



**JSS MAHAVIDYAPEETHA**  
**JSS COLLEGE OF PHYSIOTHERAPY**  
**MYSURU**

**LESSON PLAN- 2018-19**  
**BACHELOR OF PHYSIOTHERAPY (BPT)**  
**FIRST YEAR**

**NAME OF STUDENT:**

**REGISTRATION NUMBER:**

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## **FOREWORD**

The purpose of this Lesson Plan is to guide the students on resources that are recommended to master the syllabus of each subject. This document consists of the detailed topic wise plan, along with the Time table, Assignment list for the entire year, recommended books and sample questions. Each subject syllabus is divided into modules and each module is divided into units. Every unit is provided with prescribed book, reference books and supplementary material. It is intended to help the students to refer the appropriate book. Students are directed to go through the supplementary material reference which is available at our college library wherever it is required, example-videos, web links. Each subject lesson plan is followed by sample questions which helps students to understand the format of questions in university examinations.

## **HOW TO USE THIS MANUAL**

The purpose of this Lesson Plan is to guide the students on resources that are recommended to master the syllabus of each subject. This document consists of the detailed topic wise plan, along with the Time table, Assignment list for the entire year, recommended books, Sample questions and Practical manual.

Each subject syllabus is divided into modules and each module is divided into units.

Every unit is provided with prescribed book, reference books and supplementary material. It is intended to help the students to refer the appropriate book. Students are directed to go through the supplementary material wherever it is required in the form of videos or web links.

Each subject lesson plan is followed by sample questions; it helps students to understand the format of questions in university examinations.

## TIME TABLE

	8-9am	9-10am	10-11am	11-11.15 am	11.15 to 12pm	12-1pm	1-2pm	2-3pm	3-4pm	4-5pm
<b>Monday</b>	Fitness class	Refreshment break	Psychology	Coffee/Tea break	Psychology		Lunch break	Anatomy	Physiology	
<b>Tuesday</b>	Fitness class		Biomechanics (PHS)		Sociology	Psychology			Bio mechanics VSR	Practicals (PHS)
<b>Wednesday</b>		Anatomy	Physiology Practical		Physiology			Physiology	Anatomy	
<b>Thursday</b>	Fitness class		Biomechanics (PHS)		Sociology	Sociology		Bio mechanics (NK)	Nursing	Biomechanics Practicals (NK)
<b>Friday</b>		Biochemistry	Anatomy	Biochemistry		Physiology			Anatomy Practical	
<b>Saturday</b>		Professional skill enhancement class			PBL			1 <sup>st</sup> Saturday- Remedial class 3 <sup>rd</sup> Saturday-Academic activity		

**JSS College of Physiotherapy**  
**Academic calendar 2018-19**

Date	Day	Event	Working days (180)	
May 14	Monday	Commencement of ODD batch classes		
June 16	Saturday	Ramzan	June :(25)	
July			July (26)	
August 15	Tuesday	Independence day	August(25)	
August 22	Wednesday	Bakrid		
August 27-31	Odd batch 1 <sup>st</sup> IA			
August 21	RGUHS exams			
September 1 <sup>st</sup> week		RGUHS exams		
September 3	Monday	1 <sup>st</sup> BPT commencement (2018-19) MPT 18-19 commencement	September (23)	
September 1 <sup>st</sup> week		RGUHS exams		
September 05	Observe -Teachers Day			
September 08	Observe- World Physiotherapy day			
September13	Thursday	Ganesha chaturdarshi		
September 21	Friday	Last day of Muharam		
October 02	Tuesday	Gandhi Jayanti	October ( 22)	
October 03	Wednesday	COLLEGE RE-OPENS-for exam appeared students		
October 18	Thursday	Ayudh pooja		
October 19	Friday	Vijaydashmi		
October 24	Wednesday	Vaalmiki Jayanti		
November 01	Thursday	Kannada Rajyothsava		

November 02	Friday	Observe Kannada Rajyothsava	November (21)
November 06	Tuesday	Naraka chaturdarshi	
November 8	Thursday	Balipadyami	
November 16	Wednesday	Last day of BPT admission	
November 15	Wednesday	Online uploading of admission statement on RGUHS website	
November 18	Saturday	Online payment of admission fee to RGUHS	
November 22	Monday	Getting admission register certified by registrar	
November 21	Wednesday	Eid Meelad	
November 19-25		2 <sup>nd</sup> IA for ODD batch	
November 26	Monday	Kanakadas jayanthi	December( 23)
December 3	Monday	Observe -International day of parson with disability	
December 3-9		1 <sup>st</sup> Internals	
December 17-22		Cultural week	
December 22 <sup>nd</sup> to27 <sup>th</sup>		Christmas vacation (can we make it 23 -29)	
December 25	Tuesday	Christmas	

2019-January 7-13	Sports week- Indoor events		
January 21-27	Sports week- Outdoor events Classes to be suspended		
January 19	NSS regular camp		
January 26	Republic day		
January last week	Sutturjathra		
February 4-9	3 <sup>rd</sup> IA for Odd batch		
March 04-09	2 <sup>nd</sup> Internals		
March 08	Observe International women's day		
March 12-16	NSS Camp		
March 26 –April 3	Mid term vacations Only for 1 <sup>st</sup> BPT		
March 29	Thursday		
March 30	Friday	Good Friday	
March 30		Last date for submission of Synopsis to RGUHS.	
April 13	Observe – AmbetkarJayanthi		
April 14	Saturday		
April 2 <sup>nd</sup> week	University exams for repeaters Repeaters will not be exempt from classes. They will be exempt from clinics for 2 weeks prior to exam. No post exam vacation		
April 2 <sup>nd</sup> week	RGUHS Exams for ODD Batch		
April 15	Monday		Dissertation – Fine of Rs. 1,500/- per candidate,
April 29	Saturday	Dissertation -Fine of Rs. 4,000/- per candidate	
May 01	Tuesday	May Day	

May 04	Saturday	College day	May(24) Idulfitr
May last week	2 <sup>nd</sup> MPT exams		
June 15	Friday		
June 15	Saturday	Graduation Day	June(20)
June 24-30	3 <sup>rd</sup> internal assessment		
July	IA and attendance calculations, Improvement exams		
July 22			
August 1	Wednesday	Last day - RGUHS IA marks display	July(19)
			Study holidays

# General Instructions

## All assignments must follow the following format --

- Title should be underlined and written in capitals
- Name of the student
- Introduction
- Body
- Summary
- Take home message
- References in Vancouver referencing style

## Seminars –

- Seminars must be in PowerPoint format
- Must have the following slides
  - Title of topic with name of presenters
  - Objective or aim of the presentation
  - Body of presentation
  - Summary and references
  - Ending slide should contain thank you
  - Video or pictures where necessary
  - Font of all the main heading should be Arial, times new roman, or Calibri – font size 38
  - Text should be font size 32, font style should be uniform throughout, bold or italicized important points
  - Background must be professional, avoid too much animation

Avoid *PLAGIARISM* in all assignment and seminars Self-Study

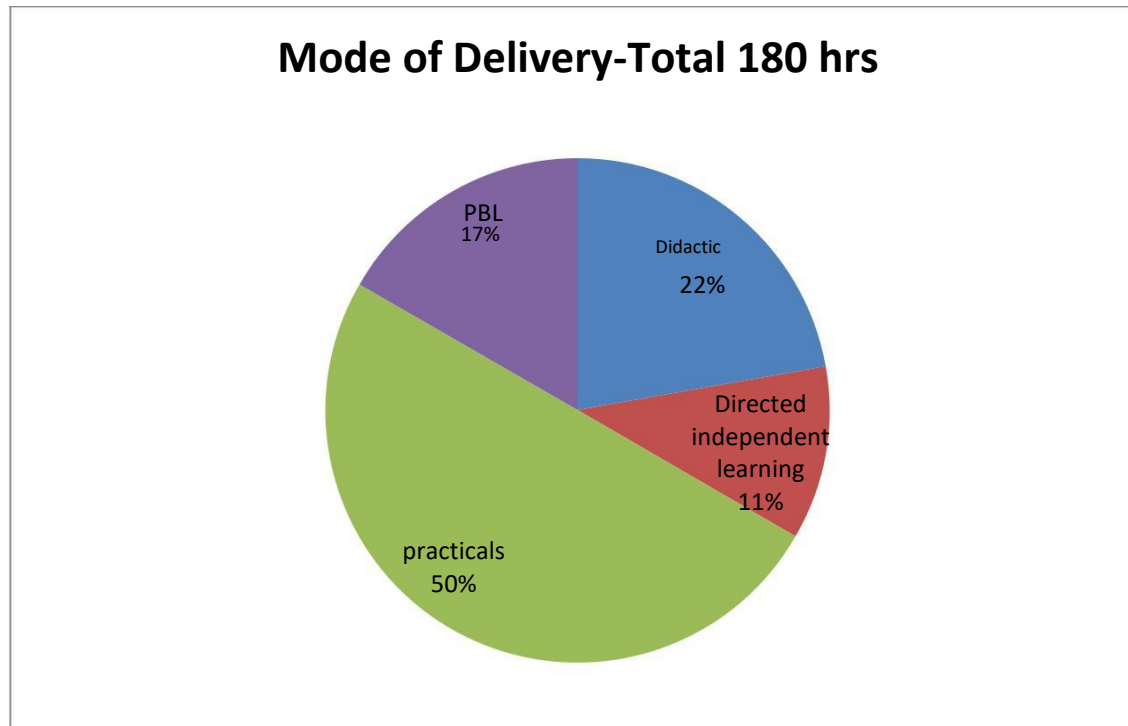
Be present in library at the allotted time. Give attendance to librarian. Read the allotted topic from reference book and digital sources mentioned in the lesson plan.

## Practical dress code—

Boys: Shorts and T shirt

Girls: Shorts / Tights and Tshirt

## BIOMECHANICS



### Method of assessment

1. Didactic: Written exams, quiz, IA exams
2. Directed independent learning: Assignments
3. Practical: IA Practical exam, Practical manual completion
4. PBL: evaluation of sessions and reflective statement

## **Objectives of the subject**

At the end of the first year the students will be able to-

- Apply the principles of mechanics to the human body and be able to articulate the same.
- Apply mechanical principles to identify difficulty and faulty movements in a healthy individual.
- Apply biomechanical evaluation to common activities –static & dynamic.

## RGUHS prescribed syllabus

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

### THEORY

#### 1. Basic Concepts in Biomechanics: Kinematics and Kinetics [3

Hours] a) Types of Motion

b) Location of Motion c)

Direction of Motion d)

Magnitude of Motion e)

Definition of Forces f)

Force of Gravity

g) Reaction forces

h) Equilibrium

i) Objects in Motion

j) Force of friction

k) Concurrent force systems

l) Parallel force systems m)

Levers

n) Pulleys

o) Work

p) Moment arm of force

q) Force components r)

Equilibrium of levers

#### 2. Joint structure and Function [ 3 Hours]

a) Joint design

b) Materials used in human joints

c) General properties of connective tissues

- d) Joint function
- e) Joint motion

### **3. Muscle structure and function [ 3 Hours]**

- a) Mobility and stability functions of muscles
- b) Elements of muscle structure
- c) Muscle function

### **4. Biomechanics of the Thorax and Chest wall [ 3Hrs]**

- a) General structure and function
- b) Rib cage movements and
- c) The muscles associated with the rib cage

### **5. The Temporomandibular Joint [ 2 Hours]**

- a) General features, structure and function

### **6. Biomechanics of the vertebral column [10 Hours]**

- a) General structure and function
- b) Regional structure and function – Cervical region, thoracic region, lumbar region, sacral region
- c) Muscles of the vertebral column
- d) Ligaments of Vertebral Column

### **7. Biomechanics of the peripheral joints (to include kinetics and kinematics) [ 52 Hours]**

- a) The shoulder complex: Structure and components of the shoulder complex and their integrated function
- b) The elbow complex: Structure and function of the elbow joint – humeroulnar and humeroradial articulations, superior and inferior radioulnar joints; mobility and stability of the elbow complex.
- c) The wrist and hand complex: Structural components and functions of the wrist complex; structure of the hand complex; prehension; functional position of the the wrist and hand.
- d) The hip complex: structure and function of the hip joint.
- e) The knee complex: structure and function of the knee joint – tibiofemoral joint and patellofemoral joint.

f) The ankle and foot complex.: structure and function of the ankle joint, subtalar joint, talocalcaneonavicular joint, transverse tarsal joint, tarsometatarsal joints, metatarsophalangeal joints, interphalangeal joints, structure and function of the plantar arches, muscles of the ankle and foot.

**8. Analysis of Posture and Gait [9 Hours] :**

- a) Static and dynamic posture, postural control, kinetics and kinematics of posture, ideal posture analysis of posture,
- b) General features of gait, gait initiation, kinematics and kinetics of gait, energy requirements, kinematics and kinetics of the trunk and upper extremities in relation to gait, stair case climbing and running.

**9. Movement Analysis [ 2 hours] :** ADL activities like sitting – to standing, lifting, various grips , pinches.

**10. Goniometry[ 2 hours]:** Parts, types, principles and uses of a goniometry. Techniques for measurement of ROM of all peripheral joints.

**11. Walking Aids[1 hour]:** Parallel bars, crutches, canes, walkers – types, parts and uses.

**The following topics are part of applied Biomechanics and are required to be taught but not for examination.**

- a) General effects of disease, injury and immobilization.
- b) Effects of immobilization, injury and aging
- c) Changes in normal structure and function I relation to pregnancy, scoliosis and COPD
- d) Effects of posture on age, pregnancy, occupation and recreation;

**PRACTICAL:** [90 Hours] shall be conducted for various joint movements and analysis of the same. Demonstration may also be given as how to analyze posture and gait. The demonstrations may be done on models or skeleton. The student shall be taught and demonstrated to analysis for activities of daily living – ADL – (like sitting to standing, throwing, lifting etc.) The student should be able to explain and demonstrate the movements occurring at the joints, the muscles involved, the movements or muscle action produced, and mention the axis and planes through which the movements occur. Measurement of Joint ROM using goniometer. Identification of walking aids.

