<sup>nd</sup> edition. New Central Book Agency.
6. V.P.Varshney and M.Bedi. 2018. Textbook of Practical Physiology. 9<sup>th</sup> Edition. Jaypee Brothers Medical Publishers.
7. K.E. Barrett et al. 2019. Ganong's Review of Medical Physiology. 26<sup>th</sup> Edition. Cengage Publisher Services.
8. K.Sembulingam. 2006. Essentials of Human Physiology. 4<sup>th</sup> Edition. Jaypee Brothers Medical Publishers.
9. J.E.Hall 2015. Guyton and Hall Textbook of Medical Physiology. 13<sup>th</sup> Edition. Saunders Publication.

**Assessment Tools:**

- Practical Viva (I and II)
- Preliminary
- File/Log Book
- End Term Examination

**Parameter of Continuous Evaluation:**

<b>Viva - I</b>	<b>25%</b>
<b>Viva - II</b>	<b>25%</b>
<b>Preliminary Viva</b>	<b>35%</b>
<b>File/ Log Book</b>	<b>15%</b>

**Course Outcome Matrix**

PO-CO Statement (BPT 102(P))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 102(P).1	3	3	--	1	--	1	2	3	3	2	--	2	3
BPT 102(P).2	--	3	3	1	3	--	1	--	1	--	---	2	1
BPT 102(P).3	1	--	3	1	2	--	--	3	3	3	--	1	--
BPT 102(P).4	---	2	2	1	3	1	2	3	3	3	2	3	3
BPT 102(P).5	1	3	--	--	--	3	--	1	--	1	--	--	3
BPT 102(P).6	1	3	2	1	3	---	---	3	3	3	1	--	--

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

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**BPT 103 (T): BIOCHEMISTRY (THEORY)**

<b>Periods/week:</b>	<b>Credits</b>	<b>Max. Mark 100</b>
<b>L: 2, T: 1</b>	<b>6</b>	<b>Continuous Evaluation : 20</b>
<b>Duration of Examination: 3 Hrs</b>		<b>End Term Examination : 80</b>

**Pre-requisite:** Nil

**Course Type:** Foundation

**Course Outcomes:**

**Student will be able to**

**BPT 103(T).1. Restate** foundations in the fundamentals and applications of current chemical theories for the physical world.

**BPT 103(T).2. Understanding** of the major types of biochemical molecules, including small, large and super-molecular components found in cells.

**BPT 103(T).3. Analyze** basic energy metabolism of cells.

**BPT 103(T).4. Describe and compare** the structure of DNA and RNA and why these molecules have different roles in the storage and decoding of the information of heredity and cell function.

**BPT 103(T).5. Discuss and analyze** the importance of biochemistry in everyday life in the 21st century

**BPT 103(T).6. Apply** the various biochemical concepts to the investigations of the patients.

**Unit 1: Biophysics and cellular biochemistry**

**1.1 Biophysics:**

1.1.1. Concepts of pH and Buffers, Acid -base equilibrium, Osmotic pressure and its physiological applications.

**1.2 Cell and sub cellular organelles**

1.2.1 Structure & function of Cell & Sub-cellular organelles

1.2.2 Biochemical characteristics of living matter, Physiochemical

1.2.3 Phenomena & their significance (Osmosis Diffusion, Donnan Membrane equilibrium)

1.2.4 Structure organization of plasma membrane & transport system.

## **Unit 2: Major energy groups: Carbohydrates, Lipids & Proteins**

### **2.1 Carbohydrates**

2.1.1 Definition, Functions, Sources, Classifications of carbohydrates

2.1.2 Monosaccharides, Disaccharides, Polysaccharides, Mucopolysaccharides and its importance.

### **2.2 Carbohydrates Metabolism**

2.2.1 Carbohydrate metabolic pathways such as Glycolysis, Gluconeogenesis, TCA cycle, HMP shunt pathway

2.2.2 Glucuronic acid pathway & Glycogen metabolism with their physiological importance, 2.2.3 Interconversion of different sugars, Metabolic integration, Regulation of blood Glucose level, DM.

### **2.3 Lipids:**

2.3.1 Definition Functions, Sources, Classifications of lipids

2.3.2 Simple lipids, Compound lipids, Derived lipids, Saturated and unsaturated fatty acids. Essential fatty acids & their importance,

2.3.3 Blood lipids and their implications, Cholesterol and its importance.

### **2.4 Metabolism of lipids and lipoproteins**

2.4.1 Fatty acid oxidation, Fatty acid synthesis, Metabolism

2.4.2 Ketone bodies, Atherosclerosis and Obesity.

2.4.3 Liver & lipo tropic factors.

### **2.5 Proteins:**

2.5.1 Definition, Sources, Functions, Classification of proteins

2.5.2 Simple protein, Conjugated proteins and derived proteins, Properties and reactions of proteins.

### **2.6 Nucleic acids:**

2.6.1 Structure and functions of DNA, RNA

2.6.2 Nucleosides, Nucleotide, Genetic code,

2.6.3 Biologically important Nucleotides.

### **2.7 Protein Metabolism**

2.7.1 Transamination, Transmethylation, Deamination, Fate of ammonia

2.7.2 Urea synthesis and synthesis of creatinine, Inborn errors of metabolism.

## **UNIT 3: Minerals, Enzymes and Electrolytes**

### **3.1 Enzymes**

- 3.1.1 Classification & Mechanism of action, factors affecting enzyme activity, Enzyme kinetic, Enzyme inhibition
- 3.1.2 Coenzymes, Allosteric enzymes, Diagnostic significance of enzymes & isoenzymes.

### **3.2 Vitamins**

- 3.2.1 Classification, Fat soluble vitamins 'A' 'D' 'E' 'K " Water soluble vitamins -B Complex and Vitamin 'C'.
- 3.2.2 Daily requirement, Physiological functions, and diseases of vitamins deficiency.

### **3.3 Biological Oxidation & Bioenergetics**

- 3.3.1 Concepts of free energy change, Exergonic & Endergonic reactions, Biological oxidation, Electron Transport chain
- 3.3.2 Oxidative phosphorylation, inhibitors & uncouplers of electron transport chain & Oxidative phosphorylation.

### **3.4 Water and Electrolytes**

- 3.4.1 Fluid compartments, Daily intake and output, Sodium and Potassium metabolism.

### **3.5 Mineral Metabolism**

- 3.5.1. Metabolism of Iron, Calcium, Phosphorous, Trace elements

## **UNIT 4: Connective Tissue**

- 4.1** Mucopolysaccharides, Connective tissue proteins, formation of collagen, Glycoproteins, Chemistry and Metabolism of bone and teeth, Metabolism of skin.

- 4.2 Nerve Tissue**

Composition, Metabolism, Chemical mediators of nerve activities

- 4.3 Muscle Tissue**

Structure Metabolism of muscles, Muscle contraction

## **UNIT 5: Nutritional Aspects**

- 5.1 Nutritional aspects of carbohydrate, fat and protein, Balance diet, Metabolism in exercise and injury.
- 5.2 Diet of chronically ill and terminally ill patients.

## **UNIT 6: Isotopes and Investigations**

### **6.1 Isotopes**

6.1.1. Isotopes and their role in diagnosis and treatment of diseases.

### **6.2 Investigations**

6.2.1 Interpretation of common clinical biochemical investigations.

6.2.2 Sugar, Urea, Creatinine, Protein, Bilirubin, Uric acid, Cholesterol.

#### **Recommended Books:**

1. U.Satyanarayan,2013, Biochemistry. 4<sup>th</sup> Ed. Elsevier, India.
2. M.N. Chatterje and R. Shinde ,2012, Textbook of Medical Biochemistry. 8<sup>th</sup> Edition. Jaypee Brothers.
3. D.M.Vasudevan, S.Sreekumari and K. Vaidyanathan, 2016, Textbook of Biochemistry for medical students. 8<sup>th</sup> Ed. Jaypee Brothers Medical Publishers.
4. W. Marshall, M. Lapsley, A. Day and R. Ayling ,2014,Clinical Biochemistry-Metabolic & Clinical Aspects. 3<sup>rd</sup> Edition. Churchill Livingstone
5. A. Gaw, M. Murphy, R. Srivastava, R. Cowan, and D. O'Reilly, 2013, Clinical Biochemistry. 5<sup>th</sup> Ed. Churchill Livingstone.
6. D. Das,2010, Biochemistry. 12<sup>th</sup> edition. Academic Publication.

#### **Assessment Tools:**

- Sessional tests
- Preliminary Examination
- Assignment/Tutorials
- Surprise questions during lectures/Class Performance
- End Term Examination

#### **Parameter of Continuous Evaluation:**

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

### Course Articulation Matrix

PO-CO Statement (BPT- 103(T))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 103(T).1	1	3	--	1	--	1	2	1	1	1	1	2	3
BPT 103(T).2	--	1	3	1	3	--	1	--	--	--	--	2	1
BPT 103(T).3	2	--	3	1	2	--	--	2	2	2	2	1	--
BPT 103(T).4	1	2	2	1	3	1	2	1	1	1	1	3	3
BPT 103(T).5	3	3	--	--	--	3	--	3	3	3	3	--	3
BPT 103(T).6	2	3	2	1	3	---	---	2	2	2	2	--	--

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

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**BPT-104 (T): ELECTROTHERAPY-I (THEORY)**

<b>Periods/week:</b>	<b>Credits</b>	<b>Max. Mark 100</b>
<b>L: 2, T: 1</b>	<b>6</b>	<b>Continuous Evaluation: 20</b>
<b>Duration of Examination: 3 Hrs</b>		<b>End Term Examination: 80</b>

**Pre-requisite:** Nil

**COURSE DESCRIPTION**

**Pre-requisite:** Nil

**Course Type:** Core

**Course Outcomes:**

**Student will be able to**

**BPT 104(T).1 Identify** the basic electricity, electronics, equipment and their application in Electrotherapy

**BPT 104(T).2 Understand** Basic operation of electric supply to the equipment and safety device

**BPT 104(T).3 Acquire** concept related to different types of currents & its electrical responses

**BPT 104(T).4 Interpret** Location and stimulation of different motor points region wise, including the upper and lower limb, trunk & face

**BPT 104(T).5 Interpret** and Analyze how different modalities function and application in Electrotherapy and human body

**BPT 104(T).6** Therapeutic Utilization of hot and cold therapy units on body

**PART A**

**UNIT 1 INTRODUCTORY PHYSICS**

**1.1 Electromagnetic Spectrum:**

1.1.1 Production and its properties, dual nature,

1.1.2 Laws governing radiation,

1.1.3 Depth of penetration, mode of heat & energy transfer.

## **1.2 Electric energy**

1.2.1 Electricity and its Units.

1.2.2 Electron theory, Static and current electricity.

1.2.3 Conduction of electricity, Conductors, Insulators, Potential difference & factors affecting it.

1.2.4 Resistance & Intensity.

1.2.5 Ohm's Law- Its application to AC & DC currents and uses of Ohm's law in Physiotherapy.

1.2.6 Polar and Chemical effects of electric currents examples in Physiotherapy.

1.2.7 Ionization: theory of Ionization, techniques of medical ionization and surgical ionization, uses of ionization in Physiotherapy.

1.2.8 EMF: Production of an E.M.F. by chemical actions, examples and uses in physiotherapy.

1.2.9 Joule law & production of heat by Joule's law its implication in Physiotherapy.

1.2.10 Electrical supply in Physiotherapy Department:

1.2.11 Brief outline of main supply of electric current.

1.2.12 Precautions - safety devices, earthing, fuses etc.

1.2.13 Dangers of DC/AC:

- a) Short circuits, electric shocks. safety, precautions and First aid & initial management of electric shocks.
- b) Electrical and chemical burns their prevention & management.

## **1.3 Magnetism:**

1.3.1 Definition.

1.3.2 Properties of Magnates.

1.3.3 Magnetic effects. Molecular theory of Magnetism.

1.3.4 Magnetic fields & magnetic forces.

1.3.5 Magnetic effects of an electric field.

1.3.6 Electromagnetic induction and its uses in Physiotherapy department.

## **UNIT 2: Medical Biophysics**

### **2.1 Condensers:**

2.1.1 Types

2.1.2 Construction and working principles.

2.1.3 Uses in Physiotherapy department.

### **2.2 Milliammeter**

2.2.1 Construction.

2.2.2 Working.

2.2.3 Uses in physiotherapy.

### **2.3 Voltmeter:**

- 2.4.1 Construction, Working and uses in physiotherapy Transformer
- 2.4.2 Definition, Types, Principle, Construction. Eddy current, Working, Uses in Physiotherapy.
- 2.4.3 Chokes: Principle. Construction and working. Uses in Physiotherapy.

