

# **Curriculum for Diploma in Medical Technology on Prosthetics and Orthotics**

**The State Medical Faculty of Bangladesh**

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**Curriculum for Diploma in Medical Technology on Prosthetics and  
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*Compiled by & edited by-*

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## Preface

Curriculum is a formal plan of educational experiences and activities offered to a learner under the guidance of an educational institution. Curriculum in fact is an organised plan of course outlines, along with the objectives and learning experiences to be used for achievement of these activities. With increasing public expectations about the health care services, specially in the emergency & pandemic situation like COVID 19 the quality of care itself is under scrutiny all over the world. Therefore a positive change is needed in the role of Medical Technologists. The role of teachers and students in teaching and learning to bring a positive changes in allied health professionals education also needs to be reviewed and further developed to make it more competency based.

This revised Health Technology (HT) competency based curriculum has been developed and scientifically designed, making it responsive to the needs of the learners and focussed towards the need of the stakeholders and country. The present HT curriculum with its assessment method is expected to effectively judge competencies acquired with those which are required to cater the health needs of our people. It is gratifying to note that all concerned in the promotion of allied health science in the country have involved themselves in the planning and formulation of this competency based & community oriented need-based curriculum.

More emphasis has been given on ethics, communication skills, behavioural science, basic computer science, communicative English, primary health care, climate change, environment and sanitation. Total duration of the curriculum has been increased from 3 years to 4years. List of competencies have been identified to acquire those by the provision of logbook based hands on training in this curriculum. Though the curriculum is not the sole determinants of the outcome, yet then it is very important as it guides the faculty members in preparing their instruction, tells the students where to go, what to do and what knowledge, skills and attitude they are expected to develop.

In conclusion, I would like to state that, the curriculum planning process should be continuous, dynamic and never-ending. If it is to serve best, the needs of the individual students, educational institutions and the expectations of people community to whom we are ultimately accountable, are required to be evaluated and given due attention.

I congratulate all who were involved in designing and developing the competency based curriculum, particularly the Director (Research, Publication, Curriculum Development), ADG (ME) & Directors of DGME, Secretary, SMFB, members of the working group and the involved faculty members of CME. My special thanks to all others who were involved in the development of this curriculum.

**Prof AKM Amirul Morshed**

Director General

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## Foreword

Curriculum development is not a static process rather it is a dynamic process. But it was also said that “It is easier to change a graveyard than to change a curriculum”. This curriculum was developed a few years back in 2009, but it was needed to be updated to make it more technology oriented students centred and competency based.

Initially there were policy level meetings and meeting of the Curriculum Working Group of different disciplines/courses from Institute of Health Technologies (IHTs) to prepare a draft curriculum. Subsequently, in order to develop a consensus, decision was taken to hold review workshops through active participation of different groups of faculty members. A taskforce group examined the revised curriculum to give it a final shape.

The revised Curriculum for Health Technology (HT) is expected to be implemented for the newly admitted students of the next session. The success of this curriculum, which is made more competence based and need-based, depends on its proper implementation with active leadership of the ME&FWD, MOH&FW, DGME, SMFB, Principals & Teachers of IHT with interactive participation of students.

It is expected that this curriculum will serve as present day guideline for the students of IHT and its faculty members. In order to ensure further improvement, this curriculum needs constant review and revision with time to time updating.

My sincere thanks to Prof AKM Amirul Morshed Khasru, Director General (In charge), DGME for his guidance & supervision with their team involving ADG (ME) and all the Directors of DGME.

I like to thank all the members of working committee of IHT Curriculum Development Committee for their continuous technical assistance and co-ordination to prepare this curriculum. The technical team comprising the faculty members of the Centre for Medical Education (CME), SMFB, DGME deserve special appreciation.

Lastly, I would like to extend my deep and sincere gratitude to all Principals & Teachers of different IHTs, subject experts, faculty members and others computer and secretarial support staff of DGME & CME who shared their expertise and worked hard to produce this valuable document.

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## **Acknowledgement**

This is indeed a pleasant responsibility to bring out this curriculum on Diploma in Health Technology course, which has been developed through a participatory approach by a team of policy peoples, teachers of IHTs and medical educationists. It aims to review and update the Health Technology (HT) curriculum.

I would like to express my deep gratitude to Prof AKM Amirul Morshed Khasru, Director General (In charge), DGME for his overall supervision in this activity along with ADG (Admin), ADG(ME) & Directors of DGME, under the leadership of whom the plan of reviewing and updating the IHT curriculum has been materialized, and who provided immense support and encouragement to finish the work.

I am grateful to all the resource persons/teachers from different institutes, subject experts, Principals of IHT specially the faculty of Center for Medical Education (CME), DGME & SMFB who devoted their immense efforts, time and hard work to develop this curriculum. My special thanks to Professor Dr. Md. Humayun Kabir Talukder, Director (Research, Publication & Curriculum Development), DGME working & co-ordinator, IHT curriculum reviewing & updating committee for his continuous efforts without which it would not have been possible to complete this work. My thanks to all other faculty members & staffs of DGME, SMFB & CME, who were involved directly or indirectly in preparation of this curriculum.