### ***Recommended Text books***

1. *Joint Structure and Function – A comprehensive Analysis, JP Bros Medical Publishers, New Delhi.*
2. *Brunnstrom, Clinical Kinesiology, JP Bros Medical Publishers, Bangalore, 5th Ed 1996, 1st Indian Ed 1998,*
3. *Clinical Kinesiology for Physical Therapist Assistants, JP Bros Medical Publishers, Bangalore, 1st Indian Ed 1997,*

### **Reference books available at library**

1	Measurement of joint motion a guide to goniometry	Cynthia c Norkin
2	Joint structure and function	Cynthia c Norkin
3	The physiology of joint Vol I+ Vol II + Vol III	Kapandiji IA
4	Basic biomechanics	Susan J Hall
5	Biomechanical basic of human movement	Joseph Hamill
6	The physiology of joint Vol I (Upper limb)+ Vol II( Lower limb) + Vol III ( Trunk and Vertebral Column)	Kapandiji IA
7	Biomechanics of musculo skeletal injury	William C Whiting
8	Biomechanics of Sports and Exercise	Peter mc ginnis
9	Understanding joints a practical guide to their structure and function	Bernard Kingston
10	Understanding joints a practical guide to muscle function	Bernard Kingston
11	Biomechanics in physical education and exercise science	Uppal AK
12	Joint motion clinical measurement and evaluation	Soames roger
13	The bio physical foundation of human movement	Abernethy Bruce
14	Bones and joints a guide for students	Gunn Christine
15	Clinical kinesiology for Physical therapist	Lippert , lynn S
16	Joint structure and function	Levangie Pamela norkin
17	Basic biomechanics of the musculoskeletal system	Nordin, margareta

# BIOMECHANICS

## MODULES

1. **INTRODUCTION AND BIOMECHANICAL FOUNDATIONAL CONCEPTS**
  - 1.1. Biomechanical applications
  - 1.2. Joint structure and function
  - 1.3. Muscle structure and function
2. **AXIAL SKELETAL SYSTEM**
  - 2.1. Vertebral column
  - 2.2. Thorax and chest wall
  - 2.3. TM joint
3. **UPPER EXTREMITY**
  - 3.1. Shoulder complex
  - 3.2. Elbow complex
  - 3.3. Wrist and Hand
4. **LOWER EXTREMITY**
  - 4.1. Hip complex
  - 4.2. Knee complex
  - 4.3. Ankle and foot
5. **INTEGRATED FUNCTION**
  - 5.1. Posture
  - 5.2. Gait
6. **PRACTICAL**
  - 6.1. Movement Analysis
  - 6.2. Goniometry
  - 6.3. Walking aids

**Module I :INTRODUCTION AND BIOMECHANICAL FOUNDATIONAL CONCEPTS**

**Objective: At the end of the module 1.1. Biomechanical applications, The student will be able to**

- Define the terms Biomechanics, Kinematics, kinetics, Kinesiology, statistics, dynamics and explain the ways in which they are related
- Describe the scope of basics addressed by the Physiotherapist
- Identify common units of measurement used in biomechanics
- Identify mechanical loads, that act on human body
- Apply the principles to each region of body to understand the mechanics of normal movement
- Solve quantitative problems involving vector quantities using both graphics and basic trigonometric procedures

<b>Topic</b>	<b>Lesson name</b>	<b>Learning objective At the end of this session students will be able to</b>	<b>Type of instructi on</b>	<b>Prescribed Books</b>	<b>Reference book</b>	<b>Assignment</b>	<b>Items to be carrie d</b>
<b>Introducti on to Kinematic s and Kinetics (2)</b>	<ol style="list-style-type: none"> <li>1. Definition</li> <li>2. Sub divisions of Biomechanics and its definition</li> <li>3. Examples of divisions of biomechanics</li> </ol>	Define and state the principles of Biomechanics and its subdivisions	Didactic  (Tp)	Joint structure and function – Norkin 5 <sup>th</sup> ed – pages 1-5	<ol style="list-style-type: none"> <li>1. Basic biomechanics of musculoskeletal system 3<sup>rd</sup>ed – NordinP.No :3</li> <li>2. Biomechanical Basis of Human Movement – Hamill and Kathleen – Pg 2-10</li> <li>3. Basic Biomechanics – susan I Hall : pg -2-17</li> </ol>	MCQ	

<p><b>Descriptions of Motion (2)</b></p>	<ol style="list-style-type: none"> <li>Types of motion</li> <li>Location of motion</li> <li>Direction of motion</li> <li>Magnitude of motion</li> </ol>	<p>List all the types of motion and give examples</p>	<p>Practical demonstration over skeletal model on types of motion (tP)</p>	<p>Joint structure and function – Norkin 5<sup>th</sup>ed – 6-10.  Brunstrom's clinical kinesiology – smith – 5<sup>th</sup>ed – 8-17</p>	<ol style="list-style-type: none"> <li>Biomechanical Basis of Human Movement – Hamill and Kathleen – Pg 11-31</li> <li>Kinesiology – The mechanics and Pathomechanics of Human motion 2ed- Carol Oatis : pg 7-8,17-18</li> <li>Basic Biomechanics – susan I Hall : pg 459-465</li> </ol>	<p>Identify different types and direction of motion, at which plane and axis the movement occurs at body (at least five joints)</p>	<p>Rubber, Small size sponge ball and a ruler</p>
<p><b>Introduction to Forces (3)</b></p>	<ol style="list-style-type: none"> <li>Definition of forces</li> <li>Force of gravity</li> <li>Segmental COG</li> </ol>	<p>Define force. List the forces applied on the body.  Name the parts of force vector. Calculate the COG, segmental center.  Distinguish and correlate COG, LOG and BOS.</p>	<p>Videos/ demos (Tp)</p>	<p>Joint structure and function – Norkin 5<sup>th</sup>ed – 11 – 23  Brunstrom's clinical kinesiology – smith – 5<sup>th</sup>ed 21-31</p>	<p>Kinesiology – The mechanics and Pathomechanics of Human motion 2 ed- Carol Oatis: pg 8-11.13-14.</p>	<p>Identify forces acting on the body structure at different positions and experience how the body changes with positions  Identify relocation of Gravity at different positions and feel the difference</p>	

<b>Students seminar (1)</b>	Newton's Law of motion	State the Newton's Laws of forces.	Students seminar	Joint structure and function – Norkin 5 <sup>th</sup> ed – 11 – 23	Kinesiology – The mechanics and Pathomechanics of Human motion 2 ed- Carol Oatis: pg 397 -403  Basic Biomechanics – susan I Hall : pg 495-497		
<b>Reaction of forces (2)</b>	1. Equilibrium 2. Objects in motion 3. Force of Friction	State the Newton's Laws of forces.  Correlate with the Human force system.  Give Anatomical examples	Video / Inertia /acceleration/reaction  (Tp)	Joint structure and function – Norkin 5 <sup>th</sup> ed – 11 – 23	Kinesiology – The mechanics and Pathomechanics of Human motion 2 ed- Carol Oatis: pg 11-12  Kinesiology movement in the context of activity David Greene / Roberts Page 31-34	State newton's laws of forces with examples	
Good to know: Qualitative Analysis : Pt. Basic Biomechanics – Susan I Hall: pg 45-59.							
<b>Concurrent force systems (2)</b>	1. Composition of force systems	Derive the forces on human body.  Define torque, moment arm,	Video/ practical demonstration Solution / discussion	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 31 –	Kinesiology movement in the context of activity David Greene /	Try to identify the muscle force vector in your body /model	

				39 2. Brunstrom' sclnical kinesiology – smith – 5 <sup>th</sup> ed 21-31	Roberts Page 35-45  Basic Biomechanics – susan I Hall : pg 41-45		
Student seminar	Levers	Types of lever system	Student seminar	1. Joint structure and function – Norkin 5 <sup>th</sup> ed –46 - 61 2. Brunstrom' sclnical kinesiology – smith – 5 <sup>th</sup> ed 31- 49	Kinesiology movement in the context of activity David Greene / Roberts Page 12-13, 19  Basic Biomechanics – susan I Hall : pg 445-458	Identify the orders in daily activities with examples.  Each of the student has to come with examples and explanation	
<b>Parallel force systems (3)</b>	1. Principles 2. First order lever 3. Second order lever 4. Third order lever 5. Applications of lever 6. work	Define lever  identify the orders of levers in the human body function  List the anatomical examples with relation to orders	levers of human body  force calculation (advantage and disadvantage)  Lever system practical model making of types of levers  (TP)				
<b>Anatomical pulley (2)</b>	1. Pulley systems 2. Anatomical pulleys with examples of forces	describe the Pulley system with examples in human body	Video/ Model making for example of anatomical pulley and its effect on torque production  (Tp)	1. Brunstrom' sclnical kinesiology – smith – 5 <sup>th</sup> ed 60 - 61		Identify anatomical pulley and its role	Practical dress code
<b>Force</b>	1. Derivation	state the force	Derivation of	1. Joint	Kinesiology	Draw	

<b>components (3)</b>	of perpendicular and parallel systems 2. Equilibrium of levers 3. conclusion	components Derive the force systems on body	force Video demo (Tp) discussion	structure and function – Norkin 5 <sup>th</sup> ed –46 - 61 2. Brunstrom’s clinical kinesiology – smith – 5 <sup>th</sup> ed 31- 49	– The mechanics and Pathomechanics of Human motion 2 ed- Carol Oatis: pg 15-16	derivation of force with examples	
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Module 1.1. Good to Know

- Lab solutions and problems solutions

Ref : Biomechanics Basis of Human movement – Joseph Hamil / Kathleen M Knutzen, Pages 325-458,470-475, 331, 389-393, 426 - 432, 454 – 458(lever)

**ASSIGNMENT**

1. Define lever and lever parameters. Explain about the orders of lever with suitable mechanical and anatomical examples.
2. Write about the factors affecting muscle function
3. Define elasticity and viscosity. Explain about the visco-elastic material in details.
4. Classify force. Describe about action of forces in human body
5. Explain newton’s laws of motion in detail with examples.
6. What is the structure of muscle and type of muscle fibers?

## 1.2 Joint structure and function

Objective: At the end of the module 1.2. Joint structure and function The student will be able to

- Identify various joints of human body
- List out the materials used in human joint design
- Explain the concept of kinematic chain and apply the principles to human body

Topic	Lesson name	Learning objective At the end of this session students will be able to	Type of instruction	Prescribed Books	Reference book	Assignment	Items to be carried
<b>Joint design (1)</b>	1. Basic principles	Discuss joints of human body	Diagram/ video (Tp)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed –65-67		Draw diagrams of human joint design	
<b>Materials used in joint (3)</b>	1. Connective tissue structure and classification 2. Ligaments 3. Tendon 4. Bursa 5. Cartilage 6. Bone	List the structures of connective tissues with diagrams	Diagrams/ video Demo (Tp)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed –67-87	Basic Biomechanics of musculoskeletal system 3 <sup>rd</sup> - Nordin - 26-125	Diagrams of CT	Histology text book
<b>General properties of connective tissue (3)</b>	1. Mechanical behavior 2. Viscoelasticity 3. Time and	List the properties of connective tissue. Draw graphs of	Practical using elastic material Graphics demo (Tp)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed –		Draw and label Stress stain graph of Bone , Ligament , Tendon and	

	rate dependent properties 4. Properties of specific tissue	stress strain curve		67 -87		muscles	
<b>Human Joint Design (2)</b>	1. Joint categories	Discuss joints of human body	Diagram/ video	2. Joint structure and function – Norkin 5 <sup>th</sup> ed –65-67	Basic Biomechanics of musculoskeletal system 3 <sup>rd</sup> - Nordin - 26-125	MCQs	
<b>Joint function Kinematic chains Joint motions (2)</b>	1. Kinematic chains 2. Joint motions	Define Closed and open kinematic chain with example Define and differentiate the arthro and osteokinematic chain	Open and closed kinematic chain practical demo (tP)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed –95-99.	Brunstrom's clinical kinesiology – smith – 5 <sup>th</sup> ed 8-11.	Demonstrate closed and open chain activities in upper and lower limb	Practical dress code
<b>General effects of Disease ,injury, immobilization on joint (1)</b>	Outline	Discuss the concept about Diseases/Injury, immobilization affecting synovial fluid,capsule,ligaments, bone	Video / on patient demo on General effects of Disease ,injury, immobilization on joint	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 98-104.		Good to know topic	

Assignments:

- Explain the structure of Human joint with a neat diagram
- Write in detail about open and close kinematic chain with examples
- Explain about various types of joints with examples
- List out types of joint lubrication
- List out types of connective tissue

**1.3 Muscle structure and function**

**1.4 Objective: At the end of the module 1.3.Muscle structure and function,The student will be able to**

- Explain basic structure of skeletal muscles with diagrams
- List out types of muscle contraction with examples
- Understand various functions of muscles

Topic	Lesson name	Learning objective At the end of this session students will be able to	Type of instruction	Prescribed Books	Reference book	Assignment	Items to be carried
<b>Elements of muscle structure (2)</b>	<ol style="list-style-type: none"> <li>1. composition of muscle fiber</li> <li>2. contractile unit</li> <li>3. Motor unit</li> <li>4. muscle structure and architect</li> <li>5. sensory receptors</li> </ol>	<p>List the basic structure of a muscle</p> <p>Define motor unit</p>	Video/diagram (Tp)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed –46-61	Kinesiology – Oatis. 2 <sup>nd</sup> . 46-64	Diagram of motor unit with label	
<b>Muscular connective Tissue (2)</b>	<ol style="list-style-type: none"> <li>1. organization of muscle tissue and its specific function</li> </ol>			2. Joint structure and function – Norkin 5 <sup>th</sup> ed –46-61	Kinesiology – Oatis. 2 <sup>nd</sup> . 46-64		
<b>Muscle</b>	<ol style="list-style-type: none"> <li>1. Muscle</li> </ol>	List out the stability	Practical	3. Joint structure	Kinesiology –	Self-demo on types of	Practical dress code

<b>function (2)</b>	tension relationships 2. types of muscle contraction	and mobility functions of muscle  Demonstrate types of muscle contractions with examples	demo/ Video demo Diagrams	and function – Norkin 5 <sup>th</sup> ed –46-61	Oatis. 2 <sup>nd</sup> . 46-64	muscle contraction	
<b>Classifications of muscles (1)</b>	1. based on the function (muscle and moment arm) 2. based on the architect		Practical demo/ Video demo Diagrams	4. Joint structure and function – Norkin 5 <sup>th</sup> ed –46-61	Kinesiology – Oatis. 2 <sup>nd</sup> . 46-64		
<b>Factors affecting muscle function (1)</b>	1. based on attachments with examples 2. passive /active insufficiency	Define and demonstrate passive and active insufficiency (upper limb and lower limb)	Practical demo/ Video demo Diagrams	5. Joint structure and function – Norkin 5 <sup>th</sup> ed –46-61	Kinesiology – Oatis. 2 <sup>nd</sup> . 46-64		
<b>Effects of immobilization, injury and aging (1)</b>	1. Abnormalities and importance		Video / on patient demo on General effects of Disease ,injury, immobilization	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 109-134.			