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

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

### **2.5 Metal oxide rectifier:**

- 2.5.1 Definition.
- 2.5.2 Construction
- 2.5.3 Working.
- 2.5.4 Uses in physiotherapy.
- 2.5.5 Display devices & indicators used in Physiotherapy- analogue & digital
- 2.5.6 Potentiometer: Construction and working principle
- 2.5.7 Fuse: Construction, working and application in Physiotherapy department.

## **UNIT 3 CURRENTS**

### **3.1 Direct currents & Low Frequency Current**

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

### **3.2 Transcutaneous Electrical Nerve Stimulations (TENS)**

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

### **Unit 4: Electrical Reactions and Electro-diagnostic tests: by Electric stimulator**

- 4.1 Electrical stimuli and normal behavior of nerve and Muscle tissue.
- 4.2 Type of lesion and development of reaction of degeneration.
- 4.3 Difference between Faradic – long duration Intermittent direct current response
- 4.1 S.D. Curve and its application.
- 4.2 Chronaxie, Rheobase & Pulse ratio.

### **Unit 5: HEAT THERAPY AND CRYOTHERAPY**

#### **5.1. Superficial heat**

- 5.1.1 Define heat and temperature (in brief).
- 5.1.2 Physical effects of heat- (in brief).
- 5.1.3 Sources of therapeutic heating and its physiological effects.
- 5.1.4 Paraffin wax bath: composition, Physiological & therapeutical effects, methods of applications, mode of heat transfer, depth of penetration, indications, Contraindications, precautions, operational skills of equipment & patient preparation.
- 5.1.5 Moist heat: types of moist heat therapy, Physiological & therapeutical effects, methods of applications, mode of heat transfer, depth of penetration, indications, Contraindications, precautions, operational skills of equipment & patient preparation.
- 5.1.6 Electrical heating pads & Fluido therapy: components, application methods, Physiological & therapeutical effects, precautions, operational skills of equipment & patient preparation.

#### **5.2. Therapeutic cold (cryotherapy)**

- 5.2.1 Source
- 5.2.2. Biophysical effects types
- 5.2.3. Therapeutic effects, indications contraindications precaution application techniques and patient preparation.

### **Unit 6: Therapeutic Compression**

- 6.1 Therapeutic mechanical pressure (Intermittent compression therapy)
- 6.2 Principal, Biophysical Effects, types, Therapeutic effects indications contraindication precautions.
- 6.3 Operational, Skill and patient preparation.

### Recommended books

1. Clayton E.B., Palastanga N.; Forster A. 1981. Clayton's Electrotherapy: theory and Practice. 9<sup>th</sup> Ed. London: Bailliere Tindall.
2. Robertson V., Ward A., Low J., and Reed A. 2006. Electrotherapy Explained: Principles & practice. 4<sup>th</sup> Ed. Butterworth Heinmann.
3. Watson T. 2008. Electrotherapy, evidence-based practice. 12<sup>th</sup> Ed. Churchill Livingstone.
4. Prentice W.E. 2005. Therapeutic Modalities in Rehabilitation. 3rd Edition. McGraw-Hill Medical publication.
5. Fox J. and Sharp T. 2007. Practical Electrotherapy: A Guide to safe Application. Elsevier.
6. Sheila Kitchen. 2002. Electrotherapy Evidence based practice. 11<sup>th</sup> edition. Churchill Livingstone.

### Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Preliminary Examination
- End Term Examination

### Parameter of Continuous Evaluation:

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

PO-CO Statement (BPT 104 (T))	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
BPT 104(T).1	2	2	2	3	--	1	2	2	3	2	--	--	3
BPT 104(T).2	--	3	3	2	2	1	2	2	3	--	---	---	2
BPT 104(T).3	1	2	2	---	2	1	2	3	3	2	3	---	3
BPT 104(T).4	---	2	3	---	3	1	2	3	3	3	2	---	3
BPT 104(T).5	1	3	3	---	3	1	2	3	3	3	2	---	3
BPT 104(T).6	1	3	2	---	3	---	---	3	2	3	1	---	3

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

(Deemed to be University under section 3 of the UGC Act, 1956)

**BPT- 104 (P): ELECTROTHERAPY-I (PRACTICAL)**

<b>Periods/week</b>	<b>Credits</b>	<b>Max. Marks: 100</b>
<b>P: 2; T:0</b>	<b>2</b>	<b>Continuous Evaluation: 50</b>
<b>Duration of Examination: 3 Hrs</b>		<b>End Term Examination: 50</b>

**Pre-requisite:** Nil

**Course Type:** Core

**Course Outcomes:**

Student will be able to

**BPT 104(P).1 Understand** the Basic operation of electric supply to the equipment and safety device

**BPT 104(P).2 Acquire** practical concept related to different types of currents & its electrical responses

**BPT 104(P).3 Critique** Location and stimulation of different motor points region wise, including the upper and lower limb, trunk & face.

**BPT 104(P).4 Critique** Practical concept related to working of different Modalities

**BPT 104(P).5 Understand** Basic operation of various machines.

**BPT 104(P).6 Understand** function, operation of hot, and cold and compression therapy.

**PART A**

**Unit 1: INTRODUCTORY PHYSICS**

1.1. Introduction to equipment's used in Physiotherapy and their classification According to types of current

**Unit 2: Direct currents & Low Frequency Current**

2.1 Setting of interrupted and surged currents Motor points Sensory and motor stimulation of nerves and muscles by various types of low frequency currents on

2.2. Self. Location and stimulation of different motor points region wise, including the upper and lower limb, trunk & face.

2.3. Application of Iontophoresis

2.4. Therapeutic application different low frequency currents faradic foot bath, faradism under pressure.

2.5. Application of Transcutaneous Electric Nerve Stimulation (TENS)

### **Unit 3: Electrical Reactions and Electro-diagnostic tests: by Electric stimulator**

- 3.1 Faradic - Intermittent direct current test.
- 3.2 S.D. Curve and its interpretation.
- 3.3 Chronaxie, Rheobase & pulse ratio

## **PART B**

### **Unit 4. Superficial heat**

- 4.1 Methods of Application
- 4.2 Placement of Moist Heat application on different parts of body

### **Unit 5. Therapeutic cold (cryotherapy)**

- 5.1 Application techniques and patient preparation.

### **Unit 6. Therapeutic Compression**

- 6.1 Therapeutic effects indications contraindication precautions operational
- 6.2 Skill and patient preparation.

### **Recommended books**

1. Clayton E.B., Palastanga N.; Forster A. 1981. Clayton's Electrotherapy: theory and Practice. 9<sup>th</sup> Ed. London: Bailliere Tindall.
2. Robertson V., Ward A., Low J., and Reed A. 2006. Electrotherapy Explained: Principles & practice. 4<sup>th</sup> Ed. Butterworth Heinmann.
3. Watson T. 2008. Electrotherapy, evidence-based practice. 12<sup>th</sup> Ed. Churchill Livingstone.
4. Prentice W.E. 2005. Therapeutic Modalities in Rehabilitation. 3rd Edition. McGraw-Hill Medical publication.
5. Fox J. and Sharp T. 2007. Practical Electrotherapy: A Guide to safe Application. Elsevier.
6. Sheila Kitchen. 2002. Electrotherapy Evidence based practice. 11<sup>th</sup> edition. Churchill Livingstone.

### **Assessment Tools:**

- Practical Viva (I and II)
- Preliminary
- File/Log Book
- End Term Examination

**Parameter of Continuous Evaluation:**

<b>Viva - I</b>	<b>25%</b>
<b>Viva - II</b>	<b>25%</b>
<b>Preliminary Viva</b>	<b>35%</b>
<b>File/ Log Book</b>	<b>15%</b>

**Course Articulation Matrix:**

PO-CO Statement (BPT 104(P))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
BPT 104(P).1	2	2	2	3	--	1	2	2	3	2	--	--	3
BPT 104(P).2	--	3	3	2	2	1	2	2	3	--	---	---	2
BPT 104(P).3	1	2	2	---	2	1	2	3	3	2	3	---	3
BPT 104(P).4	---	2	3	---	3	1	2	3	3	3	2	---	3
BPT 104(P).5	1	3	3	---	3	1	2	3	3	3	2	---	3
BPT 104(P).6	1	3	2	---	3	---	---	3	2	3	1	---	3

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

(Deemed to be University under section 3 of the UGC Act, 1956)

**BPT- 105 (T): EXERCISE THERAPY-I (THEORY)**

<b>Periods/week:</b>	<b>Credits</b>	<b>Max. Mark 100</b>
<b>L: 2, T: 1</b>	<b>6</b>	<b>Continuous Evaluation : 20</b>
<b>Duration of Examination: 3 Hrs</b>		<b>End Term Examination : 80</b>

**Pre-requisite:** Nil

**Course Type:** Foundation

**BPT 105(T).1 Understand** the principles of exercise therapy

**BPT 105(T).2 Apply** the principles of exercise therapy

**BPT 105(T).3 Learn** the recent advances of exercise therapy in the field of Physiotherapy

**BPT 105(T).4 Develop and demonstrate** the techniques and application of exercise therapy

**BPT 105(T).5 Effectively** deliver the management techniques for exercise therapy

**BPT 105(T).6 Create** new treatment protocol or device for the betterment of field

**UNIT 1: BASICS OF EXERCISE THERAPY**

**1.1 Basic Mechanics**

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

1.1.1. Force: Composition of force, parallelogram of forces.

1.1.2. Equilibrium: Stable, unstable, neutral.

1.1.3. Gravity: Center of gravity, line of gravity.

1.1.4. Levers: 1<sup>st</sup>order, 2<sup>nd</sup>order, 3<sup>rd</sup>order, their examples in the human body and their practical applications in physiotherapy, forces applied to the body levers.

1.1.5. Pulleys: Fixes, movable.

1.1.6. Springs: Series, parallel.

1.1.7. Tension.

1.1.8. Elasticity: Hook's law.

1.1.9. Axis: sagittal, frontal, transverse, vertical.

1.1.10. Planes: Sagittal, frontal, horizontal.

1.1.11. Definition of speed, velocity, work, energy, power, acceleration, momentum, friction and Inertia.

**1.2 Introduction**

1.2.1 Introduction to exercise therapy, principles, technique and general areas of its application,

assessment & its importance.

1.2.2 Description of fundamental starting position and derived position including joint positions, muscle work, stability, effects and uses.

1.2.3 Introduction to movements including analysis of joint motion, muscle work and Neuro-muscular co-ordination.

1.2.4 Classification of movement.

Describe the types, technique of application, indications, contraindications effects and uses of the following:

- Active movement.
- Passive movement.
- Active assisted movement.
- Resisted movement.

### **1.3 Suspension Therapy**

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

### **1.4 Pelvic tilt**

Describe the following:

1.4.1 Normal pelvic tilt, alteration from normal, anterior tilt (forward), posterior tilt (backward), lateral tilt.

1.4.2 Muscles responsible for alteration and pelvic rotation.

1.4.3 Identification of normal pelvic tilt, pelvic rotation and altered tilt and their corrective measures.

## **UNIT 2: MANUAL MUSCLE TESTING:**

### **2.1 Manual Muscle Testing:**

2.1.1 Principles and application techniques of manual muscle testing.

2.1.2 Testing position, procedure and grading of muscles of the upper limb, lower limb and trunk etc.

## **UNIT 3: GONIOMETRY**

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

3.1.1 Principle techniques and application of Goniometry.

3.1.2 Testing position, procedure and measurement of R.O.M. of the joints of upper limbs, lower limbs and trunk.

## **UNIT 4: SOFT TISSUE MANIPULATION**

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

- 4.1.1 History, various types of soft tissue manipulation techniques.
- 4.1.2 Physiological effects of soft tissue manipulation on the following systems of the body circulatory, Nervous, Musculoskeletal, Excretory, Respiratory & Integumentary system and metabolism.
- 4.1.3 Classify, define and describe:-effleurage, stroking, kneading, Petrissage, deep friction, vibration and shaking etc.
- 4.1.4 Preparation of patient: effects, uses, indication and contraindications of the above manipulation.

## **UNIT 5: RELAXATION**

### **5.1 Relaxation**

- 5.1.1 Describe relaxation, muscle fatigue, muscle spasm and tension (mental & physical).
- 5.1.2 Factors contributing to fatigue & tension.
- 5.1.3 Techniques of relaxation (local and general).
- 5.1.4 Effects, uses & clinical application.
- 5.1.5 Indication and contraindication.

## **UNIT 6: THERAPEUTIC GYMNASIUM**

### **6.1 Therapeutic Gymnasium**

- 6.1.1 Setup of gymnasium & its importance.
- 6.1.2 Various equipment in the gymnasium.
- 6.1.3 Operations skills, effects & uses of each equipment.