**ASSIGNMENT**

- Explain cross bridge formation. Discuss different type of muscle contraction with respect to cross bridge formation.
- Write about the factors affecting muscle function
- Define elasticity and viscosity. Explain about the visco-elastic material in details.
- What is the structure of muscle and type of muscle fibers.
- Explain various types of muscle contraction with suitable examples. Differentiate active and passive tension in muscle

## **Module 2 :AXIAL SKELETAL SYSTEM**

### **2.1 Vertebral column**

### **2.2 Thorax and chest wall**

### **2.3 TM joint**

#### **2.1 Vertebral column**

**Objectives:** At the end of the module 2-1.vertebral column :, The student will be able to

- **Describe the structure of individual vertebrae and relate to the function**
- **Describe the actors contributing to stability and instability of spine, the biomechanical contributions to common injuries of the spine**
- **Review the normal kinematics of vertebral column**
- **Explain the relationship between the muscle location and nature and effectiveness of muscle action in the spine**
- **Describe the movement relationship between the pelvis and the lumbar vertebra**

Topic	Lesson name	Learning objective At the end of this session	Type of instruction	<b>Prescribed Books</b>	Reference book	Assign ment	Items to be carried
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		students will be able to					
<b>General structure and function (4)</b>	<ol style="list-style-type: none"> <li>1. structure of Vertebral column- curvatures</li> <li>2. typical vertebrae – characteristic features</li> <li>3. biomechanical functions of the vertebra</li> </ol>	<p>Name the structures and regions of vertebral column</p> <p>List the parts of a vertebrae</p> <p>Demonstrate the movements occurring at the joints, the muscles involved.</p>	<p>Diagrams, explanation of vertebral column with spine model.</p> <p>Video Demonstration (Tp)</p>	<p>1. Joint structure and function Norkin 5<sup>th</sup> ed . 142-153.</p>		Diagrams	<p>Vertebrae – bone set</p> <p>Practical dress code</p>
<b>IVD (2 hours)</b>	<ol style="list-style-type: none"> <li>1. IVD (structure and function)</li> <li>2. Articulation and ligaments</li> <li>3. functions of the structures – mobility and stability</li> </ol>	<p>Name the ligaments of VC</p> <p>draw diagrams of ligaments</p> <p>state structure &amp; function of IVD</p>	(Tp)	<p>1. Joint structure and function – Norkin 5<sup>th</sup> ed – 154-162</p>	<p>Kinesiology – Oatis. 2<sup>nd</sup>. 473 - 486</p>		
<b>Regional structure and function</b>	<ol style="list-style-type: none"> <li>1. upper cervical structure (axis and</li> </ol>	<p>Identify the Cervical vertebrae.</p> <p>Name the parts</p>	<p>Video Demo/ Demonstration of movements of cervical spine,</p>	<p>2. Joint structure and function</p>	<p>Kinesiology – Oatis. 2<sup>nd</sup>. 473 - 486</p>	<p>Identify movements of</p>	<p>Cervical – bone set</p>

<b>Cervical region (2)</b>	atlas) 2. lower cervical structure 3. kinematics of upper 4. kinematics of lower 5. Kinetics	of CV  Demonstrate movements of Upper and lower cervical	(Tp)  Practical demo of muscles acting over VC  (Pt)	– Norkin 5 <sup>th</sup> ed – 154-162 3. Basic biomechanics of MSK – 3 <sup>rd</sup> ed – NordinP. No :287-312		cervica l spine		
<b>Thoracic region (2)</b>	1. thoracic structure 2. kinematics of thoracic region 3. kinetics at thoracic region	Identify the thoracic vertebrae.  Name the parts of TV  Demonstrate movements thoracic	Video demo/ Demonstration of movements of Thoracic spine,  Practical demo of muscles acting over VC (Tp)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 162 – 164 2.	Kinesiology – Oatis. 2 <sup>nd</sup> .520-538	Identify movements of Thoracic spine	B o n e s e t – t h o r a c i c  P r a c t i c a l d r e s s c o d e	
<b>Lumbar region (3)</b>	1. lumbar structure 2. kinematics	Identify the lumbar vertebrae.	Video demo/ Demonstration of movements of Lumbar,	1. Joint structure and	Kinesiology – Oatis. 2 <sup>nd</sup> .3 -563-	Identify movements of Lumbar spine	B o n e	

	<p>3. Thorocolu mbarfacia</p> <p>4. kinetics</p>	<p>Name the parts of lumbar</p> <p>Demonstrate movements at lumbar region</p> <p>List the function of TLF</p> <p>Name the muscles producing movements at L.region</p>	<p>Practical demo of muscles acting over VC (Tp)</p> <p>(tP)</p>	<p>function – Norkin 5<sup>th</sup>ed – 164 -171</p> <p>2. Basic biomechanics of MSK – 3<sup>rd</sup>ed - NordinP. No : 256-285</p>	600	Explain role of TLF	<p>set – thoracic</p> <p>Practical dress code</p>
<p><b>Sacral and coccyx (2)</b></p>	<p>1. Structure</p> <p>2. SI joint kinematics and Kinetics</p> <p>3. co-ordinated movements with related joints</p>	<p>Identify the Sacrum and coccyx</p> <p>Name the parts of sacrum</p> <p>Demonstrate movements at SI region on skeletal model</p>	(Tp)	<p>1. Joint structure and function – Norkin 5<sup>th</sup>ed – 171-174</p>	Kinesiology – Oatis. 2 <sup>nd</sup> .3 -621-673	<p>Video demo / Demonstration of movements of Sacral muscles acting over VC</p>	<p>Bone set</p> <p>Practical dress code</p>

<b>Muscles of the vertebral column (2)</b>	<ol style="list-style-type: none"> <li>overview of all muscles connecting vertebral column</li> <li>pelvic floor muscles</li> <li>Combined action of muscles of vertebral column</li> <li>activity description</li> </ol>	<p>Name the muscles producing movements at spine.</p> <p>Describe core muscles</p>	<p>Video demo/ Demonstration of movements of spine Practical demo of muscles acting over VC Tp</p>	<p><b>1. Joint structure and function – Norkin 5<sup>th</sup>ed – 176-187</b></p>		<p>Identify Muscle of vertebral column with its location and function</p>	
<b>General effects of injury and aging (1)</b>	<ol style="list-style-type: none"> <li>effects on aging and injury</li> </ol>	<p>List the changes with relation to age and injury</p>	<p>Video / on patient demo on General effects of Disease,injury,immobilization Tp</p>	<p><b>1. Joint structure and function – Norkin 5<sup>th</sup>ed – 187-188</b></p>			

**Assignments**

- Explain lumbo pelvic rhythm. describe in detail about role of dorsal thoraco-lumbar fascia in stability of lumbo pelvic region
- Explain Structure and functions of IVD with diagrams
- Functions of vertebral column
- Explain mechanics of vertebral column
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## 2.2.Thorax and chest wall

**Objectives:** At the end of the module 2-1.vertebral column :, The student will be able to

- Understand structure and functions of thorax
- List out ventilator muscles
- Explain mechanics of respiration

Topic	Lesson name	Learning objective At the end of this session students will be able to	Type of instruction	Prescribed Books	Reference book	Assignment	Items to be carried
<b>General structure and function (2)</b>	1. Ribcage and the muscles associated with the ribcage 2. Ribcage movements	Define & demonstrate movements occurring during breathing- (Bucket and pump handle movement)  List role of ventilator muscles	Video / Diagrams (Tp)	1. Joint structure and function – Norkin <sup>5th</sup> ed – 193-208		Bucket and pump handle movement practical demo/ Video demo Assignment on Diaphragm	Bone set  Practical dresses code
<b>General</b>	1. Changes in		(Tp)				

<b>effects of injury and aging (1)</b>	normal structure and functional relation to pregnancy, scoliosis and COPD	List the changes during disease conditions					
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**ASSIGNMENT**

- List out ligaments attached in vertebral column. Explain in general about stability and mobility of the vertebral column on the whole?
- Describe the different movement of the rib cage.
- Explain the role of intervertebral disc and its biomechanical significance.
- Explain the bucket handle and pump handle movement of rib cage.
- Explain the chest movements associated with ventilation.

**2.3**      **TM joint**

**Objectives:** At the end of the module 2-3.TM joint:, The student will be able to

- Identify the articular surface of TM joint
- Demonstrate movements of TM joint with muscle action

<b>Topic</b>	<b>Lesson name</b>	<b>Learning objective At the end of this session students will be able to</b>	<b>Type of instruction</b>	<b>Prescribed Books</b>	<b>Reference book</b>	<b>Assignment</b>	<b>Items to be carried</b>
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<b>Biomechanics of TM JOINT (3)</b>	<ol style="list-style-type: none"><li>1. Articular surfaces</li><li>2. Movements</li><li>3. Muscles</li><li>4. Dysfunctions</li></ol>	Name articular structures of TM  List Movements of TM jt  List muscles involved	Movement analysis  Video demo Diagram practice (Tp)	<b>1 Joint structure and function – Norkin 5<sup>th</sup>ed – 212 -223</b>	<b>Kinesiology – Oatis. 2<sup>nd</sup>.3 – 439-44</b>	Identify Movements and muscles of TM Joint
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Assignments

- List out the articular surface of TM joint with a neat diagram
- List out various muscles acting on TM joint with its action

## Module 3: UPPER EXTREMITY

- 3.1 Shoulder complex
- 3.2 Elbow complex
- 3.3 Wrist and Hand

**3.1**

### Shoulder complex

**Objectives:** At the end of the module 3.1.shoulder joint:, The student will be able to

- Identify various joints of shoulder complex
- Demonstrate movements of shoulder complex
- Explain gleno humeral rhythm
- Explain static and dynamic stability of shoulder joint
- List all muscles around shoulder complex with its attachments and function.

Topic	Lesson name	Learning objective At the end of this session students will be able to	Type of instruction	Prescribed Books	Reference book	Assignment	Items to be carried		
<b>Structure and Components of shoulder complex (6)</b>  (1)	1. Introduction 2. SC joint 3. AC joint 4. ST joint 5. GH joint	Demonstrate the movements occurring at the joints. Identify axis and planes	Video / Diagram Shoulder complex movements  Surface marking GH Rhythm (TP)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 232-244	Kinesiology – Oatis. 2 <sup>nd</sup> .3 -121 -135	Diagram of all joints	Bone set  Practical dress code, sleeveless t-shirt		
	6. Arthrokinematics and osteokinematics	List movements occurring at sh.complex  Demonstrate types of motions on a model				1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 245 -257		Kinesiology – Oatis. 2 <sup>nd</sup> .3 -135 -146	Demonstration
	7. Static and	Derive the				1. Joint structure		Basic	Diagrammatic

	Dynamic stabilization	action line of structures that helps in sh.stability		and function – Norkin 5 <sup>th</sup> ed – 256-267	biomechanics of MSK – 3 <sup>rd</sup> ed - NordinP.No : 328-338	explanation of static and dynamic stability
(1)	8. Scapulo-humeral rhythm	Define SHR Demonstrate on a human model				Explain normal Rhythm- Demonstration
(1)	9. Muscles	List muscles of SH complex with its functions				Identify muscles producing movements- VIVA

Assignments :

- Surface marking of AC, SC, ST and GH joints
- Individual practice of shoulder arthro and osteokinematics on models
- Individual practical demo of glenohumeral rhythm on models
- Demonstration of shoulder joint movements –axis, planes and ROM
- Identification of muscles of shoulder complex- origin, insertion, nerve supply and action
- Explain in details about the scapula humeral Rhythm during elevation through abduction of shoulder complex.

3.2	<p style="text-align: center;"><b>Elbow complex</b></p> <p><b>Objectives:</b> At the end of the module 3.2.Elbow joint:, The student will be able to</p> <ul style="list-style-type: none"> <li>• Identify <b>articular surface of elbow and radio ulnar joints</b></li> <li>• Demonstrate movements of elbow complex with muscle action</li> </ul>
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Topic	Lesson name	Learning objective At the end of this session students will be able to	Type of instruction	Prescribed Books	Reference book	Assignment	Items to be carried
<b>THE ELBOW COMPLEX (1)</b>	1. Structure and function of the elbow joint	Name the articular structures of elbow complex  Demonstrate the movements occurring at the joints  List the muscles involved	Surface marking, Movement analysis, Video / Diagrams (TP)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 272-285	Basic biomechanics of MSK – 3 <sup>rd</sup> ed - Nordin P.No : 341-355  Kinesiology – Oatis. 2 <sup>nd</sup> .3 - 198-216	Diagram on articular surface  Identify Movements and muscles producing it on elbow joint	Bone set  Practical dress code, sleeveless t-shirt

(3)	2. Humero-ulnar and humero-radial articulations  3. Superior and inferior radio-ulnar joints	Demonstrate the movements  List the accessory movements occurring during functional movements				Viva/ Written assignment
(1)	4. Mobility and stability of the elbow complex	List out various disease conditions of elbow joint				Viva
(1)	5. The effects of immobilization and injury					Case discussion

#### Assignments

- Write about the annular ligament of the elbow and its clinical significance.
- Define carrying angle.
- List the ligaments of elbow complex with its function
- Explain the movements of elbow complex with its axis and planes

<b>3.3</b>	<p><b>Wrist and Hand</b></p> <p><b>Objectives:</b> At the end of the module 3.3.wrist and hand ;, The student will be able to</p> <ul style="list-style-type: none"> <li>• Identify various bones and joints around wrist and hand complex with a neat diagram</li> <li>• List ligaments of wrist with its function</li> <li>• Explain flexor and extensor mechanism</li> </ul>
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- Explain various types of prehension with examples

Topic	Lesson name	Learning objective At the end of this session students will be able to	Type of instruction	Prescribed Books	Reference book	Assignment	Items to be carried
<b>THE HAND AND WRIST COMPLEX (5)</b>	1. Structural components	<ul style="list-style-type: none"> <li>- Name all the bones of wrist and hand complex.</li> <li>- List out the ligaments</li> <li>- Identify the structure for stability</li> <li>- State the flexor and ext. mechanism</li> </ul>	Surface marking, Movement analysis, Video / Diagrams (TP)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 306-348	Basic biomechanics of MSK –3 <sup>rd</sup> ed – NordinP.No : 359-386.  Kinesiology – Oatis. 2 <sup>nd</sup> .3 - 198-216	Diagram on articular surface	Bone set  Practical dress code, sleeveless t-shirt
	2. Functions					Written assignment	
(3)	3. Hand function	List out various types of prehension Functional position of the wrist and hand	Self-demonstrate the prehension	2. Brunstrom's Clinical kinesiology 5 <sup>th</sup> ed. Smith (213-320)		Demonstrate types of prehension with muscle work - Practical Viva	

	<p><b>ASSIGNMENTS</b></p> <ul style="list-style-type: none"> <li>• Explain the biomechanics of carpometacarpal joint of thumb?</li> <li>• Identification of bones and joints in wrist and hand complex with diagram</li> <li>• Explain various types of prehension and its movements and muscle work analysis</li> <li>• <b>Explain mechanism of finger flexion and extension</b></li> </ul>
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	<p><b>Module 4: LOWER EXTREMITY</b></p>
	<p>4.1.Hip complex 4.2.Knee complex 4.3.Ankle and foot</p>

	<p><b>4.1 Hip complex</b> <b>Objectives:</b> At the end of the module 4.1.Hip complex, The student will be able to</p> <ul style="list-style-type: none"> <li>• <b>Understand and explain the structure and function of hip complex</b></li> <li>• <b>Identify muscle action during uni&amp;bi lateral stance</b></li> <li>• <b>Explain the concept of using cane ipsi and contra lateral</b></li> </ul>
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Topic	Lesson name	Learning objective At the end of this session students will be able to	Type of instruction	Prescribed Books	Reference book	Assignment	Items to be carried
<p><b>THE HIP COMPLEX</b> <b>(1)</b> <b>(3)</b></p>	<p>1. Structure of Hip joint</p>	<p>Identify the bones at the hip complex Demonstrate the movements</p>	<p>Muscle actions video demo Unilateral and bilateral stance Use of cane</p>	<p>1. Joint structure and function – Norkin 5<sup>th</sup>ed – 356-366</p>		<p>Articular surface diagram</p>	<p>Bone set, pelvis and femur  Practical dress code</p>

		occurring at the joints List the muscles involved.	(Tp)				
(2)	2. Capsule and ligaments	List the ligaments of HC	(Tp)			Identify ligaments in diagrams	
(2)	3. Functions Lumbo-pelvic rhythm	Demonstrate LPR List the significance	Lumbo pelvic rhythm , (tP)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 368- 372	Kinesiology – Oatis. 2 <sup>nd</sup> .3 - 198-216	Demonstrate lumbo pelvic rhythm	
(2)	4. Musculature	List the biomechanical functions of muscles	Practical Demo (tP)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 279-300	Kinesiology – Oatis. 2 <sup>nd</sup> .3 – 688-702	Surface marking of muscles , list out muscle action	
(4)	5. Muscle functions in Stance	Identify the hip muscle action at different phase of Gait	Diagram calculations / practical (Tp)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 379-384			
(1)	6. Pathology	List the abnormal hip patterns					

#### Assignments

- Describe the hip complex and explain the role of the abductors in the bilateral and unilateral stance with an example.
- List Factors that provide stability to the hip joint?