### **Recommended Text Books:**

1. Hislop H.J and Montgomery J. 2007. Daniels and Worthingham's Muscle Testing: Techniques of Manual Examination. 8th Edition. Elsevier.
2. Norkin C.C., and White D.J. 2009. Measurement of Joint Motion: A Guide to Goniometry. 4th Ed. F.A.Davis Company.
3. Barron P. 2009. Hydrotherapy Theory and Technique. 4th Ed. Pine Island Publishers.
4. Brody L.T. and Hall C.M. 2010. Therapeutic Exercise: Moving Toward Function. 3rd Ed. LippincottWilliams and Wilkins.
5. Kisner C. and Colby L.A. 2007. Therapeutic Exercises: Foundations and Techniques. 5th Ed. F.A.Davis Company.
6. Hollis M. and Cook P.F. 1999. Practical Exercise Therapy. 4 th Ed. Wiley Publication.
7. Bates A. & Hanson N. 1996. Aquatic exercise therapy. 1 st Ed. Saunders Publication.

**Assessment Tools:**

- Assignment/Tutorials
- Sessional tests
- Preliminary Examination
- End Term Examination

**Parameter of Continuous Evaluation:**

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

**Course Articulation Matrix**

CO Statement (BPT 105(T))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 105(T).1	3	1	3	-	3	-	3	1	2	1	2	-	3
BPT 105(T).2	2	1	3	-	2	-	2	2	2	2	2	-	3
BPT 105(T).3	1	-	-	2	3	3	2	-	2	3	1	-	2
BPT 105(T).4	2	3	3	3	2	3	3	-	3	3	-	2	2
BPT 105(T).5	3	2	2	3	2	2	3	2	2	2	-	-	2
BPT 105(T).6	2	-	3	2	3	-	2	-	3	3	2	1	2

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

(Deemed to be University under section 3 of the UGC Act, 1956)

**BPT- 105 (P): EXERCISE THERAPY-I (PRACTICAL)**

Periods /week Credit

Max. Marks:100

L: 0 T:0 P:2 2

Continuous Evaluation: 20

Duration of Examination: 3 Hrs

Annual Examination: 80

**BPT 105(P).1 Understand** the principles of exercise therapy

**BPT 105(P).2 Acquire** knowledge about principles of exercise therapy and its application.

**BPT 105(P).3 Learn** the recent advances in the field of Physiotherapy

**BPT 105(P).4 Develop and demonstrate** the techniques and application of mobilization

**BPT 105(P).5 Effectively** deliver the exercise therapy techniques

**BPT 105(P).6 Designing** the protocol related to exercise therapy.

**Unit 1 Basic Mechanics**

- 1.1 Fundamentals and derived positions
- 1.2 Muscle work and the use of different positions
- 1.3 Anatomic movements: Flexion, r, Abduction, Inversion, Eversion, Supination, Pronation, Internal rotations, External rotations, Gross flexion, Gross extension, Trunk side flexion.
- 1.4 Rhythm of movement, Timing of movement, Duration of movement.
- 1.5 Classification of Movement: Voluntary (free, active assisted, assisted resisted, resisted), Involuntary (associated reflex, peristaltic, visceral, cardiac). Passive movements: Relaxed passive, mobilizing passive (forced P.M. manipulations, serial manipulations) effects of exercise: physiological effects, therapeutic effects. Indications and contra - indications of the following and demonstrate the technique for each : Passive ROM, Active & active-assisted ROM. Types, Indication & goals for ROM, precautions and contraindications, principles & procedures for applying ROM techniques, continuous passive motion.
- 1.6 Muscle performance and resistance exercise, determinants of resistance exercise, types of resistance exercise, principles, precautions and contra-indications. Manual resistance exercise, mechanical resistance exercise, use of equipment with resistance exercise.
- 1.7 Suspension Therapy: Basic physics of simple pendulum and pendular movement. Type of suspension: Pendular, Axial, Eccentric fixation (anterior, posterior, medial and lateral). Indications and technique for each type of suspension.
- 1.8 Pelvic tilt: Demonstrate measurement of limb girth (using measuring tape): arm, forearm, thigh

- 1.9 Normal pelvic tilts, alterations from normal, anterior tilt (forward) posterior tilt (backward), Lateral tilt. Muscles responsible for alterations and pelvic rotation. Identification of normal pelvic tilt, pelvic rotation and altered tilts and their corrective measures.

### **Unit 2. Muscle Grading Testing**

- 2.1 Principles and applications techniques of manual muscle testing
- 2.2 Testing position, procedure and grading of muscles of the upper limb, lower limb and trunk etc.

### **Unit 3. Goniometry**

- 3.1 Normal range of various joints, Description of goniometer-clinical, finger & spinal goniometer, range of measuring systems, techniques of goniometry.
- 3.2 Demonstrate measuring of individual joint range using goniometer.

### **Unit 4. Soft tissue Manipulation**

- 4.1 Preparation of patient: effects, uses, indication and contraindications of manipulation.
- 4.2 Demonstration of various techniques: effleurage, stroking, kneading, petrissage, deep friction, vibration and shaking.

### **Unit 5. Relaxation**

- 5.2 Relaxation, Muscle fatigue, Muscle spasm, General causes, signs, symptoms of tension (mental and physical). Factors contributing to fatigue. Types of relaxation (local and general), indications for relaxation, and techniques of relaxation (local and general).

### **Unit 6. Therapeutic Gymnasium**

- 6.1 Set-up of gymnasium & its importance
- 6.2 Various equipment in the gymnasium
- 6.3 Operational skills, effects, & uses of each equipment

### **Recommended Books**

1. Hislop H.J and Montgomery J. 2007. Daniels and Worthingham's Muscle Testing: Techniques of Manual Examination. 8th Edition. Elsevier.
2. Norkin C.C., and White D.J. 2009. Measurement of Joint Motion: A Guide to Goniometry. 4th Ed. F.A. Davis Company.
3. Barron P. 2009. Hydrotherapy Theory and Technique. 4th Ed. Pine Island Publishers.
4. Brody L.T. and Hall C.M. 2010. Therapeutic Exercise: Moving Toward Function. 3rd Ed. Lippincott Williams and Wilkins.
5. Kisner C. and Colby L.A. 2007. Therapeutic Exercises: Foundations and Techniques. 5th Ed. F.A. Davis Company.
6. Hollis M. and Cook P.F. 1999. Practical Exercise Therapy. 4 th Ed. Wiley Publication.

**Assessment Tools:**

- Assignment/Tutorials
- Sessional tests
- Preliminary Examination
- End Term Examination

**Parameter of Continuous Evaluation:**

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

**Course Articulation Matrix:**

CO Statement (BPT 105(P))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
BPT 105(P).1	2	-	-	2	-	3	2	2	-	1	2	1	3
BPT 105(P).2	2	3	2	-	2	-	-	2	2	2	-	2	-
BPT 105(P).3	-	3	3	3	1	2	3	-	3	2	3	1	2
BPT 105(P).4	3	3	-	3	-	3	-	3	2	2	2	-	3
BPT 105(P).5	-	-	2	2	3	-	3	-	-	3	2	3	-
BPT 105(P).6	3	2	-	1	-	3	2	3	2	-	1	-	1

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**

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**BPT 106(T): ENVIROMENTAL STUDIES**

**Periods/week Credit**

**L: 2 T:0 4**

**Duration of Examination: 3 Hrs**

**Max. Marks:100**

**Continuous Evaluation: 100**

**Pre-requisite:** Nil

**Course Type:** Foundation

**Course Outcomes:**

Student will be able to

**BPT 106(T).1 Understand** External forces, influences and conditions, which affect the life, nature, behavior, growth,

**BPT 106(T).2 Estimate** Environmental disasters and industrial management

**BPT 106(T).3 Asses** the Need for public awareness

**BPT 106(T).4 Find** human activities this has an adverse effect on the environment.

**BPT 106(T).5 Differentiate** Importance of the protection and conservation of our environment

**BPT 106(T).6 Describe** better development and management of natural resources and global environment.

**Unit 1: Introduction to Environmental Studies**

1.1 Multidisciplinary nature of Environmental Studies;

1.2 Scope and importance; Concept of sustainability and sustainable development.

**Unit 2: Ecosystems**

2.1 What is ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems:

2.1.1 Forest ecosystem

2.1.2 Grassland ecosystem

2.1.3 Desert ecosystem

2.1.4 Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

**Unit 3: Natural Resources: Renewable and Non-renewable resources**

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

#### **Unit 4: Biodiversity and Conservation**

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

#### **Unit 5: Environmental Pollution**

- 5.1 Environmental Pollution: types, causes, effects and controls; Air, water, soil and noise pollution.
- 5.2 Nuclear hazards and human health risks.
- 5.3 Solid waste management: Control measures of urban and industrial waste.
- 5.4 Pollution case studies.

#### **Unit 6: Environmental Policies and Practices, Human Communities and the Environment & Field Work**

- 6.1 Climate change, global warming, ozone layer depletion, and acid rain and impacts on human
- 6.2 communities and agriculture.
- 6.3 Environmental Laws, Environmental Protection Act, Air (prevention and Control of Pollution) Act;
- 6.4 Water (prevention and Control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act;
- 6.5 International Agreements: Montreal and Kyoto protocols and Convention on Biological Diversity
- 6.6 (CBD).
- 6.7 Nature Reserves, tribal populations and rights, and human wildlife conflicts in Indian context.
- 6.8 Human population growth: Impacts on environment, human health and welfare.
- 6.9 Resettlement and rehabilitation of project affected areas; case studies.

- 6.10 Disaster management: floods, earthquake, cyclones and landslides.
- 6.11 Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- 6.12 Environmental Ethics: Role of Indian and other religions and cultures in environmental conservation.
- 6.13 Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).
- 6.14 Visit to an area to document environmental assets: river/forest/flora/fauna, etc.
- 6.15 Visit to a local polluted site- Urban/ rural/ Industrial/Agricultural.
- 6.16 Study of common plants, insects, birds and basic principles of identification.
- 6.17 Study of simple ecosystems- pond, river, Delhi Ridge, etc.

**Recommended Text/ Reference Books:**

1. Bridge, J. & Demicco, R. 2008. Earth Surface Processes, Landforms and Sediment deposits. Cambridge University Press.
2. Duff, P. M. D. and Duff, D. (Eds.). 1993. Holmes' Principles of Physical Geology. Taylor & Francis.
3. Gupta, A. K., Anderson, D. M., & Overpeck, J. T. 2003. Abrupt changes in the Asia southwest monsoon during the Holocene and their links to the North Atlantic Ocean. Nature 421: 354-357.
4. Gupta, A. K., Anderson, D. M., Pandey, D. N., & Singhvi, A. K. 2006. Adaptation and human migration, and evidence of agriculture coincident with changes in the Indian summer monsoon during the Holocene. Current Science 90: 1082-1090.
5. Leeder, M., & Arlucea, M.P. 2005. Physical Processes in Earth and Environmental Sciences. Blackwell Publishing.
6. Pelletier, J. D. 2008. Quantitative Modeling of Earth Surface Processes (Vol. 304). Cambridge: Cambridge University Press. Chicago.

**Parameters of Continuous evaluation:**

The Environment course of 50 lectures will be conducted in the second semester and the examination shall be conducted at the end of the second semester. Credit System: The course will be awarded 4 credits. Exam Pattern: In case of awarding the marks, the question paper should carry 100 marks. The structure of the question paper being: Part-A, Short answer pattern - 25 marks Part-B, Essay type with inbuilt choice - 50 marks Part-C, Field Work - 25 marks

**Course Articulation Matrix:**

CO Statement (BPT 106 (T))	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2	PSO3	PSO4	PSO5
BPT 106(T).1	2	-	1	1	3	2	3	2	-	1	3	2	3
BPT 106(T).2	2	3	3	-	2	-	-	2	3	3	2	-	-
BPT 106(T).3	-	2	2	2	1	3	2	-	2	2	2	3	2
BPT 106(T).4	2	3	1	3	-	2	-	2	3	1	-	2	-
BPT 106(T).5	-	-	3	3	2	3	3	-	-	3	2	3	2
BPT 106(T).6	3	2	-	1	-	3	2	3	2	-	-	2	2

**BPT 201(T): Pathology and Microbiology (Theory)**

Periods/week	Credits	Max. Marks: 100
L: 2 T: 1	6	Continuous Evaluation: 20
Duration of Examination: 3 Hrs		End Term Examination: 80

**Course Type: Foundation**

**Course outcome:**

The student will be able to

- BPT 201(T).1. Acquire** the knowledge of concepts of cell injury & changes produced thereby in different tissues & organs - capacity of the body in healing process.
- BPT 201(T).2. Recall** the Etio – pathogenesis, the pathological effects & the clinico – pathological correlation of common infections & non-infectious diseases.
- BPT 201(T).3. Acquire** the knowledge of concepts of Neoplasia with reference to the Etiology, gross & microscopic features, diagnosis & prognosis in different tissues & organs of the body.
- BPT 201(T).4. Correlate** normal & altered morphology of different organ systems in different diseases needed for understanding disease process & their clinical significance (with special emphasis to Neuro-Musculo-skeletal & cardio-respiratory systems).
- BPT 201(T).5. Acquire** knowledge of common Immunological disorders & their resultant effects on the human body.
- BPT 201(T).6. Understand** in brief, about the Hematological diseases & investigations necessary to diagnose them & determine their prognosis.