- What is coxavara and valga
- List ligaments of hip joint with its function

#### 4.2 The Knee Complex

**Objectives:** At the end of the module 4.2.knee complex ;, The student will be able to

- Understand and identify various joints of knee complex with its structure and function.
- Explain the actions of muscles around knee complex.
- Understand the concept of locking and un locking of knee joint
- Identify ligaments of knee complex with its function

Topic	Lesson name	Learning objective At the end of this session students will be able to	Type of instruction	Prescribed Books	Reference book	Assignment	Items to be carried
<b>THE KNEE COMPLEX (2)</b>	structure and function of TF Joint	Name the articular structures of the knee complex  Demonstrate the movements occurring at the joints	Video/ diagrams	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 396-423	2. Kinesiology – Oatis. 2 <sup>nd</sup> ed 739-755	Diagram of articular surface	Bone set: femur, tibia, fibula and patella  Practical dress code
(2)	Capsule, Ligaments, Bursae	List the ligaments and structure of knee				Identify Ligaments in diagram	

(2)	Knee joint functions	Demonstrate the types of motion occurring at knee on anatomical model	Locking,unlocking Movement analysis Video demo Video demo / diagrams, (TP)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 412 -422	Kinesiology – Oatis. 2 <sup>nd</sup> . 759-762	Written assignment	
(2)	Muscles	List out muscles of KC with its function	Practical demonstration identification of muscles Practical demo / diagram (tP)	1. Clinical kinesiology 5 <sup>th</sup> ed Smith 312 -320		Identify Muscle around knee joint with its function	
(3)	The PF Joint	Name the articular structures of PF jt	(Tp)	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 424 -432	Kinesiology – Oatis. 2 <sup>nd</sup> .3 – 757-760	Explain stabilizing forces of patella	Practical dress code
(1)	Effect of injury aging	List out various disease conditions of KC		1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 432-435			

**Assignments**

- What is meniscus? Explain its importance in tibio femoral joint and write about their attachments.
- Explain screw home mechanism. Write in detail about biomechanical functions of ligaments of knee joint.
- Explain screw home mechanism. Write in detail about biomechanical functions of menisci of knee joint.
- What is Q angle .mention its biomechanical significance
- List the role of patella

4.3	<p><b>THE ANKLE AND FOOT COMPLEX.</b></p> <p><b>Objectives:</b> At the end of the module 4.3. Ankle and foot complex : , The student will be able to</p> <ul style="list-style-type: none"> <li>• Identify bones and joints of ankle and foot complex</li> <li>• Identify movements of ankle and foot complex with its axis and planes</li> <li>• List various muscles that acts on ankle and foot with its attachments and action</li> <li>• List ligaments of ankle complex with their functions</li> </ul>						
Topic	Lesson name	Learning objective At the end of this session students will be able to	Type of instruction	Prescribed Books	Reference book	Assignment	Items to be carried
Ankle and foot complex (5)	<ol style="list-style-type: none"> <li>1. Structure and function of the ankle joint</li> <li>2. Sub talar joint</li> <li>3. TN joint</li> <li>4. TT joint</li> <li>5. Transverse MT joint</li> <li>6. MP joint</li> </ol>	<p>Name articular surface of ankle joint</p> <p>Demonstrate the movements occurring at the joints.</p> <p>Identify axis and planes</p> <p>List ligaments</p>	<p>Diagrams</p> <p>practice Arches</p> <p>Surface marking</p> <p>Movement analysis</p> <p>Sup- pro twist</p>	<p>1. Joint structure and function – Norkin 5<sup>th</sup>ed – 441-462</p>	<p>Kinesiology – Oatis. 2<sup>nd</sup>.3 – 808-828</p>	<p>Diagram of articular surface</p> <p>Surface marking of bone and joints</p> <p>Identify muscle that produce movements</p>	<p>Bone set- tibia fibula and ankle complex</p> <p>Practical dress code</p>
(2)	7 Arches	<p>Identify arches of foot</p> <p>List functions of arches</p>	<p>Didactic/ Video/ practical demo</p>	<p>1. Joint structure and function – Norkin 5<sup>th</sup>ed – 467-471</p>	<p>Kinesiology – Oatis. 2<sup>nd</sup>.3 – 830-831</p>	<p>Identify arches of foot</p>	
(1)	8 Deviations	<p>List various</p>	<p>Didactic/</p>	<p>1. Joint structure</p>	<p>Brunstrom'sClini</p>		

from normal structure and function	structural dysfunction of AC	Video/ practical demo	and function – Norkin 5 <sup>th</sup> ed – 471-474	cal kinesiology .5 <sup>th</sup> ed. Smith 544-356		
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**ASSIGNMENT**

- What is meta tarsal break?
- Describe the arches of the foot?
- What is Supination pronation twist
- Identify movements of subtalar joint
- What is tarsal tunnel
- List out ligaments of ankle joint with its attachments and function

## 5 INTEGRATED FUNCTION

5.1 Posture

5.2 Gait

5.1

Posture

**Objectives:** At the end of the module 5-1. Posture , The student will be able to

- Describe the alignment of the body in erect standing posture and its variability
- Discuss the current understanding of the muscle needed to control erect standing
- Describe common postural faults
- Analyze the posture in sagittal ,frontal plane

Topic	Lesson name	Learning objective At the end of this session students will be able to	Type of instruction	Prescribed Books	Reference book	Assignment	Items to be carried
Analysis of posture (2)	1 Posture	Define posture Differentiate normal and abnormal posture  Demonstrate postural analysis	Didactic and Video demo on normal and abnormal posture	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 483-524	2. Kinesiology – Oatis. 2 <sup>nd</sup> .3 – 875-889	Identify normal and abnormal Posture	Practical dress code
(2)	2 Static and dynamic posture, postural control						
(3)	3 kinetics and kinematics						

	of posture						
(2)	4 Ideal posture analysis of posture,						
(1)	5 effects of posture on age, pregnancy, occupation and recreation						

Assignments

- define posture ,explain various factors that maintain posture
- Define posture? Discuss various types of posture?
- What is postural control?
- What is an ideal posture

5.2	<p><b>GAIT</b></p> <p><b>Objectives:</b> At the end of the module 5.2.Gait, The student will be able to</p> <ul style="list-style-type: none"> <li>• <b>Describe the basic component of gait cycle</b></li> <li>• <b>Present the temporal and distance characteristics of normal gait</b></li> <li>• <b>Describe the pattern of muscle activity that characterize normal locomotion</b></li> </ul>						
<b>Topic</b>	<b>Lesson name</b>	<b>Learning objective At the end of this session</b>	<b>Type of instruction</b>	<b>Prescribed Books</b>	<b>Reference book</b>	<b>Assignment</b>	<b>Items to be carried</b>

		<b>students will be able to</b>					
<b>GAIT (1)</b>	General features of gait, gait initiation	Define gait cycle	Didactic and Video demo on normal and abnormal gait	1. Joint structure and function – Norkin 5 <sup>th</sup> ed – 525-558 2. Kinesiology – Oatis. 2 <sup>nd</sup> .3 – 893-913		Identify Phases of gait cycle Muscles acting on different Phases	Practical dress code
(2)	Kinematics and kinetics of gait	List demonstrate phases of gait cycle (walking, running, stair)					
(2)	Energy requirements						
(3)	Kinematics and kinetics of the trunk and upper extremities in relation to gait	Correlate GRF & COG, list the actions at various joints					
(1)	Stair and running						
(1)	Effects of age, gender, assistive devices, disease, muscle weakness, paralysis, asymmetries of the lower extremities, injuries and malalignments in gait	Differentiate normal and abnormal gait					

### ASSIGNMENT

- Ataxic gait
- Describe phases of GAIT. Explain about determinants of GAIT?
- Describe the kinetics of gait cycle.
- Explain the lumbo pelvic rhythm?

<b>6</b>	<b>7 PRACTICAL</b>						
	<b>6.1 Movement analysis</b> <b>6.2 Goniometry</b> <b>6.3 Walking Aids</b>						
<b>6.1</b>	<b>6.2 Movement analysis</b>						
<b>Movement analysis</b>	ADL activities: sitting to standing, lifting, various grips, pinches	Define ADL examples	Practical demonstration	1. Joint structure and function – Norkin 5 <sup>th</sup> ed 2. Kinesiology – Oatis. 2 <sup>nd</sup> ed 3. Brunstrom’s Clinical kinesiology .5 <sup>th</sup> ed. 4. Basic biomechanics of MSK –3 <sup>rd</sup> ed –Nordin		Identify the joint range and type of muscle contractions acting at all the joints involved	Practical dress code
<b>6.3</b>	<b>6.4 Goniometry</b>						
<b>Goniometry</b>	Parts, types, principles and uses of a goniometry. Techniques for measurement of ROM of all peripheral joints	Describe parts of goniometer  Mention its uses	Practical demonstration	1. Measurement of Joint motion – A guide to goniometry – Cynthia norkins		Measure the range of motion of all the movements occurring at peripheral joints	Practical dress code
	<b>6.3 Walking Aids</b>						
<b>Walking Aids</b>	Parallel bars, crutches, canes, walkers – types, parts and uses.	Define walking aids  Mention its types and uses	Practical demonstration  Identification of various	1. Physical rehabilitation- 5 <sup>th</sup> edition- Susan O Sullivan-Pg: no:		Identify the various forms of walking aids and its uses	Practical dress code

**SAMPLE QUESTIONS**

## BIOMECHANICS

## LONG ESSAYS

1. Describe the hip complex and explain the role of abductors in the bilateral and unilateral stance with an example
2. Explain the structural formations of the arches of the hand and their role in hand functions
3. Movement analysis of standing to sitting
4. Write in detail function of shoulder complex, including dynamic stability of glenohumeral joint
5. Describe kinetics of gait cycle
6. Describe the type of muscle contraction. Give examples of each
7. Analyse the lifting activity
8. Explain the biomechanics of cervical spine
9. Describe the determinants of gait and explain how each is interrelated to the other
10. Describe the shoulder complex, include a note on scapulo-humeral rhythm
11. Define lever .list and explain the types of lever with an example in human body.
12. Explain cross bridge formation. Discuss different type of muscle contraction with respect to cross bridge formation.
13. Explain various types of muscle contraction with suitable examples.differentiate active and passive tension in muscle
14. Explain lumbo pelvic rhythm. Describe in detail about role of dorsal lumbo fascia in stability of lumbo pelvic region
15. Explain gleno humeral rhythm. Explain dynamic stability of shoulder joint.
16. Explain gleno humeral rhythm. Explain static stability of shoulder joint.
17. Explain static and dynamic stabilization of shoulder joint
18. List various type of prehension. Explain about precision handling.
19. List various type of prehension. Explain about power grip.
20. Explain screw home mechanism. Write in detail about biomechanical functions of ligaments of knee joint.
21. Explain screw home mechanism. Write in detail about biomechanical functions of menisci of knee joint.
22. Define gait. What are the phases of gait? Explain about temporal and spatial parameters of gait.
23. Define gait. What are the phases of gait? Explain about sagittal plain analysis of gait with diagrams.

24. Define gait. What are the phases of gait? Explain about determinants of gait cycle.
25. Define static and dynamic posture. Write in detail about postural control strategies.
26. Define static and dynamic posture. Explain the location of LOG in an ideal posture. List out postural muscles.
27. Illustrate role of TFCC at wrist joint. Describe the sequence of carpal motion occurring from full wrist flexion to full extension and radial to ulnar deviation, emphasizing the role of the scaphoid.
28. Explain the properties of connective tissue under following headings
  - A) Load deformation curve
  - B) Young's modulus
29. Describe the hip complex. Explain the role of hip abductors in bilateral and unilateral stance.
30. What is the functional position of hand?. Add a note on various power grips.
31. What are primary and secondary curvatures of spine? Add note on kinetics and kinematics of cervical spine.

#### SHORT essays

1. Write in detail scapulo humeral rhythm
2. Define gait. List out various gait deviations
3. Explain the biomechanics of carpo metacarpal joint of thumb
4. What is meniscus. Explain its importance in tibiofemoral joint and write about their attachments
5. Explain kinematic chains
6. Explain about supination twist
7. Explain Newton's laws of motion in detail with examples
8. Define posture. Discuss various types of posture
9. What is a lever. Explain types
10. Explain the biomechanics of pelvic tilts
11. State Newton's laws of motion with example
12. Define force. Explain about concurrent forces.
13. Define force. Elaborate external and internal forces acting on the human body.
14. Explain load deformation curve with a neat diagram
15. Write in detail about open and close kinematic chain with examples
16. Define active and passive insufficiency with examples

17. Explain types of muscle contraction
18. List and explain the various factors that affect the muscle function

#### SHORT ANSWERS

1. Name any two anatomical pulley
2. Define moment arm
3. Define torque
4. What is mechanical advantage
5. Define ground reaction force
6. Define COG
7. Define LOG
8. Define base of support ( BOS)
9. State concave convex rule
10. Define creep
11. Define hysteresis
12. What is young's modulus
13. Define agonist with example
14. Define antagonist with example
15. Define prime mover with example
16. Define synergist with example
17. Define fixators with example
18. What is mechanical disadvantage
19. Define Q angle
20. Define carrying angle
21. Define angle of inclination of humerus
22. Define angle of inclination of femur
23. Define angle of torsion of femur
24. Define center edge angle of acetabulum
25. List ligaments of radio ulnar joint
26. Annular ligament

27. Uses of parallel bar
28. Define goniometry
29. Mention the parts of goniometer
30. Mention any 2 uses of goniometry
31. What is the role of articular disc in TM joint
32. What is concentric muscle contraction
33. Define motor unit
34. What is eccentric contraction
35. What is isometric contraction
36. What is isokinetic contraction
37. What is the function of glenoid labrum
38. Define work
39. Define angle of pull
40. What is osteo kinematic and arthro kinematics
41. Define equilibrium
42. What is genu valgum and genu varum
43. What is cubitus valgus
44. What is metatarsal break
45. Mention any two postural deviation in sagittal plane
46. Mention any two postural deviation in frontal plane
47. Define gait cycle
48. What is cadence
49. What is stride length and step length
50. What is the Functional position of wrist and hand
51. List out the ligaments of AC joint
52. What is the function of ACL in knee joint
53. What is double support phase of gait cycle
54. What are anatomical pulleys? Give an example of the same
55. Define lordosis
56. Mention the role of TFCC at wrist joint

57. State newton's 3<sup>rd</sup> law
58. Define unstable equilibrium
59. Define neutral equilibrium
60. What is zone of opposition
61. Mention the role of triceps during push ups
62. Mention the axis and plane for elbow joint movement
63. List the scapular stabilizers
64. What is coracoacromio arch
65. List out the movements of SC joint
66. Define active insufficiency
67. Define passive insufficiency
68. Define prehension
69. Mention two examples for second order lever in human body
70. What are primary and secondary curvatures of spine
71. List the primary muscle of ventilation
72. List the accessory muscle of ventilation
73. What is patella alta
74. Types of crutches and its uses
75. List any 4 spatial parameters of gait cycle
76. List any 4 temporal parameters of gait cycle
77. Mention the movements of sub talar joint
78. Mention the movements of radio ulnar joints
79. Define pulleys and what are the types of pulleys
80. What are the pulleys of hand?
81. What are the components of swing phase gait
82. What are the components of stance phase gait
83. What is the action of lumbricals of hand
84. List any 2 external and internal forces acting on human body
85. What are muscle proteins?
86. Define end feel. Mention the types of end feel