**PART A**

**1. Pathology and Immunology**

**1.1. Inflammation & Repair**

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

**1.2. General pathology**

- 1.2.1. Cell injury- causes, mechanisms with special reference to Physical, Chemical and toxic injury and ionizing radiation.
- 1.2.2. Reversible cell injury (degenerations)-types, morphology-cellular swelling, fatty change.
- 1.2.3. Intracellular accumulations -hyaline change and mucoid change.
- 1.2.4. Irreversible cell injury, types of necrosis, apoptosis, Gangrene: types and etiopathogenesis
- 1.2.5. Pathological calcification-dystrophic and metastasis, pathogenesis and morphology
- 1.2.6. Extra- cellular accumulation-amyloidosis.
- 1.2.7. Pigments and pigmentations.

**1.3. Immunopathology**

- 1.3.1. Immune system: - organization, cell- Antibodies- Regulations of immune responses.
- 1.3.2. Hyper-sensitivity.

- 1.3.3. Secondary immune deficiency including HIV.
- 1.3.4. Organ transplantation.
- 2. Circulatory disturbances and growth disturbances**
  - 2.1. Circulatory disturbances**
    - 2.1.1. Edema- pathogenesis, Types, transudate, exudates.
    - 2.1.2. Chronic venous congestion- lung, liver and spleen.
    - 2.1.3. Thrombosis- formation fate and effects.
    - 2.1.4. Embolism- types clinical effects
    - 2.1.5. Infarction- types, common sites.
    - 2.1.6. Shocks- Pathogenesis, Types, morphologic changes.
    - 2.1.7. Atrophy- malformation, agenesis, dysplasia.
  - 2.2. Growth disturbances**
    - 2.2.1. Neoplasia- classification, histogenesis, biologic behaviour, differences between benign & malignant tumors.
    - 2.2.2. Malignant neoplasm- grades, stages, local invasion & distal spread.
    - 2.2.3. Carcinogenesis- environmental carcinogenesis: Chemical, viruses, radiations, Physical, occupational.
    - 2.2.4. Heredity and miscellaneous factors.
    - 2.2.5. Precancerous lesions & carcinoma in situ.
    - 2.2.6. Tumor & host interactions- systemic effects- metastasis or spread of tumors especially affecting bones, spinal cord leading to paraplegia etc.
- 3. Systemic pathology and clinical pathology**
  - 3.1. Systemic pathology**
    - 3.1.1. **Cardio Vascular system:** Atherosclerosis, Ischemic heart disease- (Myocardial infarctions): Pathogenesis, pathology, hypertension, congestive cardiac Failure, Rheumatic heart diseases and Peripheral vascular diseases.
    - 3.1.2. **Diseases of Blood:** Red cell disorders, anaemia, polycythaemia, Non-Neoplastic disorders and neoplastic proliferation of white cell. Bleeding Disorders: - DIC, Thrombocytopenia, coagulation Disorders.
    - 3.1.3. **Respiratory System:** COPD, pneumonia (lobar, broncho & viral), Tuberculosis: - primary and secondary, morphologic types, pleuritis, Complications, lung collapses & atelectasis.
    - 3.1.4. **Nervous system:** Reaction of nervous tissue to injury infection- & Ischemia pyogenic tuberculous and viral meningitis, cerebro-vascular diseases, Atherosclerosis, thrombosis, embolism, aneurysm, hypoxia infarction & hemorrhage, effects of Hypotension on CNS, Coma, polio myelitis, leprosy, demyelination diseases, parkinsonism, Cerebral palsy, metachromatic, leucodystrophy, dementia, Hemiplegia and paraplegia, pathogenesis & pathology of Wilson's disease, space occupying lesions (in brief), peripheral nerve injury.
    - 3.1.5. **Muscular system:** muscular dystrophy, hypertrophy, pseudo hypertrophy, atrophy, poliomyelitis, myositis, ossificans, necrosis, regeneration, myotonia. Neuro-muscular junction: myasthenia gravis, myasthenic syndromes.
    - 3.1.6. **Skeletal system:** Fracture healing, osteomyelitis, rickets, osteomalacia, bone tumors, osteoporosis, spondylosis, PID, hemarthrosis, gout, T.B. Arthritis, degenerative and inflammatory Arthritis, rheumatoid arthritis, Ankylosis spondylitis, tenosynovitis.
    - 3.1.7. **Urinary system:** Commonly encountered in paralytic bladder, common urinary tract, infections (brief), urinary calculi.
    - 3.1.8. **Gastrointestinal system:** Gastric duodenal ulcer, enteric fever, tuberculosis enteritis, gastritis (related to consumption of NSAID). Hepatic diseases: Cirrhosis and emphasis on systemic effects of portal hypertension.
    - 3.1.9. **Endocrine system:** Hyperthyroidism, diabetes.
    - 3.1.10. **Integumentary system:** melanin pigment disorders, vitiligo, psoriasis, bacterial infection, fungal infections, cutaneous tuberculosis, scleroderma, SLE, leprosy, alopecia.
    - 3.1.11. **Deficiency of vitamins:** Vitamin A, B complex, C, D, E, K

### 3.2. Clinical pathology

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

## PART B

### 4. Immunology and Bacteriology

#### 4.1. Immunology

- 4.1.1. Introduction - Definition of immunity, types of immunity, factors influencing mechanism of innate immunity, active and passive immunity, local immunity and herd immunity.
- 4.1.2. Antigens Definition, types, antigen, determinants properties of antigen
- 4.1.3. Antibodies Definition, nature, structure, classes, physical and biological properties of immunoglobulin.
- 4.1.4. Serological Reactions Definition of titer sensitivity and specificity, mention about principles types and application of Precipitation gel, diffusion glutination, complement Fixation, ELISA, RIA, immune, fluorescence, neutralization and opsonization.
- 4.1.5. Lymph Structure of primary and secondary lymphoid organs, Function of immune system, mention about cells of immune system, lymphocytes, T-cells, null cells, antigen presenting cells (APC).
- 4.1.6. Immune response Humeral CMI
- 4.1.7. Complement. Definition components biological functions.
- 4.1.8. Hypersensitivity Definition, classification, difference between immediate and delayed reactions, mechanism and manifestation of anaphylaxis, types and tests for anaphylaxis.
- 4.1.9. Vaccination National immunization programme. nature of vaccines rationale and dosage.

#### 4.2. Bacteriology

- 4.2.1. **Introduction and background:** importance of medical microbiology in diagnosis & prevention of infectious diseases. Contributions of Antony van leeuwen hock, Louis Pasteur, Robert koch, Fleming, Jenner etc.
- 4.2.2. **Definition:** Medical microbiology which includes the Bacteriology, Virology, Mycology, Parasitology and Immunology, infection, pathogen, common salsymbiosis, Host vector, contagious disease, infections disease, Epidemic, endemic, pandemic & Zoonosis, normal flora of the human body. Source, mode of infection, route of infection and endogenous and exogenous infections, reservoirs of infection.
- 4.2.3. **Morphology of Bacteria:** Bacterial cell, morphological classifications, method of studying of bacteria, staining methods and their principles especially gram and ziehl nelson staining, their importance in presumptive diagnosis.
- 4.2.4. **Physiology of bacteria:** Nutritional requirements, growth curve, culture media:- definition, classifications and application.
- 4.2.5. **Identification of bacteria** Specimen collection, transportation and processing of specimens for microbiology, diagnosis which include smear examination culture methods, biochemical reactions, serological tests and animal pathogenicity.
- 4.2.6. **Sterilization and disinfection:** Definition of sterilization disinfection asepsis antiseptis, discussion of physical methods of sterilization which includes principles and their application details On working and efficacy testing of autoclave hot air oven inspissator and koch' s steamer modes of action of chemical

#### 4.3. Systemic bacteriology

- 4.3.1. **Gram positive cocci:** Staphylococcus / Streptococcus/ Pneumococcus: morphology, pathogenesis, laboratory diagnosis.
- 4.3.2. **Gram negative cocci:** Neisseria-morphology, pathogenesis laboratory diagnosis
- 4.3.3. **Gram positive bacilli:** C. diphtheria: Morphology, pathogenesis, laboratory diagnosis, treatment, prevention and control. Mycobacterium tuberculosis: Classification, morphology, growth on L.J medium, Pathogenesis, laboratory

diagnosis, briefly mention National T.B control Programme. Atypical mycobacterium: Pathogenesis, laboratory diagnosis of HIV and Mycobacterium. M. Lepae: classification morphology pathogenesis, laboratory diagnosis.

- 4.3.4. **C. I. welchii, C.I. Tetani:** Classification, morphology, pathogenesis, laboratory diagnosis, prevention and control. Entero bacteriaeae General characters classification, (briefly mention about E coli Klebsiella, proteus and shigella).
- 4.3.5. **Salmonella:** Morphology, pathogenesis, laboratory diagnosis, prevention and control.
- 4.3.6. **Vibrio Morphology:** pathogenesis, laboratory diagnosis of V. cholera
- 4.3.7. **Spirochaetes:** Morphology, pathogenesis, laboratory diagnosis, T. pallidum, Bacteriology of Air, mention briefly Water, milk and food Mycology

## **5. Parasitology and mycology**

### **5.1. Parasitology**

- 5.1.1. Introduction to parasitology Parasite: - their nature, classification, explanation of Terminology, emerging parasitic infections.
- 5.1.2. Malaria parasites: Morphology, life cycle, pathogenesis, laboratory diagnosis.
- 5.1.3. Miscellaneous mention briefly about toxoplasma, pathogenic protozoa
- 5.1.4. Cestodes Taenia saginata and solium Echinococcus granulosus: life cycle, morphology, pathogenesis, laboratory diagnosis
- 5.1.5. Tissue nematodes morphology, life cycle, pathogenesis, laboratory diagnosis, briefly mention about T. Spiralis.

### **5.2. Mycology**

- 5.2.1. General mycology: Characterization of fungi, morphological and clinical classification of Fungi.
- 5.2.2. Superficial mycosis mention briefly.
- 5.2.3. Subcutaneous mycosis Mycetoma- pathogenesis and lab diagnosis.
- 5.2.4. Systemic mycosis- Candida Cryptococcus- morphology pathogenesis lab diagnosis with cultural characteristic.
- 5.2.5. Opportunistic fungal Aspergillosis Infection

## **6. Virology and clinical microbiology**

### **6.1. Virology**

- 6.1.1. General virology: morphology, multiplication, classification of viruses, bacteriophage. Laboratory diagnosis of viral infections, collection of Samples, Transport Cultivation and method of diagnosis
- 6.1.2. Herpes virus: Morphology, classification & pathogenesis.
- 6.1.3. Hepatitis viruses: Hepatitis-B, C: Morphology, laboratory diagnosis, prophylaxis in detail, (Mention briefly about the other hepatitis viruses)
- 6.1.4. Picorna viruses: morphology pathogenesis clinical feature Immuno prophylaxis (Polio virus)
- 6.1.5. Paramyxo viruses: Important feature of measles in relation to physiotherapy (SSPE)
- 6.1.6. HIV/AIDS, Morphology, pathogenesis, lab diagnosis, universal precautions, specific precaution and Prophylaxis for Retroviruses

### **6.2. Clinical microbiology**

- 6.2.1. Upper respiratory tract infections (sore throat) and their laboratory diagnosis.
- 6.2.2. Lower respiratory tract infections and their laboratory diagnosis.
- 6.2.3. Infection of central nervous system and their laboratory diagnosis
- 6.2.4. Wound infection and pyogenic infections
- 6.2.5. Bone and joint infections and their laboratory diagnosis.
- 6.2.6. Hospital infections role of laboratory in cross infections control policies.

### **Recommended Book :**

- Pathological Basis of Disease Saunders; 9 edition (July 28, 2014) Robbins and Cotran
- Muri's Text Book of Pathology 12th edition J.R. Andersons; 1986
- Text Book of Pathology Harsh Mohan; 6th edition Jaypee Brother; 2010

- Microbiology- An Introduction for the Health Sciences-Akerman & amp; Richards- W.B Saunders Co. 1e; 1991

**Instruction for paper setting:** Question no 1 will be compulsory for all candidates. It will consist of very short questions from entire syllabus of 20 marks. In Part A student will be required to answer 2 long questions out of 3 each of 15 marks. In Part B also student will be required to answer 2 long questions out of 3 each of 15 marks.