87. Define active and passive muscle tension
88. What is winging of scapula
89. Define degree of toe out
90. What is inclinometer
91. Mention 2 uses of pulley in physiotherapy clinic

# ANATOMY

## MODULES

SL. NO	MODULES	NO: OF HOURS
01	UNIT 1.1:HISTOLOGY	30
	UNIT 1.2: EMBRYOLOGY	
	UNIT 1.3: REGIONAL ANATOMY	
02	MUSCULOSKELETAL ANATOMY	60
03	NEURO ANATOMY	30
04	APPLIED ANATOMY	30

MODULES	TOPIC	CONTENTS
MODULE:01		
Unit 1.1: Histology		
	Histology	General Histology, study of the basic tissues of the body; Microscope, Cell, Epithelium, Connective Tissue, Cartilage, Bone, Muscular tissue, Nerve Tissue – TS & LS, Circulatory system – large sized artery, medium sized artery, large sized vein, lymphoid tissue, Skin and its appendages.
Unit 1.2: Embryology		

	Embryology	<p>a) Ovum, Spermatozoa, fertilization and formation of the Germ layers and their derivations.</p> <p>b) Development of skin, Fascia, blood vessels, lymphatic,</p> <p>c) Development of bones, axial and appendicular skeleton and muscles,</p> <p>d) Neural tube, brain vessels and spinal cord,</p> <p>e) Development of brain and brain stem structures</p>
Unit 1.3: Regional Anatomy		
	<p>Thorax:</p> <p>a) Cardio – Vascular System</p>	<p>Mediastinum: Divisions and contents</p> <p>Pericardium: Thoracic Wall: position, shape and parts of the heart; conducting System; blood Supply and nerve supply of the heart; names of the blood vessels and their distribution in the body – region wise.</p>
	b) Respiratory system	<p>Outline of respiratory passages</p> <p>Pleura and lungs: position, parts, relations, blood supply and nerve supply; Lungs – emphasize on bronchopulmonary segments</p> <p>Diaphragm: Origin, insertion, nerve supply and action, openings in the diaphragm.</p> <p>Intercostal muscles and Accessory muscles of respiration: Origin, insertion, nerve supply and action.</p>
	Abdomen:	Parietal peritoneum, visceral peritoneum, folds of peritoneum, functions of

	c) Peritoneum:	peritoneum.
	d) Large blood vessels of the gut	Large blood vessels of the gut
	e) Location, size, shape, features, blood supply, nerve supply and functions of the following	stomach, liver, spleen, pancreas, kidney, urinary bladder, intestines, gall bladder.
	Pelvis: f) Position, shape, size, features, blood supply and nerve supply of	the male and female reproductive system.
	Endocrine glands: g) Position, shape, size, function, blood supply and nerve supply of the following glands :	Hypothalamus and pituitary gland, thyroid glands, parathyroid glands, Adrenal glands, pancreatic islets, ovaries and testes, pineal glands, thymus.
MODULE 02: Musculo Skeletal Anatomy		
	a) Anatomical positions of body	Anatomical positions of body, axes, planes, common anatomical terminologies (Groove, tuberosity, trochanters etc)
	b) Connective tissue	classification.
	c) Bones	Composition & functions, classification and types according to morphology and

		development.
	d) Joints	-definition-classification, structure of fibrous, cartilaginous joints, blood supply and nerve supply of joints.
	e) Muscles	– origin, insertion, nerve supply and actions
	f) Upper Extremity	<p>a. Osteology : Clavicles, Scapula, Humerus, Radius, Ulna, Carpals, Metacarpals, Phalanges.</p> <p>b. Soft parts: Breast, pectoral region, axilla, front of arm, back of arm, cubital fossa, front of fore arm, back of fore arm, palm, dorsum of hand, muscles, nerves, blood vessels and lymphatic drainage of upper extremity.</p> <p>c. Joints : Shoulder girdle, shoulder joint, elbow joints, radio ulnar joint, wrist joint and joints of the hand.</p> <p>d. Arches of hand, skin of the palm and dorsum of hand.</p>
	g) Lower Extremity	<p>a. Osteology : Hip bone, femur, tibia, fibula, patella, tarsals, metatarsals and phalanges.</p> <p>b. Soft parts: Gluteal region, front and back of the thigh (Femoral triangle, femoral canal and inguinal canal), medial side of the thigh (Adductor canal), lateral side of the thigh, popliteal fossa, anterior and posterior compartment of leg, sole of the foot, lymphatic drainage of lower limb, venous drainage of the lower limb, arterial</p>

		supply of the lower limb, arches of foot, skin of foot. c. Joints: Hip Joint, Knee joint, Ankle joint, joints of the foot.
	h) Trunk & Pelvis:	d. Osteology: Cervical, thoracic, lumbar, sacral and coccygeal vertebrae and ribs e. Soft tissue: Pre and Para vertebral muscles, intercostals muscles, anterior abdominal wall muscles, Inter-vertebral disc. f. Pelvic girdle and muscles of the pelvic floor
	i) Head and Neck:	g. Osteology : Mandible and bones of the skull. h. Soft parts : Muscles of the face and neck and their nerve and blood supply-extra ocular muscles, triangles of the neck, i. Gross anatomy of eyeball, nose, ears and tongue.
MODULE 03: Neuro Anatomy		
	a) Organization of Central Nervous system	- Spinal nerves and autonomic nervous system mainly pertaining to cardiovascular, respiratory and urogenital system
	b) Cranial nerves	Cranial nerves
	c) Peripheral nervous system	a. Peripheral nerve b. Neuromuscular junction c. Sensory end organs
	d) Central Nervous	a. Spinal segments and areas

	System	<ul style="list-style-type: none"><li>b. Brain Stem</li><li>c. Cerebellum</li><li>d. Inferior colliculi</li><li>e. Superior Colliculi</li><li>f. Thalamus</li><li>g. Hypothalamus</li><li>h. Corpus striatum</li><li>i. Cerebral hemisphere</li><li>j. Lateral ventricles</li><li>k. Blood supply to brain</li><li>l. Basal Ganglia</li><li>m. The pyramidal system</li><li>n. Pons, medulla, extra pyramidal systems</li><li>o. Anatomical integration</li></ul>
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PRACTICAL

## List of Practical / Demonstrations \*

### Topics

1. Upper extremity including surface Anatomy [20Hrs]
2. Lower extremity including surface Anatomy [20Hrs]
3. Head & Spinal cord and Neck and Brain including surface Anatomy [20Hrs]
4. Thorax including surface anatomy, abdominal muscles joints [10Hrs]
5. Histology-Elementary tissue including surface Anatomy [10Hrs]
6. Embryology-models, charts & X-rays[10Hrs]

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- Demonstration of the muscles of the whole body and organs in thorax and abdomen in a cadaver · Demonstration of movements in important joints.
  - Surface making of the lung, pleura, fissures and lobes of lungs, heart, liver, spleen, · Kidney, cranial nerves, spinal nerves and important blood vessels.
  - Identification of body prominences on inspection and by palpation especially of extremities.
  - Points of palpation of nerves and arteries.

### Recommended Text books:

1. SNELL [ Richard S], Clinical Anatomy for Medical students : Ed. 5. Little Brown and Company Boston. 1995, p898
2. B.D Chaurasia's Human Anatomy – Regional And Applied; Volume I, Volume li And Volumelii.
3. MOORIE [Kieth L], Clinically Oriented Anatomy. Ed.3., Williams and Wilkins, Baltimore,1992, p917
4. DATTA[A.K], Essentials of human Anatomy: Thorax and Abdomen Ed 2. Vol. I Current Book International, Culcutta 1994, p433,DATTA[A.K], Essentials of human Anatomy: Head and Neck Ed 2. Vol. II, Current Book International, Culcutta 1995, p363,
5. SINGH [Inderbir], Text book of Anatomy with colour atlas: Introduction, Osteology, Upper Extremity, Lower Extremity.Vol I. P Brothers, New Delhi 1996
6. SINGH [Inderbir], Text book of Anatomy with colour Atlas: Thorax and Abdomen. Vol II. JP Brothers, New Delhi 1996
7. SINGH [Inderbir], Text book of Anatomy with colour Atlas: Head and Neck Central Nervous System.Vol III. JP Brothers, New Delhi 1996,
8. SINGH [Inderbir],Human Osteology. JP Brothers, New Delhi 1990,p191

1. ROMANES [ G J], Cunningham manual of practical anatomy: upper and lower limb ed 15 Vol 1 Oxford Medical Publication, Oxford 1996, P263

2. ROMANES [G J], Cunningham manual of practical anatomy : Thorax and abdomen ed 15 Vol II Oxford Medical Publication, Oxford 1996, P298

3. ROMANES [G J], Cunningham manual of practical anatomy : Head and Neck and Brain ed 15 Vol II Oxford Medical Publication, Oxford 1996, P346

## ANATOMY

### LONG ESSAYS

1. EXPLAIN THE MEDIAL LONGITUDINAL ARCH OF FOOT
2. EXPLAIN THE SHOULDER JOINT
3. EXPLAIN THE BASAL GANGLIA
4. NAME THE CRANIAL NERVES IN ORDER. EXPLAIN FACIAL NERVE IN DETAIL
5. DESCRIBE THE EXTERNAL FEATURES OF HEART. EXPLAIN RIGHT ATRIUM IN DETAIL
6. NAME THE THENAR AND HYPOTHENAR MUSCLES. DESCRIBE ANY ONE THENAR AND HYPOTHENAR MUSCLE
7. DESCRIBE THE ORIGIN, COURSE, RELATINS, BRANCHES AND APPLIED ANATOMY OF SCIATIC NERVE
8. DEFINE A BRONCHOPULMONARY SEGMENT. DESCRIBE THE RELATIONS AND BLOOD SUPPLY OF RIGHT LUNG
9. WHAT ARE THE BOUNDARIES AND CONTENTS OF INGUINAL CANAL. ADD A NOTE ON INGUINAL HERNIA
10. NAME THE MUSCLES ATTACHED TO MEDIAL BORDER OF SCAPULA. ADD A NOTE ON SERRATUS ANTERIOR

### SHORT ESSAYS

1. FEMORAL SHEATH
2. LIGAMENTS OF KNEE JOINT
3. GREATER OMENTUM
4. DIAPHRAGM
5. PERICARDIUM
6. EXTERNAL FEATURES OF LIVER
7. SUPPORTS OF THE UTERUS
8. HISTOLOGY OF SKELRTAL MUSCLE
9. UPPER END OF HUMERUS
10. MASTOID PROCESS

## SHORT ANSWERS

1. HISTOLOGICAL DIAGRAM OF LARGE SIZED ARTERY
2. NAME THE ARTERIES SUPPLYING SUPRARENAL GLAND
3. NAME THE DEEP FLEXORS OF FOREARM
4. NAME THE PARTS OF BRAIN STEM
5. NAME THE BONES OF MIDDLE EAR
6. NAME THE INTRINSIC MUSCLE GROUPS OF THE TONGUE
7. NAME THE NERVE SUPPLY OF EXTRA OCULAR MUSCLES
8. NAME THE CONTENTS OF CUBITAL FOSSA
9. NAME THREE DERIVATIVES OF NEURAL CREST
10. NAME THE BRANCHES OF TIBIAL NERVE IN POPLITEAL FOSSA

## PHYSIOLOGY

MODULES	TOPIC	NO:OF HOURS
1	General Physiology	2
2	Blood	10
3	Nerve Muscle Physiology	15
4	Cardiovascular System	20
5	Respiratory System	15
6	Digestive System	5
7	Renal System	8
8	Endocrine System	10
9	Reproductive System	5
10	Special Senses	10
11	Nervous System	20
12	Physiology of Exercise	15
13	Applied Physiology	15

SL:NO	MODULES	UNITS	TOPIC
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1	General Physiology		Cell: Morphology. Organelles: their structure and functions Transport Mechanisms across the cell membrane Body fluids: Distribution, composition. Tissue fluid – formation.
2	Blood	Introduction	Composition and functions of blood.
		Plasma	Composition, formation, functions. Plasma proteins.
		RBC	count and its variations. Erythropoiesis- stages, factors regulating. Reticulo-endothelial system (in brief) Haemoglobin - Anemia (in detail), types of Jaundice. Blood indices, PCV,ESR.
		WBC	Classification. Morphology, functions, count, its variation of each. Immunity
		Platelets	Morphology, functions, count, its variations
		Hemostatic mechanisms:	Blood coagulation–factors, mechanisms. Their disorders.Anticoagulants.
		Blood Groups	Landsteiner’s law. Types, significance, determination, Erythroblastosisfoetalis.
		Blood Transfusion:	Cross matching. Indications and complications
		Lymph	Composition, formation, circulation and functions.
3	Nerve Muscle Physiology	Introduction	Resting membrane potential. Action potential – ionic basis and properties
		Nerve	Structure and functions of neurons. Classification, Properties and impulse transmission of nerve fibres. Nerve injury – degeneration and regeneration
		Neuroglia	Types and functions.
		Muscle	Classification. Skeletal muscle: Structure. Neuromuscular junction : Structure. Neuromuscular transmission, myasthenia gravis. Excitation- Contraction coupling. Rigor

			mortis. Motor unit. Properties of skeletal muscles, Strength- Duration curve, Length-tension relationship, fatigue, load
		Smooth muscle:	Structure, types, mechanism of contraction. Plasticity.
4	Cardiovascular System	introduction	Physiological anatomy and nerve supply of the heart and blood vessels. Organisation of CVS. Cardiac muscles: Structure. Ionic basis of action potential and pacemaker potential. Properties
		Conducting system:	Components. Impulse conduction Cardiac Cycle: Definition. Phases of cardiac cycle. Pressure and volume curves. Heart sounds – causes, character. ECG: Definition. Different types of leads. Waves and their causes. P-R interval. Heart block.
		Cardiac Output:	Definition. Normal value. Determinants. Stroke volume and its regulation. Heart rate and its regulation. Their variations
		Arterial Blood Pressure	Definition. Normal values and its variations. Determinants. Peripheral resistance. Regulation of BP.
		Arterial pulse.	Arterial pulse.
		Shock	Definition. Classification–causes and features
		Regional Circulation:	Coronary, Cerebral and Cutaneous circulation
		Cardiovascular changes during exercise.	Cardiovascular changes during exercise.
5	Respiratory System	introduction	Physiological anatomy – Pleura, tracheo-bronchial tree, alveolus, respiratory membrane and their nerve supply. Functions of respiratory system. Respiratory muscles.