**Assessment Tools:**

- Assignment/Tutorials
- Sessional tests
- Preliminary Examination
- End Term Examination

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

**Course Outcome Matrix**

PO-CO Statement (BPT 201(T))	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
BPT 201(T).1	3	--	3	1	2	--	--	3	3	2	--	1	3
BPT 201(T).2	2	3	3	2	1	1	2	1	3	2	---	3	3
BPT 201(T).3	3	2	--	2	2	--	2	3	3	2	3	---	3
BPT 201(T).4	---	2	2	1	3	1	2	3	3	3	2	3	3
BPT 201(T).5	1	3	2	1	3	1	2	3	2	3	2	--	3
BPT 201(T).6	1	3	2	1	3	---	---	3	3	3	1	3	2

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**BPT 202(T): Pharmacology (Theory)**

Periods/week	Credits	Max. Marks: 100
L: 1 T:1	4	Continuous Evaluation: 20
Duration of Examination: 3 Hrs		End Term Examination: 80

**Course Type:** Foundation

**Course Outcomes:**

The student will be able to

- BPT 202(T).1. Recall and understand** the basics of pharmacology, pharmacokinetics & pharmacodynamics.
- BPT 202(T).2. Apply** the understanding the classes of the drugs, their metabolism.
- BPT 202(T).3. Evaluate** route of administration, absorption and excretion from human body
- BPT 202(T).4. Conclude** pharmacological effects of commonly used drugs by patients referred for physiotherapy
- BPT 202(T).5. Recognize** List their adverse reactions, precautions to be taken, contraindications, formulation and route of administration
- BPT 202(T).6. Design** the treatment protocol after having knowledge of drugs.

**PART A**

- 1. General pharmacology:**
  - 1.1. Definition division of pharmacology, dosage, forms, drug nomenclature.
  - 1.2. Routes of administration, advantages & disadvantages of commonly used routes of administration.
  - 1.3. Factors affecting dose of a drug, bioavailability and other important pharmacokinetic parameters.
  - 1.4. Various mechanism of action of a drug.
  - 1.5. Adverse drug reaction include drug.
  - 1.6. Adverse drug reaction including drug allergy idiosyncrasy.
  - 1.7. Drug interactions synergism antagonism etc.
- 2. Central nervous system and peripheral nervous system**
  - 2.1. Central nervous system**
    - 2.1.1. Pre anesthetic medication & G.A. and steps of anesthesia.
    - 2.1.2. Analgesics – NASID's Opioids.etc.
    - 2.1.3. Anti - Parkinsonian drug & Treatment of neurodegenerative disorders.
    - 2.1.4. Sedative & hypnotics & Treatment of Insomnia.
    - 2.1.5. Antiepileptic drug & Treatment of epileptics.
    - 2.1.6. Ethyl alcohol drug of addiction treatment of Methyl alcohol poisoning
    - 2.1.7. Drug used in common psychiatric disorders.
  - 2.2. Peripheral nervous system**
    - 2.2.1. Skeletal muscle relaxants.
    - 2.2.2. Centrally acting muscle relaxants.
    - 2.2.3. Local anesthetics.
    - 2.2.4. Anti histaminic (HI blockers).

3. **Autonomic nervous system and Endocrines**
  - 3.1. **Autonomic nervous system**
    - 3.1.1. Sympathomimetic drug, therapeutic uses of adrenaline etc.
    - 3.1.2. Beta adrenergic blockers & alpha-adrenergic blockers.
    - 3.1.3. Parasympathomimetic drug, their therapeutic uses and uses and adverse effects and treatment of myasthenia gravis.
    - 3.1.4. Atropine, Atropine substitute & treatment of organ phosphorus poisoning.
  - 3.2. **Endocrines**
    - 3.2.1. Anti-diabetes drug Treatment of Diabetes mellitus & Diabetic ketoacidosis.
    - 3.2.2. Glucocorticoids.
    - 3.2.3. Anabolic steroids.
    - 3.2.4. Ca++Metabolism, Treatment of osteoporosis etc

## PART B

4. **Gastrointestinal system, Cardiovascular system and Blood**
  - 4.1. **Gastrointestinal system**
    - 4.1.1. Laxative & purgative and treatment of constipation.
    - 4.1.2. Anti-diarrhoeal drugs & treatment of diarrhoea.
    - 4.1.3. Drug for gastric and peptic ulcer.
    - 4.1.4. Antiemetics & misc. Drugs digestants etc.
  - 4.2. **Cardiovascular system and blood**
    - 4.2.1. Anti hypertensive & Treatment of hypertension etc.
    - 4.2.2. Antianginal druge & Treatment of MI.
    - 4.2.3. Drugs used in shock, Treatment of anaphylactic shock and Hemorrhagic shock etc.
    - 4.2.4. Iron - deficiency anaemia and other anaemias.
5. **Chemotherapy**
  - 5.1. Penicillin's & Sulphonamides.
  - 5.2. Broad spectrum Antibiotics.
  - 5.3. Aminoglycosides & Treatment of urinary tract infection.
  - 5.4. Macrolides & Misc. AMA.
  - 5.5. Quinolones.
  - 5.6. Anti TB, HIV, AIDS drugs & Treatment of AIDS.
  - 5.7. Anti leprosy drug & treatment of anaerobic infections.
  - 5.8. Anti cancer drugs.
  - 5.9. Treatment of amoebiasis, helminthic infection.
  - 5.10. Antifungal druges.
  - 5.11. Anti septics & disinfectants.
6. **Miscellaneous topics**
  - 6.1. Drug acting on skin e.g. Lotions liniments ointments.
  - 6.2. Vitamin deficiency.
  - 6.3. Heavy metal antagonists & general principles of treatment of poisoning.
  - 6.4. Immuno-stimulants and Immunosuppressant.
  - 6.5. Antitussives & Bronchial asthma drugs.
  - 6.6. Drugs banned in sports & Athletes.
  - 6.7. Vaccines & sera, Immunization schedule

### Recommended Book:

1. Tripathi K.D. 2013. Essential of Medical Pharmacology. 7 th Edition. Jaypee Brothers Medical Publishers.
2. Ciccone C. 2007. Pharmacology in Rehabilitations- F. A. Davis; 4th Edition,
3. Gaddum J.H. 1948. Pharmacology. 3 rd Ed. Oxford University Press
4. Satoskar S.D. & Bhandarkar S.D. 2005. Pharmacology & Pharmacotherapeutics. Revised 19 th Edition. Elsevier.

5. Krantz J.C. & Carr C.J. 1965. Pharmacology principle of Medical practice. 6 th Ed. Williams and Wilkins
6. Brunton L., Chabner B.A. and Kollman B. 2011. Goodman and Gilman's Pharmacology basis of Therapeutic, 12 Ed. McGraw-Hill Education

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**Assessment Tools:**

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- Sessional tests
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- End Term Examination

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

**Course Outcome Matrix**

PO-CO Statement (BPT 202(T))	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
BPT 202(T).1	3	--	3	1	2	--	--	3	3	2	--	1	3
BPT 202(T).2	2	3	3	2	1	1	2	1	3	2	---	3	3
BPT 202(T).3	3	2	--	2	2	--	2	3	3	2	3	---	3
BPT 202(T).4	---	2	2	1	3	1	2	3	3	3	2	3	3
BPT 202(T).5	1	3	2	1	3	1	2	3	2	3	2	--	3
BPT 202(T).6	1	3	2	1	3	---	---	3	3	3	1	3	2

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**BPT 203(T): Electrotherapy-II (Theory)**

Periods/week	Credits	Max. Marks: 100
L: 2 T:1 P: 0	6	Continuous Evaluation: 20
Duration of Examination: 3 Hrs		End Term Examination: 80

**Course Type:** Core

**Course Outcomes:**

The student will be able to

- BPT 203(T).1. understand** the basics of electrotherapy.
- BPT 203(T).2. apply** the knowledge of electrotherapeutic modalities to patients.
- BPT 203(T).3. acquire** concept related to different types of currents & its electrical responses.
- BPT 203(T).4. understand** Location and stimulation of different motor points region wise, including the upper and lower limb, trunk & face.
- BPT 203(T).5. design** the appropriate dosage given to the patient.
- BPT 203(T).6. analyze and evaluate** the indications and contra-indications for patients

**PART A**

- 1. High frequency currents**
  - 1.1. Short wave Diathermy**
    - 1.1.1. Production, biophysical effects, types, Therapeutic effects, techniques of application, indication, contraindications, precautions, Operational skills and patient preparation, dosimetry, prescription writing of SWD.
  - 1.2. Microwave Diathermy**
    - 1.2.1. Production, biophysical effects, types, Therapeutic effects, techniques of application, indication, contraindications, precautions, Operational skills and patient preparation, dosimetry, prescription writing of MWD.
- 2. Medium frequency currents**
  - 2.1. Medium frequency current**
    - 2.1.1. conceptual framework of medium frequency current therapy, production, biophysical effects
  - 2.2. Interferential therapy**
    - 2.2.1. production, biophysical effects, types, therapeutic effects, Techniques of application, indication, contraindication, precautions, operational skill and patient preparation, prescription writing for IFT.
  - 2.3. Russian Current**
    - 2.3.1. production, biophysical effects, types, therapeutic effects, Techniques of application, indication, contraindication, precautions, operational skill and patient preparation, prescription writing
  - 2.4. Diadynamic current**
    - 2.4.1. production, biophysical effects, types, therapeutic effects, Techniques of application, indication, contraindication, precautions, operational skill and patient preparation, prescription writing

### 3. **Low frequency current**

#### 3.1. **Direct current**

- 3.1.1. Introduction of direct, alternating & modified currents.
- 3.1.2. Production of direct current -: Physiological and therapeutic effects of constant current, anodal and cathodal, Galvanism, Ionization and their application in various conditions.
- 3.1.3. Modified direct current – types of modifications of direct current, Production of interrupted and surged current, various pulses, duration and frequency and their specific effects on nerve and muscle tissue.
- 3.1.4. Modified direct current - Physiological and therapeutic effects, of different variations of modified current principles of clinical application, indications, contra indications, precautions, operational skill of equipment & patient preparation. Stimulations of different muscles and nerves.

#### 3.2. **Faradic current**

- 3.2.1. Faradic Current: wave form, production, physiological and therapeutical effects of classical faradic current.
- 3.2.2. Faradism under pressure.
- 3.2.3. Faradism under tension.

#### 3.3. **Iontophoresis**

- 3.3.1. Iontophoresis –Physical principles, principles of clinical application, different ions and their physiological and therapeutical effects indication, contraindication, precaution, operational skill of equipment and patient preparation.

## **PART B**

### 4. **Ultrasound therapy and TENS**

#### 4.1. **Ultrasound therapy**

- 4.1.1. High frequency sound waves (ultrasound)-production, biophysical effects, types, Therapeutic effects, techniques of application, indication, contraindications, precautions, operational skill and patient preparation, Dosimetry, prescription writing for therapeutical Ultra sound.

#### 4.2. **Phonophoresis**

- 4.2.1. Therapeutic effects, techniques of application, indication, contraindications, precautions, operational skill and patient preparation, Dosimetry, prescription writing

#### 4.3. **Transcutaneous nerve stimulation therapy**

- 4.3.1. Transcutaneous Electrical Nerve Stimulations (TENS):-Type of low frequency, pulse widths, frequencies & intensities used as TENS application. Theories of pain relief by TENS. Types of TENS and respective physiological and therapeutical effects, indications. Principle of clinical application effects & uses, indications, contraindications, precautions, operational skills of equipment & patient preparation.

### 5. **Actinotherapy**

#### 5.1. **Infra-red rays**

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

#### 5.2. **Ultra violet rays (UVR)**

- 5.2.1. Wavelength, frequency, types & sources of IRR generation, techniques of irradiation, depth of penetration, physiological and therapeutic effects, indications, contraindications, precautions, operational skills of equipment's and patient preparation, dosimetry of UVR.

### 5.3. **LASER**

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

## 6. **Electro-diagnosis tests**

### 6.1. **Electromyography and nerve conduction velocity**

6.1.1. Instrumentation, definition & basic techniques of E.M.G. and. NCV.

### 6.2. **Biofeedback**

6.2.1. Instrumentation, principles, therapeutic effects

6.2.2. Indications, contraindication, limitations, precautions,

6.2.3. Operational skill and patient preparation.

### 6.3. **Electric stimulator test**

6.3.1. Electrical stimuli and normal behavior of nerve and Muscle tissue.

6.3.2. Type of lesion and development of reaction of degeneration.

6.3.3. Difference between Faradic – long duration Intermittent direct current response.

6.3.4. S.D. Curve and its application.

6.3.5. Chronaxie, Rheobase & Pulse ratio.

## **Recommended books**

1. Clayton E.B., Palastanga N.; Forster A. 1981. Clayton's Electrotherapy: theory and Practice. 9<sup>th</sup> Ed. London: Bailliere Tindall.
2. Robertson V., Ward A., Low J., and Reed A. 2006. Electrotherapy Explained: Principles & practice. 4<sup>th</sup> Ed. Butterworth Heinmann.
3. Watson T. 2008. Electrotherapy, evidence-based practice. 12<sup>th</sup> Ed. Churchill Livingstone.
4. Prentice W.E. 2005. Therapeutic Modalities in Rehabilitation. 3rd Edition. McGraw-Hill Medical publication.
5. Knight, K.L. and Draper D.O. 2013. Therapeutic Modalities: The Art and Science. 2<sup>nd</sup> Ed. Lippincott Williams and Wilkins.

**Instruction for paper setting:** Question no 1 will be compulsory for all candidates. It will consist of very short questions from entire syllabus of 20 marks. In Part A student will be required to answer 2 long questions out of 3 each of 15 marks. In Part B also student will be required to answer 2 long questions out of 3 each of 15 marks.

## **Assessment Tools:**

- Assignment/Tutorials
- Sessional tests
- Preliminary Examination
- End Term Examination

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

### Course Outcome Matrix

PO-CO Statement (BPT 203(T))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PSO 1	PSO 2	PSO 3	PSO 4	PSO5
BPT 203(T).1	3	--	3	1	2	--	--	3	3	2	--	1	3
BPT 203(T).2	2	3	3	2	1	1	2	1	3	2	---	3	3
BPT 203(T).3	3	2	--	2	2	--	2	3	3	2	3	---	3
BPT 203(T).4	---	2	2	1	3	1	2	3	3	3	2	3	3
BPT 203(T).5	1	3	2	1	3	1	2	3	2	3	2	--	3
BPT 203(T).6	1	3	2	1	3	---	---	3	3	3	1	3	2

**BPT 203 (P): Electrotherapy-II (Practical)**

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	2	Continuous Evaluation: 20
Duration of Examination: 3 Hrs		End Term Examination: 80

**Course Type:** Core

**Course Outcomes:**

The student will be able to

- BPT 203(P).1. understand** the basics of electrotherapy.
- BPT 203(P).2. apply** the knowledge of electrotherapeutic modalities to patients.
- BPT 203(P).3. acquire** concept related to different types of currents & its electrical responses.
- BPT 203(P).4. understand** Location and stimulation of different motor points region wise, including the upper and lower limb, trunk & face.
- BPT 203(P).5. design** the appropriate dosage given to the patient.
- BPT 203(P).6. analyze and evaluate** the indications and contra-indications for patients

**1. High frequency currents**

- 1.1. To study a short-wave diathermy unit, its operation and different methods of application-region wise.
- 1.2. To study a microwave diathermy unit its operation and different methods of application region Wise.

**2. Medium frequency currents**

- 2.1. To study an Interferential therapy unit its operation and different methods of application region wise.
- 2.2. To study a Russian current and diadynamic current unit its operation and different methods of application region wise.

**3. Low frequency current**

- 3.1. Therapeutic application of different direct currents
- 3.2. Therapeutic application of different low frequency currents faradic foot bath, faradism under pressure, faradism under tension, iontophoresis.

**4. Ultrasound therapy and TENS**

- 4.1. To study an ultrasound unit its operational and different method of application-region wise.
- 4.2. To study a TENS Stimulator, its operation and application -region wise.

**5. Actinotherapy**

- 5.1. To study the different types of Ultra violet units, their operation, and assessment of test dose and application of I.R.R - region wise.
- 5.2. To study the different types of Ultra violet units, their operation, and assessment of test dose and application of U.V.R. - region wise.
- 5.3. To study LASER unit its operation and different methods of application region wise.

**6. Electro-diagnosis tests**

- 6.1. To observe various electro- myography (EMG) procedures.

- 6.2. To observe various electro - neurography (ENG/ NCV) Procedures.
- 6.3. To study a bio feedback unit, its operation and different methods of application-region wise.
- 6.4. To study the reactions of degeneration of nerves, to plot strength duration curves.

### Recommended books

1. Clayton E.B., Palastanga N.; Forster A. 1981. Clayton's Electrotherapy: theory and Practice. 9<sup>th</sup> Ed. London: Bailliere Tindall.
2. Robertson V., Ward A., Low J., and Reed A. 2006. Electrotherapy Explained: Principles & practice. 4<sup>th</sup> Ed. Butterworth Heinmann.
3. Watson T. 2008. Electrotherapy, evidence-based practice. 12<sup>th</sup> Ed. Churchill Livingstone.
4. Prentice W.E. 2005. Therapeutic Modalities in Rehabilitation. 3rd Edition. McGraw-Hill Medical publication.
5. Knight, K.L. and Draper D.O. 2013. Therapeutic Modalities: The Art and Science. 2<sup>nd</sup> Ed. Lippincott Williams and Wilkins.

### Assessment Tools:

- Practical Viva (I and II)
- Preliminary
- File/Log Book
- End Term Examination

### Parameter of Continuous Evaluation:

<b>Viva - I</b>	<b>25%</b>
<b>Viva - II</b>	<b>25%</b>
<b>Preliminary Viva</b>	<b>35%</b>
<b>File/ Log Book</b>	<b>15%</b>

### Course Outcome Matrix

PO-CO Statement (BPT 203(P))	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 203(P).1	3	--	3	1	2	--	--	3	3	2	--	1	3
BPT 203(P).2	2	3	3	2	1	1	2	1	3	2	---	3	3
BPT 203(P).3	3	2	--	2	2	--	2	3	3	2	3	---	3
BPT 203(P).4	---	2	2	1	3	1	2	3	3	3	2	3	3
BPT 203(P).5	1	3	2	1	3	1	2	3	2	3	2	--	3
BPT 203(P).6	1	3	2	1	3	---	---	3	3	3	1	3	2

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**  
(Deemed to be University under section 3 of the UGC Act, 1956)

**BPT 204 (T): Exercise Therapy (Theory)**

Periods/week	Credits	Max. Marks: 100
L: 2 T:1 P: 0	6	Continuous Evaluation: 20
Duration of Examination: 3 Hrs		End Term Examination: 80

**Course Type:** Core

**Course Outcomes:**

The student will be able to

- BPT 204(T).1. Understand** the basics of exercise therapy.
- BPT 204(T).2. Acquire** basic knowledge related to posture & gait
- BPT 204(T).3. Understand & apply** the basic skills related to hydrotherapy
- BPT 204(T).4. Develop** concept related to motor learning.
- BPT 204(T).5. Acquire** knowledge related to mobilization and breathing exercises
- BPT 204(T).6. Inculcate** the foundation and principles related to group therapy & yoga

**PART A**

1. **Therapeutic Exercises**
  - 1.1. Principal classification techniques physiological & therapeutic effects indications & contraindications of therapeutic exercises.
  - 1.2. Assessment & evaluation of a patient (region wise) to plan a therapeutic exercise program.
  - 1.3. Joint mobility etiogenesis of joint stiffness general techniques of mobilization, effects, indications, contraindication & precautions.
  - 1.4. Muscle insufficiency - etiogenesis of muscle insufficiency (strength tone power, endurance & volume), general techniques of strengthening effects indication, contraindications & precautions.
  - 1.5. Neuromuscular in co-ordination-review normal neuromuscular coordination, etiogenesis of neuromuscular in co-ordination & general therapeutic techniques effects indications, Contraindication & precautions.
  - 1.6. Functional re-education- general therapeutic techniques to re-educate ADL function.
2. **Posture, balance and gait**
  - 2.1. Normal posture-overview of the mechanism of normal posture.
  - 2.2. Abnormal posture -assessment types aetiogenesis management including therapeutic Exercise.
  - 2.3. Static and dynamic balance- assessment & management including therapeutic exercise.
  - 2.4. Gait-overview of normal gait & its components.
  - 2.5. Gait-deviations-assessment, types, aetiogenesis, management including therapeutic exercise.
  - 2.6. Types of walking aid indications effects & various training techniques.
3. **Hydrotherapy**
  - 3.1. Basic principles of fluid mechanic as they relate to hydrotherapy.
  - 3.2. Physiological & therapeutic effects of hydrotherapy including joint mobility, muscle strengthening & wound care etc.

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

## **PART B**

### **4. Motor learning**

- 4.1. Introduction to motor learning
  - 4.1.1. Classification of motor skills.
  - 4.1.2. Measurement of motor performance.
- 4.2. Introduction of motor control
  - 4.2.1. Theories of motor control.
  - 4.2.2. Application.
- 4.3. Learning Environment
  - 4.3.1. Learning of skill.
  - 4.3.2. Instruction & augmented feedback.
  - 4.3.3. Practice condition.

### **5. Special techniques**

- 5.1. Introduction to special mobilization & manipulation techniques effects indication & contraindications.
- 5.2. Conceptual framework, principle of proprioceptive neuromuscular facilitation (PNF) techniques including indication therapeutic effects and precautions.
- 5.3. Principles of traction physiological & therapeutic effects classification types indications contraindications techniques of application operational skill & precautions.
- 5.4. Review normal breathing mechanism, types, techniques, indication, contraindications, Therapeutic effects & precautions of breathing exercise.

### **6. Exercise & Yoga**

- 6.1. Group theory – types, advantages & disadvantages.
- 6.2. Exercise for the normal person - importance and effects of exercise to maintain optimal health & its role in the prevention of diseases Types advantages, disadvantages, indications, contraindications & precautions for all age group.
- 6.3. Introduction to yoga - conceptual framework various asanas the body mind relationship effects & precautions.

### **Reference Books**

1. C.C.Norkin and D.J. White. 2009. Measurement of Joint Motion: A Guide to Goniometry. 4th Ed. F.A. Davis Company.
2. P.Barron. 2009. Hydrotherapy Theory and Technique. 4th Ed. Pine Island Publishers.
3. L.T. Brody,C.M. Hall. 2010. Therapeutic Exercise: Moving Toward Function. 3rd Ed. Lippincott
4. Williams and Wilkins.
5. D.Gardiner. 1985. Principles of Exercise Therapy. 4th Ed. CBS Publishers
6. S.Litch 1976. Massage, Manipulation & Traction. 1st Ed. Krieger Publication Company.
7. C.Kisner.2012. Therapeutic Exercise— foundation & techniques. 6th Ed. FA Davis Co.

**Instruction for paper setting:** Question no 1 will be compulsory for all candidates. It will consist of very short questions from entire syllabus of 20 marks. In Part A student will be required to answer 2 long questions out of 3 each of 15 marks. In Part B also student will be required to answer 2 long questions out of 3 each of 15 marks.

**Assessment Tools:**

- Assignment/Tutorials
- Sessional tests
- Preliminary Examination
- End Term Examination

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

**Course Outcome Matrix**

PO-CO Statement (BPT 204(T))	PO 1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 204(T).1	3	1	3	1	-	3	2	-	1	-	2	-	2
BPT 204(T).2	3	-	2	-	2	3	2	-	2	3	-	-	2
BPT 204(T).3	1	3	3	2	1	1	-	1	3	3	1	2	3
BPT 204(T).4	2	-	2	2	-	3	-	2	1	-	-	-	3
BPT 204(T).5	3	2	3	-	2	1	-	-	3	3	2	2	3
BPT 204(T).6	2	-	3	3	2	-	3	3	2	1	1	-	3

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**  
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**BPT 204 (P): Exercise Therapy (Practical)**

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	2	Continuous Evaluation: 20
Duration of Examination: 3 Hrs		End Term Examination: 80

**Course Type:** Core

**Course Outcomes:**

The student will be able to

- BPT 204(P).1. Learn & apply** the assessment & evaluation of exercise muscles
- BPT 204(P).2. Assess & Evaluate** problems related to posture & gait
- BPT 204(P).3. Understand & apply** the basic skills related to hydrotherapy.
- BPT 204(P).4. Learn & evaluate** motor learning & augmented feedback.
- BPT 204(P).5. Acquire** knowledge related to mobilization and breathing exercises
- BPT 204(P).6. Analyse and design** rehabilitation techniques related to group therapy & yoga

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

**Reference Books**

1. C.C.Norkin and D.J. White. 2009. Measurement of Joint Motion: A Guide to Goniometry. 4th Ed. F.A. Davis Company.
2. P.Barron. 2009. Hydrotherapy Theory and Technique. 4th Ed. Pine Island Publishers.
3. L.T. Brody,C.M. Hall. 2010. Therapeutic Exercise: Moving Toward Function. 3rd Ed. Lippincott
4. Williams and Wilkins.
5. D.Gardiner. 1985. Principles of Exercise Therapy. 4th Ed. CBS Publishers
6. S.Litch 1976. Massage, Manipulation & Traction. 1st Ed. Krieger Publication Company.
7. C.Kisner.2012. Therapeutic Exercise— foundation & techniques. 6th Ed. FA Davis Co.