		Mechanics of breathing:	Intrapleural and Intrapulmonary pressure changes during respiration. Chest expansion. Lung compliance: Normal value, pressure-volume curve, factors affecting compliance and its variations. Surfactant – Composition, production, functions. RDS
		Spirometry	Lung volumes and capacities. Timed vital capacity and its clinical significance. Maximum ventilation volume. Respiratory minute volume.
		Dead Space:	Types and their definition.
		Pulmonary Circulation.	Ventilation-perfusion ratio and its importance.
		Transport of respiratory gases	Diffusion across the respiratory membrane. Oxygen transport – Different forms, oxygen-haemoglobin dissociation curve. Factors affecting it. P50, Haldane and Bohr effect. Carbon dioxide transport: Different forms, chloride shift.
		Regulation of Respiration	Neural Regulation. Hering-breuer's reflex. Voluntary control. Chemical Regulation.
		Hypoxia	Effects of hypoxia. Types of hypoxia. Hyperbaric oxygen therapy. Acclimatization Hypercapnoea. Asphyxia. Cyanosis – types and features. Dysbarism
		Disorders of Respiration:	Dyspnoea. Orthopnoea. Hyperpnoea, hyperventilation, apnoea, tachypnoea. periodic breathing – types
		Artificial respiration	Artificial respiration
		Respiratory changes during exercise.	Respiratory changes during exercise.
6	Digestive System	Introduction	Physiological anatomy and nerve supply of alimentary canal. Enteric nervous System
		Salivary Secretion	Saliva: Composition. Functions. Regulation. Mastication (in brief)

		Swallowing	Definition. Different stages. Functions
		Stomach	Functions. Gastric juice: Gland, composition, function, regulation. Gastrin: Production, function and regulation. Peptic ulcer. Gastric motility. Gastric emptying. Vomiting.
		Pancreatic Secretion:	Composition, production, function. Regulation
		Liver	Functions of liver. Bile secretion: Composition, functions and regulation. Gall bladder: Functions.
		Intestine	Succusentericus: Composition, function and regulation of secretion. Intestinal motility and its function and regulation.
		Mechanism of Defaecation.	Mechanism of Defaecation.
7	Renal System	Introduction	Physiological anatomy. Nephrons – cortical and juxtamedullary. Juxtaglomerular Apparatus. Glomerular membrane. Renal blood flow and its regulation. Functions of kidneys.
		Mechanism of Urine Formation	Glomerular Filtration: Mechanism of glomerular filtration. GFR – normal value and factors affecting. Renal clearance. Inulin clearance. Creatinine clearance.
		Tubular Reabsorption	Reabsorption of Na <sup>+</sup> , glucose, HCO <sub>3</sub> <sup>-</sup> , urea and water. Filtered load. Renal tubular transport maximum. Glucose clearance: T <sub>mG</sub> . Renal threshold for glucose.
		Tubular Secretion	Secretion of H <sup>+</sup> and K <sup>+</sup> . PAH clearance

		Mechanism of concentrating and diluting the Urine	Counter-current mechanism. Regulation of water excretion. Diuresis. Diuretics.
		Micturition	Mechanism of micturition. Cystometrogram. Atonic bladder, automatic bladder. Acid-Base balance (very brief) Artificial Kidney: Principle of haemodialysis. Skin and temperature regulation.
8	Endocrine System	Introduction	Major endocrine glands. Hormone: classification, mechanism of action. Functions of hormones
		Pituitary Gland	Anterior Pituitary and Posterior Pituitary hormones: Secretory cells, action on target cells, regulation of secretion of each hormone. Disorders: Gigantism, Acromegaly, Dwarfism, Diabetes insipidus. Physiology of growth and development: hormonal and other influences. Pituitary-Hypothalamic Relationship.
		Thyroid Gland	Thyroid hormone and calcitonin: secretory cells, synthesis, storage, action and regulation of secretion. Disorders: Myxoedema, Cretinism, Grave's disease. Parathyroid hormones: secretory cell, action, regulation of secretion. Disorders: Hypoparathyroidism. Hyperthyroidism. Calcium metabolism and its regulation.
		Adrenal Gland	Adrenal Cortex: Secretory cells, synthesis, action, regulation of secretion of Aldosterone, Cortisol, Androgens. Disorders: Addison's disease, Cushing's syndrome, Conn's syndrome, Adrenogenital syndrome. Adrenal Medulla: Secretory cells, action, regulation of secretion of adrenaline and noradrenaline. Disorders: Pheochromocytoma.

		Endocrine Pancreas	<p>Secretory cells, action, regulation of secretion of insulin and glucagon.</p> <p>Glucose metabolism and its regulation. Disorder: Diabetes mellitus.</p> <p>Calcitriol, Thymus and Pineal gland (very brief).</p> <p>Local Hormones.(briefly).</p>
9	Reproductive System	Introduction	<p>Physiological anatomy reproductive organs. Sex determination. Sex differentiation. Disorder</p>
		Male Reproductive System & Female Reproductive System:	<p>Functions of testes. Pubertal changes in males. Spermatogenesis.</p> <p>Testosterone: action. Regulation of secretion. Semen.</p> <p>Functions of ovaries and uterus. Pubertal changes in females.</p> <p>Oogenesis. Hormones:oestrogen and progesterone-action. regulation of secretion.</p> <p>Menstrual</p> <p>Cycle: Phases. Ovarian cycle. Uterine cycle. Hormonal basis. Menarche. Menopause.</p> <p>Pregnancy: Pregnancy tests. Physiological changes during pregnancy. Functions of placenta.</p> <p>Lactation. Contraception methods</p>
10	Special Senses	Vision	<p>Introduction: Functional anatomy of eye ball. Functions of cornea, iris, pupil, aqueous humor – glaucoma, lens – cataract, vitreous humor, rods and cones. Photopic vision.</p> <p>Scotopic vision.</p> <p>Visual Pathway and the effects of lesions.</p> <p>Refractive Errors: myopia, hypermetropia, presbyopia and astigmatism.</p> <p>Visual Reflexes: Accommodation, Pupillary and Light. Visual acuity and Visual field. Light adaptation. Dark adaptation.Color vision – color blindness. Nyctalopia.</p>

		Audition	Physiological anatomy of the ear. Functions of external ear, middle ear and inner ear. Structure of Cochlea and organ of corti. Auditory pathway. Types of Deafness. Tests for hearing. Audiometry.
		Taste	Taste buds. Primary tastes. Gustatory pathway
		Smell	Olfactory membrane. Olfactory pathway
		Vestibular Apparatus	Crista ampullaris and macula. Functions. Disorders
11	Nervous System	Introduction	Organisation of CNS – central and peripheral nervous system. Functions of nervous system. Synapse: Functional anatomy, classification, Synaptic transmission. Properties.
		Sensory Mechanism	Sensory receptors: function, classification and properties. Sensory pathway: The ascending tracts – Posterior column tracts, lateral spinothalamic tract and the anterospinothalamic tract – their origin, course, termination and functions. The trigeminal pathway. Sensory cortex. Somatic sensations: crude touch, fine touch, tactile localization, tactile discrimination, stereognosis, vibration sense, kinesthetic sensations. Pain sensation: mechanism of pain. Cutaneous pain –slow and fast pain, hyperalgesia. Deep pain. Visceral pain – referred pain. Gate control theory of pain. tabes dorsalis, sensory ataxia
		Motor Mechanism	Motor Cortex. Motor pathway: The descending tracts – pyramidal tracts, extrapyramidal tracts – origin, course, termination and functions. Upper motor neuron and lower motor neuron. Paralysis, monoplegia, paraplegia, hemiplegia and quadriplegia.
		Reflex Action	components, Bell-Magendie law, classification and Properties. Monosynaptic and polysynaptic reflexes, superficial reflexes, deep reflexes.Stretch reflex– structure of muscle spindle, pathway, higher control and functions. Inverse stretch reflex. Muscle tone – definition, and properties hypotonia, atonia and hypertonia. UMNL and LMNL

		Lesions	Spinal cord Lesions: Complete transection and Hemisection of the spinal cord. Cerebellum: Functions. Cerebellar ataxia.
		Posture and Equilibrium	Postural reflexes – spinal, medullary, midbrain and cerebral reflexes
		others	Thalamus and Hypothalamus: Nuclei. Functions. Thalamic syndrome Reticular Formation and Limbic System: Components and Functions. Basal Ganglia: Structures included and functions. Parkinson’s disease. Cerebral Cortex: Lobes. Brodmann’s areas and their functions. Higher functions of cerebral cortex – learning, memory and speech. EEG : Waves and features. Sleep: REM and NREM sleep. CSF: Formation, composition, circulation and functions. Lumbar puncture and its significance. Blood brain barrier. Hydrocephalus. ANS: Features and actions of parasymapathetic and sympathetic nervous system.
12	Physiology of Exercise	A. Effects of acute and chronic exercise on	1) O2 transport 2) Muscle strength/power/endurance 3) B.M.R./R.Q. 4) Hormonal and metabolic effect 5) Cardiovascular system 6) Respiratory system 7) Body fluids and electrolyte
		B. Effect of gravity / altitude /acceleration / pressure on	

		physical parameters	
		C. Physiology of Age	
13	Applied Physiology	a. Pulmonary Functions	<ol style="list-style-type: none"> <li>1. Properties of gases, Mechanics of respiration, Diffusion capacity, special features of pulmonary circulation and their application.</li> <li>2. Respiratory adjustments in exercises.</li> <li>3. Artificial respiration</li> <li>4. Breath sounds.</li> </ol>
		b. Cardio vascular Functions	<ol style="list-style-type: none"> <li>1. Blood flow through arteries, arterioles, capillaries, veins and venuoles.</li> <li>2. Circulation of Lymph, Oedema</li> <li>3. Factors affecting cardiac output.</li> <li>4. Circulatory adjustment in exercise and in postural and gravitational changes,</li> <li>5. Pathophysiology of fainting and heart failure.</li> </ol>
		c. Muscles and Nervous System Functions	<ol style="list-style-type: none"> <li>1. Peripheral nervous system, Neuromuscular transmission, Types of nerve fibres.</li> <li>2. Action potential, Strength-duration curve, ECG, EMG, VEP, NCV</li> <li>3. Degeneration and regeneration of nerve, Reactions of denervations.</li> <li>4. Synaptic transmission, Stretch reflex- Mechanism and factors affecting it.</li> <li>5. Posture, Balance and Equilibrium/Coordination of voluntary movement</li> <li>6. Voluntary motor action, clonus, Rigidity, Discordination,</li> <li>7. Special senses- Vision, taste, hearing, vestibular, Olfaction</li> <li>8. Sympathetic and Parasympathetic regulation, Thermoregulation</li> </ol>
		d. Blood functions	<ol style="list-style-type: none"> <li>1. Thalassemia Syndrome, Hemophilia, VWF</li> <li>2. Anemia, Leucocytosis</li> <li>3. Bone marrow transplant</li> </ol>
		e. Metabolic	Diabetes Mellitus, Physiological basis of Peptic Ulcer, Jaundice, GIT disorders and Dietary

		Functions	fiber, Thyroid functions, Vitamins deficiency,
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#### PRACTICALS

SL.NO	TOPIC	DESCRIPTION
1	Haematology [ 20 Hours]	<p>To be done by the students</p> <ol style="list-style-type: none"> <li>1. Study of Microscope and its uses</li> <li>2. Determination of RBC count</li> <li>3. Determination of WBC count</li> <li>4. Differential leukocyte count</li> <li>5. Estimation of hemoglobin</li> <li>6. Calculation of blood indices</li> <li>7. Determination of blood groups</li> <li>8. Determination of bleeding time</li> <li>9. Determination of clotting time</li> </ol> <p>Demonstrations only</p> <ol style="list-style-type: none"> <li>1. Determination of ESR</li> <li>2. Determination of PCV</li> </ol>

2	Clinical Examination [20 Hours]	<ol style="list-style-type: none"> <li>1. Examination of Radial pulse.</li> <li>2. Recording of blood pressure</li> <li>3. Examination of CVS</li> <li>4. Examination of Respiratory system</li> <li>5. Examination of Sensory system</li> <li>6. Examination of Motor System</li> <li>7. Examination of reflexes</li> <li>8. Examination of cranial nerves</li> </ol>
3	Amphibian Experiments – Demonstration and Dry charts Explanation.  [15 Hours]	<ol style="list-style-type: none"> <li>1. Instruments used for frog experiments. Kymograph, heart liver, Muscle trough, stimulator.</li> <li>2. Simple muscle curve.</li> <li>3. Effect of increasing the strength of the stimuli</li> <li>4. Effect of temperature on muscle contraction.</li> <li>5. Effect of two successive stimuli.</li> <li>6. Effect of Fatigue.</li> <li>7. Effect of load on muscle contraction</li> <li>8. Genesis of tetanus and clonus.</li> <li>9. Velocity of impulse transmission.</li> <li>10. Normal cardiogram of amphibian heart.</li> </ol>

		11. Properties of Cardiac muscle 12. Effect of temperature on cardiogram
4	Recommended Demonstrations [ 5 Hours]	1. Spirometry 2. Artificial Respiration 3. ECG 4. Perimetry 5. Mosso's Ergometry

Recommended text books:

1. Text book of medical physiology – Guyton Arthur
2. Concise medical physiology – Chaudhuri Sujit K.
3. Human Physiology – Chatterjee C.C.
4. Text book of practical Physiology – Ranade.
5. Text of Physiology – A.K.Jain.
6. Basics of Medical physiology- Venkatesh D & Sudhakar H H
7. Manipal Manual of Physiology – Prof. C N Chandrashekar

Reference:

8. Review of Medical Physiology – Ganong William F.
9. Physiological basis of Medical practice – Best & Taylor

HUMAN PHYSIOLOGY

LONG ESSAYS

1. NAME FOUR ASCENDING TRACTS OF THE SPINAL CORD. TRACE THE PATHWAY FOR FINE TOUCH

2. DESCRIBE IN DETAIL THE PROPERTIES OF CARDIAC MUSCLE
3. WITH A LABELLED DIAGRAM EXPLAIN THE NEURO MUSCULAR TRANSMISSION
4. DEFINE ARTERIAL BLOOD PRESSURE. BRIEFLY EXPLAIN THE REGULATION OF ARTERIAL BLOOD PRESSURE
5. DEFINE SYNAPSE. DISCUSS THE PROPERTIES OF SYNAPSE
6. CLASSIFY SYNAPSES AND DESCRIBE THEIR PROPERTIES
7. WHAT ARE THE PHYSIOLOGICAL ACTIONS OF CORTISOL? HOW ITS SECRETIONS IS REGULATED
8. DESCRIBE A NORMAL ECG IN LEAD 2
9. ENUMERATE ANTIGENS AND ANTIBODIES OF ABO SYSTEM. WHAT WILL BE SEQUENCES OF A MISMATCHED BLOOD TRANSFUSION
10. FUNCTIONS OF MIDDLE EAR

#### SHORT ESSAYS

1. TABULATE ANY THREE DIFFERENCES BETWEEN SKELETA MUSCLE, CARDIAC MUSCLE AND SMOOTH MUSCLE
2. DESCRIBE THE INTRINSIC MECHANISM OF COAGULATION
3. DEFINE CARDIAC CYCLE. EXPLAIN THE PHASES OF CARDIAC CYCLE TAKING PLACE IN VENTRICLES
4. EXPLAIN STRETCH REFLEX WITH THE HELP OF A DIAGRAM
5. DISCUSS THE DIFFERENT PHASES OF MENSTRUAL CYCLE WITH THEIR HORMONAL BASIS
6. FUNCTIONS OF HYPOTHALAMUS
7. BRIEFLY EXPLAIN THE OXYGEN DISSOCIATION CURVE
8. TRACE THE PATHWAY OF FINE TOUCH
9. DESCRIBE THE FUNCTIONS OF PLASMA PROTEINS
10. FUNCTIONS OF MIDDLE EAR

#### SHORT ANSWERS

1. STATE STERLING'S LAW OF FORCE OF CONTRACTION
2. LIST THE FUNCTIONS OF JUXTA- GLOMERULAR APPARATUS
3. DEFINE OSMOSIS

4. NAME THE NEUROGLIAL CELLS. WHAT ARE THE FUNCTIONS OF ASTROCYTES
5. ENUMERATE THE FUNCTIONS OF ANGIOTENSIN 2
6. INTRAPULMONARY PRESSURE AND ITS NORMAL VALUE
7. NAME THE CONTRACTILE PROTEINS
8. DEFINE DEAD SPACE. MENTION THE TYPES OF DEAD SPACE
9. DRAW A LABEL DIAGRAM OF ECG WAVES
10. DEFINE MUSCLE TONE