**Assessment Tools:**

- Practical Viva (I and II)
- Preliminary
- File/Log Book
- End Term Examination

**Parameter of Continuous Evaluation:**

<b>Viva - I</b>	<b>25%</b>
<b>Viva - II</b>	<b>25%</b>
<b>Preliminary Viva</b>	<b>35%</b>
<b>File/ Log Book</b>	<b>15%</b>

**Course Outcome Matrix**

PO-CO Statement (BPT 204(P))	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 204(P).1	3	--	3	1	2	--	--	3	3	2	--	1	3
BPT 204(P).2	2	3	3	2	1	1	2	1	3	2	---	3	3
BPT 204(P).3	3	2	--	2	2	--	2	3	3	2	3	---	3
BPT 204(P).4	---	2	2	1	3	1	2	3	3	3	2	3	3
BPT 204(P).5	1	3	2	1	3	1	2	3	2	3	2	--	3
BPT 204(P).6	1	3	2	1	3	---	---	3	3	3	1	3	2

**MANAV RACHNA INTERNATIONAL INSTITUTE OF RESEARCH AND STUDIES**  
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**BPT 205 (T): Biomechanics (Theory)**

Periods/week	Credits	Max. Marks: 100
L: 1 T:1 P: 0	4	Continuous Evaluation: 20
Duration of Examination: 3 Hrs		End Term Examination: 80

**Course Type:** Core

**Course Outcomes:**

The student will be able to

- BPT 205(T).1.** **understand** the role of mechanics in movement  
**BPT 205(T).2.** **recall and analyse** normal human movements from global perspective.  
**BPT 205(T).3.** **describe** the osteokinetics, arthrokinematics and kinetics of upper limb, lower limb and spine.  
**BPT 205(T).4.** **describe** the quantity methods of movement analysis using various analytical methods.  
**BPT 205(T).5.** **analyse** the normal and pathological posture and gait.  
**BPT 205(T).6.** **recall** the basics principles of biomechanics for upper limb, lower limb and spine with physiotherapy intervention.

**PART A**

**UNIT 1: Mechanics, Posture and gait**

**1.1. Mechanics**

- 1.1.1. Introduction to mechanics including types of motion (planes, direction and quantity of motion), forces, parallel forces system (vector component).
- 1.1.2. Concurrent force system-composition forces, muscle action line, torque, moment arm of muscle force.
- 1.1.3. Newton's Law of motion, law of inertia, law of reaction, friction.
- 1.1.4. Center of Gravity, line of gravity, stability and equilibrium,
- 1.1.5. Simple machine: Levers, pulleys, mechanical advantage of simple machine, moment arm and anatomic pulleys.
- 1.1.6. Introduction to kinesiology: Kinematics and kinetics

**1.2. Posture**

- 1.2.1. Posture: Definition, factors responsible for posture, relationship of gravity on posture
- 1.2.2. Postural in balance: factors responsible for static and dynamic posture
- 1.2.3. Abnormal posture

**1.3. Gait**

- 1.3.1. Description of normal gait, determinants of gait, spatial-temporal parameters.
- 1.3.2. Kinematics and kinetics of gait
- 1.3.3. Gait division: Types, causative factors and analysis.
- 1.3.4. Abnormal gait

## **UNIT 2: Structure and function of muscle, joint, ligament, tendon and bone.**

### **2.1. Muscle Structure and Function**

- 2.1.1. Elements of muscles structure and muscles work, mobility and stability functions of muscle
- 2.1.2. Muscle fiber: composition, types, size, number and arrangement of muscle fiber
- 2.1.3. Muscle tension: Active and passive tension, length-tension relationship, force-velocity relationship, factors affecting muscle tension, motor unit
- 2.1.4. Classification of muscle: spurt and shunt muscle, tonic and phasic muscles
- 2.1.4. Types of muscle contraction: concentric, eccentric, isometric and isokinetic contraction and muscles work.
- 2.1.5. Group action of muscles and coordinated movement, agonist antagonist and synergist muscles
- 2.1.6. Factors affecting muscle function: type of joint, location of muscle, number of joints, active and passive insufficiency, sensory receptors.

### **2.2. Joint Structure and Function**

- 2.2.1. Basic principles of joint design of human joint.
- 2.2.2. Tissues present in human joint including dense fibrous tissue, bone, cartilage and connective tissue.
- 2.2.3. Classification of joints: Synarthrosis, Amphiarthrosis, Diarthrosis
- 2.2.4. Joint function, Kinematics chains and range of motion.
- 2.2.5. General effects of injury and disease
- 2.2.6. Stability and mobility factors of joint
- 2.2.7. Axis, plane and degree of freedom of the spine, shoulder girdle, joints of the upper extremity, pelvic girdle, and the joints of the lower extremity

### **2.3. Ligaments and tendon mechanics**

- 2.3.1. Structure, composition, and mechanical properties.
- 2.3.2. Muscle tendon properties.
- 2.3.3. Changes with aging, exercise and immobilization in ligaments and tendons.

### **2.4. Bone mechanics**

- 2.4.1. Structure, composition and mechanical properties
- 2.4.2. Changes with ageing, exercise, and immobilization in bones.

## **UNIT 3: The Vertebral Column and Shoulder Complex**

### **3.1. Regional Structure and Function of vertebral column**

- 3.1.1. Articulations, ligaments, muscles, vertebrae, intervertebral disc.
- 3.1.2. Factors of stability and mobility of vertebral column: flexion, extension, lateral bending and rotation.
- 3.1.3. Regional structure and function of cervical, dorsal, lumbar and sacral vertebrae.
- 3.1.4. Characteristics- curves, rhythms, movements, rotations.
- 3.1.5. Lumbo-pelvic rhythm.
- 3.1.6. Muscle of vertebral column: flexors, extensors, rotators and lateral flexors.

### **3.2. Regional Structure and Function of Shoulder complex**

- 3.2.1. Structural components and their significance.
- 3.2.2. Articular surface, ligaments, accessory joint structures and range of motions: sternoclavicular, acromioclavicular, scapulothoracic and glenohumeral joints.
- 3.2.3. Contributions of each joint in mobility of shoulder complex.
- 3.2.4. Function of shoulder complex including stability factors including dynamic stability of glenohumeral rhythm and scapulothoracic rhythm.
- 3.2.5. Scapulohumeral rhythm
- 3.2.6. Muscles and movements of shoulder complex (kinematics and kinetics).

- 3.2.7. Restriction, limitations and deficits and their effects on shoulder functions.

## **PART B**

### **UNIT 4: The Elbow, wrist and hand Complex**

#### **4.1. Regional Structure and Function of Elbow complex**

- 4.1.1. Structure and function of the elbow complex – humeroulnar and humeroradial articulations, superior and inferior radioulnar joints.
- 4.1.2. Mobility and stability of the elbow complex and its relationship with wrist and hand.
- 4.1.3. Effects of immobilization, injury and resistance to longitudinal, compression, distraction and medial lateral forces.
- 4.1.4. Factors limiting motion in supination and pronation, flexion and extension.

#### **4.2. Regional Structure and Function of wrist and hand complex**

- 4.2.1. Structure and function of wrist and hand complex: radiocarpal, midcarpal, carpometacarpal, MCP, PIP and DIP joints.
- 4.2.2. Muscles and movements of wrist and hand complex: intrinsic and extrinsic muscle, gliding mechanism of flexors and extensors, optimizing length of extrinsic muscle.
- 4.2.3. Functional position of the wrist and hand.
- 4.2.4. Prehensions, power, cylindrical, spherical and hook grasp.
- 4.2.5. Precision handling, pad to pad, tip to tip, and pad to side prehension.

### **UNIT 5: The Hip and Knee Complex**

#### **5.1. Regional Structure and function of Hip complex**

- 5.1.1. Internal architecture of femur and pelvis
- 5.1.2. Hip joint and Pelvis: Articulation, ligaments, movements.
- 5.1.3. Axis, plane and range of movement: lumbar spine, pelvis and hip joint.
- 5.1.4. Tilt, rhythm and contribution of lumbar spine and pelvis on hip joint.
- 5.1.5. Muscle and movements of Pelvic motions rotation, tilt and hip joint.
- 5.1.6. Reduction of weight on shifting- using cane (in muscular weakness and bony deformities).

#### **5.2. Regional Structure and function of knee complex**

- 5.2.1. Structure and function of Knee complex: tibiofemoral and patellofemoral joints.
- 5.2.2. Movement- axis, plane, degree of freedom, range of motion.
- 5.2.3. Function of menisci: locking and unlocking.
- 5.2.4. Muscle function around knee complex.
- 5.2.3. Articulations and their contribution in mobility and stability of knee complex (dynamic and static stabilizers).
- 5.2.4. Weight transfer in normal and abnormal conditions
- 5.2.5. Effect of injury and other pathological conditions on the knee efficiency.

### **UNIT 6: The Ankle and Foot Complex**

#### **6.1. Regional Structure and function of Ankle complex**

- 6.1.1. Structure and function of Ankle Complex: ankle joint, tibiofibular joint, subtalar joint.
- 6.1.2. Articulations, joint capsules, ligaments, muscles
- 6.1.3. Axis of motion, range of motion, muscle action.
- 6.1.4. Mobility and stability of ankle joint.

#### **6.2 Regional Structure and function of Foot complex**

- 6.2.1. Structure and function of Foot Complex: transverse tarsal joint, tarsometatarsal joint, Metatarsophalangeal joints, interphalangeal joints.
- 6.2.2. Articulations, joint capsules, ligaments, muscles.
- 6.2.3. Plantar arches
- 6.2.4. Axis of motion, range of motion, muscle action.
- 6.2.5. Kinematics of midfoot and hindfoot during weight bearing and non-weight bearing
- 6.2.6. Effects of injury and resistance to forces.

**Reference Books:**

1. P. K. Levangie. Joint Structure and Function: A comprehensive Analysis. Revised Ed. F.A. Davis Company
2. B. F. LeVeau.2010. Biomechanics of Human Motion. 1st Ed. SLACK incorporated.
3. A. Reed, J. Low.1996. Basic biomechanics explained. 1st Ed. Butterworth Heinmann
4. G. I. Soderberg.1986. Kinesiology-Applied to pathological motion. Lippincott Williams and Wilkins
5. C. Norkins, 2015. Joint structure and function: A comprehensive Analysis, 5th Edition
6. Hamill, 2014. Biomechanics of Human Motion, 4th Edition, Wolters Kluwer | Lippincott Williams and Wilkins
7. Peggy A Houglum, Dolores B Bertoti, Brunnstrom's clinical kinesiology, 6TH Edition, F.A. Davis Company

**Instruction for paper setting:** Question no 1 will be compulsory for all candidates. It will consist of very short questions from entire syllabus of 20 marks. In Part A student will be required to answer 2 long questions out of 3 each of 15 marks. In Part B also student will be required to answer 2 long questions out of 3 each of 15 marks.

**Assessment Tools:**

- Assignment/Tutorials
- Sessional tests
- Preliminary Examination
- End Term Examination

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

**Course Outcome Matrix**

PO-CO Statement (BPT 204(T))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 204(T).1	2	-	2	3	-	-	1	2	2	3	2	2	2
BPT 204(T).2	3	-	2	2	-	1	2	2	2	3	3	2	2
BPT 204(T).3	3	-	2	2	-	-	2	2	2	2	3	2	3
BPT 204(T).4	2	2	3	3	1	1	3	1	1	2	2	2	3
BPT 204(T).5	2	2	3	3	1	-	3	2	2	3	3	3	3
BPT 204(T).6	3	3	3	2	2	3	3	1	1	3	3	3	3

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**BPT 205 (P): Biomechanics (Practical)**

Periods/week	Credits	Max. Marks: 100
L: 0 T: 0 P: 2	2	Continuous Evaluation: 20
Duration of Examination: 3 Hrs		End Term Examination: 80

**Course Type:** Core

**Course Outcomes:**

The student will be able to

- BPT 204(P).1. understand** the role of mechanics in movement
- BPT 204(P).2. recall and analyse** normal human movements from global perspective.
- BPT 204(P).3. describe** the osteokinetics, arthrokinematics and kinetics of upper limb, lower limb and spine.
- BPT 204(P).4. describe** the quantity methods of movement analysis using various analytical methods.
- BPT 204(P).5. analyse** the normal and pathological posture and gait.
- BPT 204(P).6. recall** the basics principles of biomechanics for upper limb, lower limb and spine with physiotherapy intervention.

**UNIT 1: Mechanics, Posture and gait**

**1.1. Mechanics**

- 1.1.1. Demonstration of Newton's Law of motion, muscle action line etc.
- 1.1.2. Application of line of gravity, stability and equilibrium, law of inertia.
- 1.1.3. Demonstration Levers, mechanical advantage and anatomic pulleys in human body.