## BIOCHEMISTRY

SL NO	TOPIC	CONTENTS	NO : OF HOURS
1	Nutrition	<p>Introduction, Importance of nutrition</p> <p>Calorific values,</p> <p>Respiratory quotient – Definition, and its significance</p> <p>Energy requirement of a person -</p> <p>Basal metabolic rate: Definition, Normal values, factor affecting BMR</p> <p>Special dynamic action of food</p> <p>Physical activities - Energy expenditure for various activities.</p> <p>Calculation of energy requirement of a person</p> <p>Balanced diet</p> <p>Recommended dietary allowances</p> <p>Role of carbohydrates in diet: Digestible carbohydrates and dietary fibers</p> <p>Role of lipids in diet</p> <p>Role of proteins in diet: Quality of proteins - Biological value, net protein utilization, Nutritional aspects of proteins-essential and non essential amino acids. Nitrogen balance</p> <p>Nutritional disorders</p>	7

2	Carbohydrate Chemistry	<p>Definition, general classification with examples, Glycosidic bond</p> <p>Structures, composition, sources, properties and functions of Monosaccharides, Disaccharides, Oligosaccharides and Polysaccharides.</p> <p>Glycosaminoglycans (mucopolysaccharides)</p>	3
3	Lipid Chemistry	<p>Definition, general classification</p> <p>Definition, classification, properties and functions of Fatty acids, Triacylglycerol, Phospholipids, Cholesterol</p> <p>Essential fatty acids and their importance</p> <p>Lipoproteins: Definition, classification, properties, Sources and function</p> <p>Ketone bodies</p>	3
4	Amino-acid Chemistry	<p>Amino acid chemistry: Definition, Classification, Peptide bonds</p> <p>Peptides: Definition, Biologically important peptides</p> <p>Protein chemistry: Definition, Classification, Functions of proteins,</p>	3
5	Enzymes	<p>Definition, Active site, Cofactor (Coenzyme, Activator), Proenzyme. Classification with examples, Factors effecting enzyme activity, Enzyme inhibition and significance, Isoenzymes,</p> <p>Diagnostic enzymology (clinical significance of enzymes)</p>	3
6	Nucleotide and Nucleic acid Chemistry	<p>Nucleotide chemistry: Nucleotide composition, functions of free nucleotides in body.</p> <p>Nucleic acid (DNA and RNA) chemistry: Difference between DNA and RNA, Structure of DNA (Watson and Crick model), Functions of DNA. Structure and functions of tRNA, rRNA, mRNA.</p>	2

7	Digestion and Absorption	General characteristics of digestion and absorption, Digestion and absorption of carbohydrates, proteins and lipids. Disorders of digestion and absorption – Lactose intolerance,	3
8	Carbohydrate Metabolism	Introduction, Glycolysis – Aerobic, Anaerobic Citric acid cycle, Substrate level phosphorylation Glycogen metabolism – Glycogenesis, Glycogenolysis, Metabolic disorders glycogen, Gluconeogenesis, Cori cycle Hormonal regulation of glucose, Glycosuria, Diabetes mellitus,	5
9	Lipid Metabolism	Introduction to lipid metabolism, Lipolysis, Oxidation of fatty acids $\beta$ -oxidation of fatty acids, Lipogenesis - Denovo synthesis of fatty acids, chain elongation, desaturation, triacylglycerol synthesis, fat metabolism in adipose tissues Ketone body metabolism: Ketone body formation (ketogenesis), utilization (ketolysis), ketosis, Rothera's test Cholesterol metabolism: synthesis, degradation, cholesterol transport Hypercholesterolemia and its effects (atherosclerosis and coronary heart diseases) Hypocholesterolemic agents, Common hyperlipoproteinemia, Fatty liver	5
10	Amino acid and Protein Metabolism	Catabolism of amino acids - Introduction, transamination, deamination, Fate of ammonia, transport of ammonia, Urea cycle Specialized products formed from amino acids - from glycine, arginine, methionine, phenylalanine and tyrosine.	3

11	Vitamins	Definition, classification according to solubility,  Individual vitamins - Sources, Coenzyme forms, functions, RDA, digestion, absorption and transport, deficiency and toxicity	7
12	Mineral Metabolism	Definition, Sources, RDA, Digestion, absorption, transport, excretion, functions, disorder of  Individual minerals - Calcium, phosphate, iron, Magnesium, fluoride, selenium, molybdenum, copper. Phosphate, calcium and iron in detail	2
13	Cell Biology	Introduction, Cell structure, Cell membrane structure and function, various types of absorption.  Intracellular organelles and their functions, briefly on cytoskeleton	2
14	Muscle Contraction	Contractile elements in muscle, briefly on the process of muscle contraction, Energy for muscle contraction	2
15	Biochemistry of Connective tissue	Introduction, various connective tissue proteins: Collagen, elastin - Structure and associated disorders. Glycoproteins, Proteoglycans	2
16	Hormone Action	Definition, classification, Mechanism of hormone action. Receptors, signal transduction, second messengers and cell function	2
17	Acid-Base balance	Acids, bases and buffers, pH. Buffer systems of the body, bicarbonate buffer system  Role of lungs and kidneys in acid base balance, Acid base imbalance	2
18	Water balance	Water distribution in the body, Body water, water turnover, Regulation of water balance: role of ADH and thirst centre	1

19	Electrolyte balance	Osmolarity. Distribution of electrolytes Electrolyte balance: Role of aldosterone, rennin angiotensin system and ANF	1
20	Clinical Biochemistry	Normal levels of blood and urine constituents, Relevance of blood and urine levels of Glucose, Urea, Uric acid, Creatinine, Calcium, Phosphates, pH and Bicarbonate. Liver function tests, Renal function tests	2

#### Recommended Text books

1. MURRAY [ROBERT KK], Harper's Bio Chemistry Ed 24, Prentice Hall. 1996, p925,
2. RAMAKRISHNA [S], PRASANNA [KG], RAJAN [R], Text Book of Medical Biochemistry, Ed 1, orient Langman, Bombay 1980, p717.
3. VASUDEVAN [DM] and SREE KUMARI [S], Text Book of Bio Chemistry for Medical students, Ed 1, Jaypee Brothers, New Delhi, 1995, p637,
4. DAS [Debajyothi], Biochemistry, Ed. 7, Academic Publishers Calcutta, 1992, p648,
5. PRASAD RM, RM's Physiotherapy Textbook Series, Text book of Biochemistry for Bachelor of Physiotherapy First Edition, RM Publications, Mangalore.

#### Reference

1. LEHNINGER [Albert] et. al., Principles of Biochemistry, Ed. 3, LBS Publishers, Delhi, 1993,p1143,
2. ORTEN [James M] and NEUHAUS [OHO.W]. Human Biochemistry, Ed. 9, Mosby, St.Louis,1975 p994.
3. Strayer [LUBERT], Biochemistry, Ed. 4, WH, Freeman & Co., Ny.1995, p1064
4. DEVLIN [Thomas M], Biochemistry with Clinical Correalation, Ed. 4, Willey Libs, Ny 1997,p1186

## BIO- CHEMISTRY

### LONG ESSAYS

1. DESCRIBE CITRIC ACID CYCLE. ADD A NOTE ON ENERGETIC.
2. DESCRIBE THE B- OXIDATION OF FATTY ACIDS
3. DESCRIBE THE SOURCES, RDA, METABOLIC FUNCTIONS, DIGESTIONS AND ABSORPTION OF VIT C.
4. DESCRIBE THE CHEMISTRY SOURCES REQUIREMENTS, METABOLIC FUNCTIONS AND DEFICIENCY MANIFESTATIONS OF VIT C.
5. WHAT ARE KETONE BODIES? DESCRIBE THEIR METABOLISM .WRITE THEIR METABOLISM. WRITE A NOTE ON KETOSIS.
6. WHAT IS GLYCOLYSIS? DESCRIBE ITS REACTIONS AND ADD A NOTE ON ITS ENERGETIC.
7. DESCRIBE THE STRUCTURE BIOCHEMICAL COMPOSITION AND FUNCTIONS OF DIFFERENT COMPONENTS OF CELL.
8. DESCRIBE THE OXIDATION OF FATTY ACIDS GIVING ENERGETICS
9. DESCRIBE THE REACTIONS OF TCA CYCLE AND ADD A NOTE ON ITS ENERGETIC.
- 10.DESCRIBE THE METABOLISM OF PHENYLALANINE.

### SHORT ESSAYS

1. CONTRACTILE PROTEINS?
2. UREA CYCLE
3. CELL MEMBRANE
4. RIBOSOMES
5. FUNCTION OF CALCIUM
- 6.METABOLIC ACIDOSIS

7.LIOPROTEINS.

8.PHOSPHOLIPIDS

9.LIVER FUNCTION TEST

10.STRUCTURE OF DNA

SHORT ANSWERS.

1.BMR

2. MRNA

3. DIBETES MELLITUS

4. ESSENTIAL FATTY ACIDS

5. EPIMERS

6. DNA

7. CYCLIC AMP

8. CHOLESTEROL

9. TRANSMINATION

10. BERI-BERI

## PSYCHOLOGY

SL NO	TOPIC	CONTENTS	NO:OF HOURS
1	Introduction to Psychology	<p>a. Schools: Structuralism, functionalism, behaviorism, Psychoanalysis.</p> <p>b. Methods: Introspection, observation, inventory and experimental method.</p> <p>c. Branches: pure psychology and applied psychology</p> <p>d. Psychology and physiotherapy</p>	6
2	Growth and Development	<p>a. Life span: different stages of development (Infancy, childhood, adolescence, adulthood, middle age, old age).</p> <p>b. Heredity and environment: role of heredity and environment in physical and psychological development, "Nature v/s Nurture controversy"</p>	6
3	Sensation, attention and perception	<p>a. Sensation: Vision, Hearing, Olfactory, Gustatory and Cutaneous sensation, movement, equilibrium and visceral sense.</p> <p>b. Attention: Types of attention, Determinants of attention (subjective determinants and objective determinants)</p> <p>c. Perception: Gestalt principles of organization of perception (principle of figure ground and principles of grouping), factors influencing perception (past experience and</p>	6

		context) d. Illusion and hallucination: different types	
4	Motivation	a. Motivation cycle (need, drive, incentive, reward). b. Classification of motives. c. Abraham Maslow's theory of need hierarchy	4
5	Frustration and conflict	a. Frustration: sources of frustration. b. Conflict: types of conflict. c. Management of frustration and conflict	2
6	Emotions	a. Three levels of analysis of emotion (physiological level, subjective state, and overt behavior). b. Theories of emotion c. Stress and management of stress.	6
7	Intelligence	a. Theories of intelligence. b. Distribution of intelligence. c. Assessment of intelligence	6
8	Thinking	a. Reasoning : deductive and inductive reasoning b. Problem solving: rules in problem solving (algorithm and heuristic) c. Creative thinking: steps in creative thinking, traits of creative people	4
9	Learning	a. Factors effecting learning. b. Theories of learning: trial and error learning, classical conditioning, Operant conditioning, insight learning, social learning theory. c. The effective ways to learn: Massed/Spaced, Whole/Part,	8

		Recitation/Reading, Serial/Free recall, Incidental/Intentional learning, Knowledge of results, association, organization, and mnemonic methods.	
10	Personality	a. Approaches to personality: type & trait, behavioristic, psychoanalytic and humanistic approach. b. Personality assessment: observation, situational test, questionnaire, rating scale, interview, and projective techniques. c. Defense Mechanisms: denial of reality, rationalization, projection, reaction formation, identification, repression, regression, intellectualization, undoing, introjection, acting out.	8
11	Social psychology	a. Leadership: Different types of leaders. Different theoretical approaches to leadership. b. Attitude: development of attitude. Change of attitude	4

Recommended text books:

1. Feldman.R.H(1996). Understanding Psychology. New Delhi: Tata McGraw hill.
2. Morgan et al(2003). Introduction to Psychology. New Delhi: Tata McGraw hill.
3. Lefton( ). Psychology. Boston: Alwin&Bacot Company.
4. Mangal, S.K (2002). Advanced Educational Psychology. New Delhi: prentice hall.
5. Atkinson(1996). Dictionary of Psychology.

GENERAL PSYCOLOGY

## LONG ESSAYS

1. WHAT IS PSYCHOLOGY. EXPLAIN THE OBSERVATION METHOD AND INVENTORY METHOD
2. WHAT IS LEARNING. DESCRIBE THE EFFECTIVE WAYS OF LEARNING
3. WHAT IS LEARNING. EXPLAIN PAVLOVS CLASSICAL CONDITIONING
4. WHAT IS PERCEPTION . EXPLAIN VARIOUS PRINCIPALS OF PERCEPTION
5. WHAT IS THE PSYCHOLOGY . EXPLAIN THE SCOPE OF PSYCOLOGY
6. WHAT IS MOTIVATION. DESCRIBE THE CLASSIFICATION OF MOTIVES
7. DESCRIBE THE ROLE OF HERIDITY AND ENVIRONMENT IN PHYSICAL AND PSYCHOLOGICAL DEVELOPMENT
8. WHAT IS EMOTION. EXPLAIN THE THEORIES OF EMOTION
9. DEFINE PERSONALITY. EXPLAIN VARIOUS METHODS OF ASSESSING PERSONALITY
10. WHAT IS INSTRUMENTAL LEARNING. EXPLAIN SKINNERS OPERANT LEARNING

## SHORT ESSAYS

1. DETERMINANTS OF ATTENTION
2. EXPLAIN THE ASSESSMENT OF INTELLIGENCE
3. BIOLOGICAL MOTIVES
4. TYPES OF REASONING
5. EXPLAIN THE TYPES OF LEADERSHIP
6. CLINICAL PSYCHOLOGY
7. DEVELOPMENT AND GROWTH OF BEHAVIOUR DURING INFANCY AND CHILDHOOD
8. PHYSIOLOGICAL CHANGES DURING EMOTION
9. EFFECTIVE WAYS OF LEARNING
10. CLASSIFICATION OF PERSONALITY

## SHORT ANSWERS

1. SCHOOLS OF PSYCHOLOGY

2. INDEPENDENT AND DEPENDENT VARIABLES
3. THIRST MOTIVE
4. PSYCHOLOGICAL NEEDS
5. FEELING AND EMOTION
6. STRESS
7. WHAT IS ATTITUDE
8. RATIONALIZATION
9. CONFLICT
10. ILLUSION

## SOCIOLOGY

SL NO	TOPIC	CONTENTS (60 hrs)
1	Introduction	<ol style="list-style-type: none"> <li>1. Meaning- Definition and scope of sociology</li> <li>2. Its relation to Anthropology, Psychology, Social Psychology.</li> <li>3. Methods of Sociological investigations- Case study, social survey, questionnaire, Interview and opinion poll methods.</li> <li>4. Importance of its study with special reference to Health Care Professionals.</li> </ol>
2	Social Factors in Health and disease situations	<ol style="list-style-type: none"> <li>1. Meaning of social factors</li> <li>2. Role of social factors in health and illness</li> </ol>
3	Socialization	<ol style="list-style-type: none"> <li>1. Meaning and nature of socialization</li> <li>2. Primary, Secondary and Anticipatory socialization</li> <li>3. Agencies of socialization</li> </ol>
4	Social Groups	<p>Concepts of social groups, influence of formal and informal groups on health and sickness. The role of primary groups and secondary groups in the hospital and rehabilitation setup.</p>
5	Family	<ol style="list-style-type: none"> <li>1. The family, meaning and definitions.</li> <li>2. Functions of types of family</li> </ol>