**UNIT 2: Posture and gait**

**1.1. Posture**

- 1.1.1. Posture assessment: Normal posture and abnormal posture

**1.2. Gait**

- 1.2.1. Gait assessment: Normal gait and abnormal gait

**UNIT 3: The Vertebral Column and Shoulder Complex**

**3.1. Regional Structure and Function of vertebral column**

- 3.1.1. Measurement of forward head posture
- 3.1.2. Measurement of lumbosacral angle
- 3.1.3. Detection of rotation of spinous process

**3.2. Regional Structure and Function of Shoulder complex**

- 3.2.1. Demonstration of arthrokinematics of shoulder complex
- 3.2.2. Measurement of scapulo-thoracic rhythm
- 3.2.3. Detection of scapular position

**UNIT 4: The Elbow, wrist and hand Complex**

**4.1. Regional Structure and Function of Elbow complex**

- 4.1.1. Demonstration of Structure and function of the elbow joint – humero ulnar and humero radial articulations, superior and inferior radio ulnar joints mobility
- 4.1.2. Measurement of carrying angle

**4.2. Regional Structure and Function of wrist and hand complex**

- 4.2.1. Demonstration of structure and functions of the wrist and hand complex

- 4.2.2. Functional position of the wrist and hand.
- 4.2.3. Demonstration of Prehensions, power, cylindrical, spherical and hook grasp.
- 4.2.4. Demonstration Precision, handling, pad to pad, tip to tip, and pad to side prehension.

**UNIT 5: The Hip and Knee Complex**

**5.1. Regional Structure and function of Hip complex**

- 5.1.1. Measurement of functional limb varus under bilateral and unilateral stance
- 5.1.2. Detection of pelvic tilt: Anterior and posterior.

**5.2. Regional Structure and function of knee complex**

- 5.2.1. Determination of Q-angle
- 5.2.2. Measurement of popliteal angle

**UNIT 6: The Ankle and Foot Complex**

**6.1. Regional Structure and function of Ankle complex**

- 6.1.1. Measurement of eversion and inversion ranges at subtalar joint
- 6.1.2. Subtalar neutral joint positioning

**6.2 Regional Structure and function of Foot complex**

- 6.2.1. Measurement of calcaneal inversion and eversion in non-weight bearing and weight bearing stance

**Reference Books:**

1. P. K. LeVangie. Joint Structure and Function: A comprehensive Analysis. Revised Ed. F.A. Davis Company
2. B. F. LeVeau.2010. Biomechanics of Human Motion. 1st Ed. SLACK incorporated.
3. A. Reed, J. Low.1996. Basic biomechanics explained. 1st Ed. Butterworth Heinmann
4. G. I. Soderberg.1986. Kinesiology-Applied to pathological motion. Lippincott Williams and Wilkins
5. C. Norkins, 2015. Joint structure and function: A comprehensive Analysis, 5th Edition
6. Hamill, 2014. Biomechanics of Human Motion, 4th Edition, Wolters Kluwer | Lippincott Williams and Wilkins
7. Peggy A Houglum, Dolores B Bertoti, Brunnstrom’s clinical kinesiology, 6TH Edition, F.A. Davis Company

**Assessment Tools:**

- Practical Viva (I and II)
- Preliminary
- File/Log Book
- End Term Examination

**Parameter of Continuous Evaluation:**

<b>Viva - I</b>	<b>25%</b>
<b>Viva - II</b>	<b>25%</b>
<b>Preliminary Viva</b>	<b>35%</b>
<b>File/ Log Book</b>	<b>15%</b>

### Course Outcome Matrix

PO-CO Statement (BPT 205(P))	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 205(P).1	2	-	2	3	-	-	1	2	2	3	2	2	2
BPT 205(P).2	3	-	2	2	-	1	2	2	2	3	3	2	2
BPT 205(P).3	3	-	2	2	-	-	2	2	2	2	3	2	3
BPT 205(P).4	2	2	3	3	1	1	3	1	1	2	2	2	3
BPT 205(P).5	2	2	3	3	1	-	3	2	2	3	3	3	3
BPT 205(P).6	3	3	3	2	2	3	3	1	1	3	3	3	3

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**BPT-206(T): Sociology and psychology (Theory)**

Periods/week	Credits	Max. Marks: 100
L: 4 T:1 P: 0	10	Continuous Evaluation: 20
Duration of Examination: 3 Hrs		End Term Examination: 80

**Course Type:** Core

**Course Outcomes:**

The student will be able to

- BPT 206(T).1. understand** the core sociological concepts and its importance in the health care delivery system
- BPT 206(T).2. recognize** the role of family and community in the development of human behaviour
- BPT 206(T).3. develop** the knowledge, skills, and attitudes necessary to be engaged members of the community.
- BPT 206(T).4. recall** the basic psychology of the individual.
- BPT 206(T).5. analyse and apply** the appropriate psychotherapeutic interventions for the patients' presenting problems, diagnoses, and level of functioning.
- BPT 206(T).6. create** the effective, culturally-competent, goal-directed psychotherapy in a variety of modalities, including individual, family, and group therapy.

**PART A**

1. **Introduction to Sociology & Psychology**
  - 1.1. **Sociology**
    - 1.1.1. Introduction
    - 1.1.2. Meaning - Definition and scope of sociology
    - 1.1.3. It's relation with Anthropology, Psychology, Social Psychology and Ethics opinion poll methods
    - 1.1.4. Importance of its study with special reference to Health Care Professionals
    - 1.1.5. Social Factors in Health and Disease
    - 1.1.6. The Meaning of Social factors
    - 1.1.7. The role of social factors in health and illness
    - 1.1.8. Socialization
    - 1.1.9. Meaning and nature of socialization
    - 1.1.10. Primary Secondary and Anticipatory Socialization
    - 1.1.11. Agencies of Socialization
  - 1.2. **General Psychology**
    - 1.2.1. Definition, application and methods in psychology.
    - 1.2.2. Biology of Behaviour.
    - 1.2.3. Sensory processes and perception.
    - 1.2.4. Brief description of psychological assessment and testing.
    - 1.2.5. Abnormal Psychology.
    - 1.2.6. Therapy for Psychological distress

## **2. Family & Social Groups**

### **2.1. Family**

**2.1.1.** Influence of Family on the individuals health, family and nutrition, the effects of sickness of family and Psycho-somatic disease and their importance to Physiotherapy

### **2.2. Social Groups**

**2.3.** Concepts of social groups influence of formal and informal groups of health and sickness

**2.4.** The role of primary groups and secondary groups in the hospital and rehabilitation settings

## **3. Social Control, Change & Security**

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

### **3.2. Social Change**

**3.2.1.** Meaning of social changes

**3.2.2.** Factors of social change

**3.2.3.** Human adaptation and social change

**3.2.4.** Social change and stress

**3.2.5.** Social change and deviance

**3.2.6.** Social change and health programme

**3.2.7.** The role of social planning in the improvement of health and rehabilitation

**3.3. Social Security:** Social security and social legislation in relation to the disabled

## **PART B**

## **4. Social Problem**

**4.1.** Consequences of the following social problems in relation to sickness and Disability, remedies to prevent these problems

**4.2.** Population explosion

**4.3.** Poverty and' unemployment

**4.4.** Piggery

**4.5.** Juvenile delinquency

**4.6.** Prostitution

**4.7.** Alcoholism

**4.8.** Problems of women in employment

**4.9.** Social worker

**4.10.** Meaning of social work

**4.11.** The role of medical social worker

**4.12.** Caste System: Features of the modern caste system and its trends

## **5. Learning, Motivation and development**

**5.1.** Principles of learning: Classical and Instrumental Conditioning, Cognitive learning.

**5.2.** Memory: Theories, long and short – term memories, forgetting, amnesia.

**5.3.** Thinking and Language: Concepts, thinking process, problem- solving and decision making, creative thinking and language communication.

**5.4.** Motivation: Theories, Biological and Social motives, frustration and conflict of motives, motives to know and be effective.

**5.5.** Emotion and Stress: Expression and perception of emotions, physiology and application of emotion.

**5.6.** Social perceptions, influences, and relationships.

**5.7.** Attitudes; Nature and measurement of attitudes, Attitude theories, Factors in attitude change, behavior and attitudes

**5.8.** Development – A Lifespan Perspective (infancy, childhood, adolescence, adult, old age)

## 6. Personality, disorders and importance of counselling and communication

- 6.1. Personality: Defining and thinking about personality, Theories and issues and controversies and research
- 6.2. Anxiety disorders
- 6.3. Personality disorder
- 6.4 Counselling and Communication

### Recommended Books

1. K.P.Neeraja.2010. Textbook of Sociology for Physiotherapy Students. 2nd edition. Jaypee Publisher.
2. V.Bhushan, D.R. Sachdeva.2014. Introduction to Sociology. Kitab Mahal.
3. J.H.Turne.1995. The Structure of Sociological Theory. 4th Edition. Dorsey Press.
4. B.Kuppuswamy.1979. Social changes in India.5th Edition. Vikas Publication. New Delhi.
5. R. Ahuja. 2014. Social Problems in India. 3rd Edition. Rawat Publication. Delhi.
6. E.V.Teijlingen and Humphris G. Psychology & sociology applied to medicine. 4th Edition. Elsevier Publication
7. M.Mehta.2009. Behavioural Sciences for medical undergraduate 2nd Ed. Jaypee Brothers Medical Publishers.
8. S.M.Mohsin.Elementary Psychology. Motilal Banarsidass, New Delhi. 3. D.K. Henderson.1962. Henderson and Gellipie's Text Book of Psychiatry. 9th Ed. Oxford University Press.
9. V.M.D. Namboodiri.2016. An Introduction to Psychiatry. 1st Ed. CBS publishers and distributors
10. Porter & Alder. Psychology & sociology-applied to medicine. W.B Saunders Co

**Instruction for paper setting:** Question no 1 will be compulsory for all candidates. It will consist of very short questions from entire syllabus of 20 marks. In Part A student will be required to answer 2 long questions out of 3 each of 15 marks. In Part B also student will be required to answer 2 long questions out of 3 each of 15 marks.

### Assessment Tools:

- Assignment/Tutorials
- Sessional tests
- Preliminary Examination
- End Term Examination

<b>Sessional - I</b>	<b>25%</b>
<b>Sessional - II</b>	<b>25%</b>
<b>Preliminary Exam</b>	<b>35%</b>
<b>Assignment</b>	<b>15%</b>

### Course Outcome Matrix

PO-CO Statement (BPT 206(T))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 206(T).1	2	1	2	1	2	2	1	2	2	3	-	1	2
BPT 206(T).2	1	1	2	2	1	1	2	2	3	1	-	2	-
BPT 206(T).3	2	2	1	1	2	-	1	2	2	1	1	-	3
BPT 206(T).4	3	-	-	-	-	2	1	1	2	-	2	1	2
BPT 206(T).5	3	1	2			2	-	2	3	-	1	-	-
BPT 206(T).6	-	2	2	1	-	3	-	1	1	-	2	2	3

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**BPT 207(P): Computer Application (Practical)**

Periods/week	Credits	Max. Marks: 100
L: 4 T:1 P: 0	10	Continuous Evaluation: 20
Duration of Examination: 3 Hrs		End Term Examination: 80

**Course Type:** Core

**Course Outcomes:**

The student will be able to

- BPT 206(P).1. understand** the basic knowledge of networking.
- BPT 206(P).2. apply** the knowledge of various software.
- BPT 206(P).3. acquire** concept of latest researches in software.
- BPT 206(P).4. understand** various skills about Microsoft word.
- BPT 206(P).5. design** the appropriate skills for Microsoft excel.
- BPT 206(P).6. analyse and evaluate** the various components of computer.

**1. Components of computer**

- 1.1. To study the various components of a personal computer

**2. Knowledge of hardware and software**

- 2.1. To have knowledge about Microsoft word
- 2.2. To have knowledge about Microsoft excel
- 2.3. To have knowledge about Microsoft PowerPoint
- 2.4. Graphics

**3. Works processing & spread sheet software**

- 3.1. To practice the operational skill of common computer application including works processing & spread sheet software.

**4. Knowledge about multi-media**

- 4.1. To have a basic knowledge of utility of multi- media.
- 4.2. Introduction to operating system
- 4.3. Basic idea of Local area network (LAN), Wide area network (WAN), E-mail, internet browsing and multimedia.

**5. Various skills and recent research**

- 5.1. To learn skills of web surfing-For literature.
- 5.2. To learn research relevance to the field of medicine.

**Assessment Tools:**

- Practical Viva (I and II)
- Preliminary
- File/Log Book
- End Term Examination

**Parameter of Continuous Evaluation:**

<b>Viva - I</b>	<b>25%</b>
<b>Viva - II</b>	<b>25%</b>
<b>Preliminary Viva</b>	<b>35%</b>
<b>File/ Log Book</b>	<b>15%</b>

**Course Outcome Matrix**

PO-CO Statement (BPT 206(P))	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO8	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
BPT 206(P).1	3	--	3	1	2	--	--	3	3	2	--	1	3
BPT 206(P).2	2	3	3	2	1	1	2	1	3	2	---	3	3
BPT 206(P).3	3	2	--	2	2	--	2	3	3	2	3	---	3
BPT 206(P).4	---	2	2	1	3	1	2	3	3	3	2	3	3
BPT 206(P).5	1	3	2	1	3	1	2	3	2	3	2	--	3
BPT 206(P).6	1	3	2	1	3	---	---	3	3	3	1	3	2