		<p>3. Changing family patterns</p> <p>4. Influence of family on the individuals health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their importance to physiotherapy.</p>
6	Community	<p>1. Rural community : Meaning and features –Health hazards of ruralities, health hazards to tribal community.</p> <p>2. Urban community : Meaning and features- Health hazards of urbanities.</p>
7	Culture and Health	<p>1. Concept of Health</p> <p>2. Concept of Culture</p> <p>3. Culture and Health</p> <p>4. Culture and Health Disorders</p>
8	Social change	<p>1. Meaning of social changes.</p> <p>2. Factors of social changes.</p> <p>3. Human adaptation and social change</p> <p>4. Social change and stress.</p> <p>5. Social change and deviance.</p> <p>6. Social change and health programme</p> <p>7. The role of social planning in the improvement of health and rehabilitation</p>

9	Social Problems of disabled	<p>Consequences of the following social problems in relation to sickness and disability, remedies to prevent these problems.</p> <ol style="list-style-type: none"> <li>1. Population explosion</li> <li>2. Poverty and unemployment</li> <li>3. Beggary</li> <li>4. Juvenile delinquency</li> <li>5. Prostitution</li> <li>6. Alchoholism</li> <li>7. Problems of women in employment</li> <li>8. geriatric problems</li> <li>9. Problems of underprivileged.</li> </ol>
10	Social Security	Social security and social legislation in relation to the disabled.
11	Social worker	<ol style="list-style-type: none"> <li>1. Meaning of Social Work</li> <li>2. The role of a Medical Social Worker</li> </ol>

Recommended Text Books

1. Sachdeva and Vidyabushan, Introduction to the study of sociology
2. INDRANI T K, Text Books of Sociology for Graduates Nurses and Physiotherapy Students, JP Brothers, New Delhi,10

## SOCIOLOGY

### LONG ESSAYS

1. DEFINE FAMILY. EXPLAIN TYPES OF FAMILY
2. EXPLAIN THE MEASURES TAKEN FOR THE ERADICATION OF POVERTY
3. SOCIOLOGY IS NOT A PHYSICAL SCIENCE- EXPLAIN
4. MEASURES INTRODUCED FOR PREVENTION OF ALCOHOLISM IN INDIA
5. MEASURES TAKEN TO PREVENT JUVENILE DELIQUENCY
6. DEFINE SOCIAL GROUP AND EXPLAIN FEATURES
7. CAUSES OF POVERTY AND WRITE REMEDIAL MEASURES
8. EXPLAIN MERITS AND DEMERITS OF FAMILY SYSTEM IN INDIA
9. EXPLAIN THE FACTORS OF SOCIAL CHANGE
10. CHARACTERISTICS OF RURAL COMMUNITY

### SHORT ESSAYS

1. CLASSIFICATION OF GROUP
2. STAGES OF SOCIALIZATION
3. TYPES OF FAMILY
4. CULTURE IN HEALTH AND ILLNESS
5. SOCIAL CHANGE AND STRESS
6. OBSERVATION METHOD
7. RELATION OF SOCIOLOGY WITH PSYCHOLOGY
8. EFFECTS OF ALCOHOLISM ON THE SOCIETY
9. SOCIAL DEVIANCE AND HEALTH
10. CAUSES OF BEGGARY

## SHORT ANSWERS

1. RESOCIALISATION
2. OUT GROUP
3. POLYANDRY
4. CLINICAL UNEMPLOYMENT
5. JUVENILE DELIQUENCY
6. QUESTIONNAIRE METHOD
7. SOCIAL FACTOR
8. JOINT FAMILY
9. FORMAL GROUP
10. SOCIAL CONFORMITY

## ENGLISH

Behavioural Objectives:

The student at the end of training is able to

1. Read and comprehend English language
2. Speak and write grammatically correct English
3. Appreciates the value of English literature in personal and professional life,

UNITS	TOPICS	CONTENTS (30 hrs)
1	Introduction	Study Techniques Organisation of effective note taking and logical processes of analysis and synthesis The use of the dictionary Enlargement of vocabulary Effective diction
2	Applied Grammer	Correct usage The structure of sentences The structure of paragraphs Enlargements of Vocabulary
3	Written Composition	Precise writing and summarizing Writing of bibliography Enlargement of Vocabulary
4	Reading and comprehension	Review of selected materials and express oneself in one's words.

		Enlargement of Vocabulary.
5	The Study of Various Forms of Composition	Paragraph, Essay, Letter, Summary, Practice in writing
6	Verbal Communication	Discussions and Summarization, Debates, Oral reports, use in teaching

#### Reference

1. English Grammar Collins, Birmingham University, International Language Data Base, Rupa & Co. 1993
2. Wren and Martin - Grammar and Composition, 1989, Chanda & Co, Delhi
3. Letters for all Occassions A S Myers. Pub - Harper Perennial
4. Spoken English V Shasikumar and P V Dhanija\_ Pub. By: Tata Mcgraw Hill, New Delhi
5. Journalism Made Simple , D Wainwright
6. Writers Basic Bookshelf Series, Writers Digest series
7. Interviewing by Joan Clayton Platkon
8. Penguin Book of Interviews

## BASIC NURSING

SL NO	TOPICS	CONTENTS (30hrs)
1	What is Nursing ? Nursing principles. Inter-Personnel relationships. Bandaging	Basic turns; Bandaging extremities; Triangular Bandages and their application.
2	Nursing Position	Environment safety; Bed making, prone, lateral, dorsal, dorsal recumbent, Flower's positions, comfort measures, Aids and rest and sleep
3	Lifting and Transporting Patients	Lifting Patients up in the bed. Transferring from bed to wheel chair. "Transferring from bed to stretcher".
4	Bed side Management	Giving and taking Bed pan, Urinal : Observation of stools, urine. Observation of sputum, Understand use and care of catheters, enema giving.
5	Methods of Giving Nourishment	Feeding, Tube feeding, drips, transfusion
6	Care of Rubber Goods	Obervation, Reporting and Recording Temperature, Respiration and Pulse, Simple aseptic Technique, Sterlisation and Disinfection
7	Surgical Dressing	Observation of dressing procedures

**ಕನ್ನಡ : ಒಂದು  
ಪಠ್ಯಕ್ರಮದ ರೂಪರೇಖೆ**

- ಸ್ಥಾನ : ಬೇಸಿಕ್ ವಿ.ಎಸ್ಸಿ., (ನರ್ಸಿಂಗ್) ಮೊದಲ ವರ್ಷ  
 ಸಮಯ : 15 ಘಂಟೆಗಳು (ಪದಿನೈದು ಘಂಟೆಗಳು)  
 ಪಠ್ಯಕ್ರಮದ : ವಿದ್ಯಾರ್ಥಿ/ವಿದ್ಯಾರ್ಥಿನಿಯರು ದಿನನಿತ್ಯ ಸಂಪರ್ಕಿಸಬಹುದಾದ  
 ಜನಸಾಮಾನ್ಯರೊಡನೆ ಶುಶ್ರೂಷೆಗೆ ಸಂಬಂಧಿಸಿದಂತೆ ಕನ್ನಡದಲ್ಲಿ  
 ಸಂಭಾಷಣೆ ಮಾಡಲು ಹಾಗೂ ತಿಳುವಳಿಕೆ ನೀಡಲು ಸಹಕಾರ  
 ವಾಗುವಂತೆ ಪಠ್ಯಕ್ರಮದ ಮಾದರಿಯನ್ನು ಆಳವಡಿಸುವುದು.  
 ಉದ್ದೇಶ : 1. ದಿನ ಬಳಕೆಯ ವ್ಯವಹಾರದಲ್ಲಿ ಶುಶ್ರೂಷೆಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಕನ್ನಡ ಭಾಷೆಗೆ  
 ಅಳವಡಿಕೆ  
 2. ಕನ್ನಡೇತರರಿಗೆ ಕನ್ನಡ ಭಾಷೆಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

**ಪಠ್ಯಕ್ರಮದ ವಿವರ**

- ಘಟಕ ಒಂದು : (ಅ) ಆಶ್ವರಮಾಲೆ, ಸ್ವರಗಳು, ವ್ಯಂಜನಗಳು  
 (ಆ) ವದ, ವದಮಂಜ, ವಾಕ್ಯ ರಚನೆ, ಪತ್ರಲೇಖನ ಪ್ರಬಂಧರಚನೆ  
 ಎರಡು : ಶುಶ್ರೂಷಾ ಪದಗಳು (ಇಂಗ್ಲೀಷಿನಿಂದ ಕನ್ನಡಕ್ಕೆ  
 ಶುಶ್ರೂಷೆಯಲ್ಲಿ ಸಾಮಾನ್ಯ ಬಳಕೆಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ)  
 ಮೂರು : ರೋಗಿ ಹಾಗೂ ಶುಶ್ರೂಷಕರ ಮಧ್ಯೆ ಸಾಮಾನ್ಯವಾಗಿ ನಡೆಯುವ ಸಂಭಾಷಣೆ  
 (ಅ) ಪ್ರಶ್ನಾರ್ಥಕ ಸಲಹೆ ಕೊಡುವ ವಾಕ್ಯಗಳು  
 (ಆ) ವೈದ್ಯರೊಂದಿಗೆ ಹಾಗೂ ಇತರೆ ಸಹಚರರೊಂದಿಗೆ ವ್ಯವಹರಿಸಲು,  
 ಸಂಭಾಷಣೆ ನಡೆಸಲು ಬೇಕಾದ ವಾಕ್ಯಗಳು.

**ಅಧ್ಯಯನಕ್ಕೆ ಶಿಫಾರಸ್ಸು ಮಾಡಲಾಗಿರುವ ಗ್ರಂಥಗಳು**

1. ಕನ್ನಡ ವ್ಯಾಕರಣ (8, 9 ಮತ್ತು 10ನೇ ತರಗತಿಗಳಿಗೆ ಕರ್ನಾಟಕ ಸರ್ಕಾರ, ಪಠ್ಯಮಸ್ತಕಗಳಿಗಲಾಖೆ)
2. ವ್ಯವಹಾರಿಕ ಕನ್ನಡ : ಎಚ್.ಎಸ್.ಎಸ್.
3. ಪತ್ರ ಲೇಖನ : ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್ತು
4. ಲೇಖನ ಕಲೆ : ಎನ್. ಪ್ರೊಫೆಸರ್ ರಾಮ್
5. ಆರೋಗ್ಯ ಮತ್ತು ಇತರೆ ಪ್ರಬಂಧಗಳು : ಡಾ|| ಪಿ. ಎನ್. ಶಂಕರ್
6. ವೈದ್ಯ ಪದಗಳ ಮುಟ್ಟು ರಚನೆ : ಡಾ|| ಡಿ.ಎನ್. ಶಿವಪ್ಪ

**ಕನ್ನಡ : ಎರಡು  
ಪಠ್ಯಕ್ರಮದ ರೂಪರೇಖೆ**

ಸ್ಥಾನ : ಬೇಸಿಕ್ ಬಿ.ಎಸ್ಸಿ. (ನರ್ಸಿಂಗ್) ಮೊದಲ ವರ್ಷ  
 ಸಮಯ : 15 ಘಂಟೆಗಳು (ಪದಿನೈದು ಘಂಟೆಗಳು)  
 ಉದ್ದೇಶ : ಜನಾರೋಗ್ಯದ ಬಗ್ಗೆ ಜನಸಮುದಾಯಕ್ಕೆ ತಿಳುವಳಿಕೆ ಕೊಡುವುದು.

**ಪಠ್ಯಕ್ರಮದ ವಿವರ**

ಘಟಕ ಒಂದು : ಜನಾರೋಗ್ಯದ ಶುಕ್ರಪ್ರಯೋಗದಲ್ಲಿ ಸಂದೇಶಗಳು ವ್ಯವಸ್ಥೆ ಸಂದರ್ಶನ ಮಹತ್ವ ಸಂದರ್ಶನದ ಗುಣಗಳು.  
 ಅನುಸರಿಸಬೇಕಾದ ನಿಯಮಗಳು  
 ಆವಾಜ್ ಮಾಹಿತಿಗಳ ಸಂಗ್ರಹ, ಸಂದೇಶಗಳು (ಶಂಕೆಗಳು)  
 ಕುಟುಂಬ ಸಂಪರ್ಕ, ಸಂದರ್ಶಕ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ ಬಳಕೆ  
 ಎರಡು : ವೈಯಕ್ತಿಕ ಆರೋಗ್ಯ  
 ಮೂರು : ನೈಸರ್ಗಿಕ ನೈರ್ಮಲ್ಯ  
 ನಾಲ್ಕು : ಸಾಂಕ್ರಾಮಿಕ ರೋಗಗಳು ಮತ್ತು ಅವುಗಳ ತಡೆಗಟ್ಟುವಿಕೆ  
 ಐದು : ಆಹಾರ ಮತ್ತು ಆರೋಗ್ಯ  
 ಆರು : ಶಾಯಿ ಮತ್ತು ಮಗುವಿನ ಆರೋಗ್ಯ  
 ಏಳು : ಕುಟುಂಬ ಕಲ್ಯಾಣ ಯೋಜನೆ

**ಅಧ್ಯಯನಕ್ಕೆ ಶಿಫಾರಸ್ಸು ಮಾಡಲಾಗಿರುವ ಗ್ರಂಥಗಳು**

1. ಸಮಾಜ ಆರೋಗ್ಯ : ಡಾ|| ಎಸ್. ಎ. ನಾರಾಯಣ್
2. ಶಾಯಿ ಮಗು : ಡಾ|| ಅನುಪಮ ನಿರಂಜನ್
3. ರೋಗೋಪಚಾರ : ಡಾ|| ಎಸ್. ಆರ್. ಕಾವಳಿ  
 (ಸೆಂಟ್‌ಜಾನ್ ಆಂಬುಲೆನ್ಸ್ ಆಸೋಸಿಯೇಷನ್)
4. ಪರಿಸರ ಸಂದರ್ಶನ
5. ಪರಿಸರ ಮಲಿನತೆ : ಕರ್ನಾಟಕ ರಾಜ್ಯ ವಿಜ್ಞಾನ ಪರಿಷತ್ತಿನ ಪ್ರಕಟಣೆಗಳು
6. ಆರೋಗ್ಯ ಶಿಕ್ಷಣ ಮತ್ತು ಶಾಲಾ ಮಕ್ಕಳ ಆರೋಗ್ಯ (ಆರೋಗ್ಯ ಮತ್ತು ಕುಟುಂಬ ಯೋಜನೆ ಇಲಾಖೆ, ಬೆಂಗಳೂರು ಪ್ರಕಟಗೊಳಿಸಿರುವ ಪ್ರಸ್ತುತ ಪುಸ್ತಕಗಳು)

## ORIENTATION TO PHYSIOTHERAPY

SL NO	TOPIC	CONTENTS (30 hrs)
1	Patterns of Health Care Delivery	<ul style="list-style-type: none"><li>a. National Trends and resources</li><li>b. Local trends and resources</li><li>c. Overview of Health Science Professions</li></ul>
2	Components of Physiotherapy Profession	<ul style="list-style-type: none"><li>a. History of Medical Therapeutics</li><li>b. History of Physiotherapy</li><li>c. Overview of Health Science Professions</li></ul>
3	Role of Physiotherapy in meeting Health Care Needs in India	<ul style="list-style-type: none"><li>a. Needs versus Demands</li><li>b. Physiotherapist as 'Educator'</li><li>c. Typical Job settings</li><li>d. Common problems and solutions</li></ul>