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## Course Overview

### Course Aims:

To prepare Prosthetics and Orthotics Technologists with proper explained knowledge, skill and attitude to enable them to serve the people with physical disabilities and to take an active role in the national health care system in Bangladesh.

### Course Objectives:

After successful completion of the 4 years Diploma course in Medical Technology (Prosthetics Orthotics), the students will be able to:

- Demonstrate sound and adequate explained knowledge and activities related to Prosthetics and Orthotics.
- Apply knowledge of organs and systems of the human body in provision of care to individuals with problems requiring prosthetics and orthotics rehabilitation
- Describe various medical problems requiring prosthetics and orthotics rehabilitation
- Employ knowledge in the use, care and maintenance of hand and machine tools used in prosthetics and orthotics.
- Keep abreast with advances in Prosthetic and Orthotic fields through continuing education
- Evaluate individuals with problems requiring prosthetics and orthotics rehabilitation to reach appropriate diagnosis
- Administer correct interventions to the individuals with problems requiring prosthetics and orthotics rehabilitation and refer where appropriate
- Manage health facilities providing prosthetics and orthotics services.
- Identify and provide relevant prosthetics and orthotics rehabilitation services according to national and community priorities
- Promote positive good health and prevent disease and disability.
- Inform the public and other members of the health care team about the role and scope of Prosthetics and Orthotics.
- Demonstrate values and attitudes consistent with high standards of ethical and professional conduct.
- Contribute to the future development of Prosthetics and Orthotics.



## Course Details

**Course Title: Curriculum for Diploma in Medical Technology on Prosthetics and Orthotics**  
**A.**

### **B. Course philosophy and rationale**

- Prosthetics and Orthotics technologists are prime participants in the provision of quality health care and rehabilitation service to individuals, families, societies and community at large. Therefore, they should be equipped with necessary concepts and skills as well as attitudes of orthotics and prosthetics service.
- Continuing education is a foundation for professional and self development. Hence it is important for Orthopedic technologists to strive for further learning to keep them well informed of new concepts and technology in the health care sector particularly the orthotic and prosthetic services
- In the pursuit of excellence, the Prosthetics and Orthotics are expected to practice the highest level of professional ethics. In addition, open and honest communication, as well as respect the dignity of all individuals, families and community they will serve is of paramount important in the delivery of orthotic and prosthetic services. Therefore, students will be equipped with adequate information on organizational growth, innovation, and productivity as well as cooperation among members and clients they will serve.

### **C. Conditions for entrance:**

1. Qualifications & prerequisite:
  - (i) SSC Science or equivalent with Science with Physics, Chemistry and Biology.
  - (ii) Candidate has to secure required grade point in the SSC examinations which will be decided by the concern competent authority.
  - (iii) Candidate passed SSC examination in current Year and previous 3<sup>rd</sup> Year is eligible for admission or as decided by the authority for each year of admission.

### **D. Examinations for Entrance/Admission Test:**

All candidates are to sit for admission tests through prescribed rules and examination method as specified in the advertisement. Selection of the candidates will be done on merit basis as based on marks obtained in the admission test.

Despite the general merit in consideration for selection the reserved quota for different groups of applicants as specified in the advertisement shall be maintained on the merit basis for the respective reserved quota as well. Candidates selected for admission will have to appear before the Medical Boards as organized by the respective Institute of Health/ Medical Technology.

### **Course structure and duration**

Total duration of the course will be 4 years

The course will be of four years' duration. The total period is divided into 4 parts-1<sup>st</sup> year, 2<sup>nd</sup> year, 3<sup>rd</sup> year and 4<sup>th</sup> year. In each there will be 40 weeks of teaching and learning at the end of which there will be a year final examination. Supplementary examinations will be held 6 months of the year final examination.

<b>Year</b>	<b>Duration</b>
1 <sup>st</sup> Year	12 months
2 <sup>nd</sup> Year	12 months
3 <sup>rd</sup> Year	12 months
4 <sup>th</sup> Year	12 months

*NB: All academic activities including yearly faculty examination of each phase must be completed within the specified time of the phase.*

**NB:** Total duration for completion of the four years (4) course will be 7 years after admission in

**E. Distribution of the papers with teaching /learning hour's as per year wise:**

*1st Year*

Exams	Papers	Subjects	Lecture (in hours)	Tutorial (in hours)	Institutional Academic Lab based Practical Training/ Demonstration (in hours)	Formative Exam		Summative exam		Total Hours
						Preparatory leave	Exam time	Preparatory leave	Exam time	
Teaching-learning both formative & summative assessment	I	English	66	34	-	7 days	10 days	10 days	15 days	100
	II	Basic Human Anatomy	70	60	70					200
	III	Basic Human Physiology	75	60	65					200
	IV	Basic Community Medicine & Behavioral science	150	50	-					200
	V	Basic computer science	25	-	75					100
		<b>Total</b>	<b>386</b>	<b>204</b>	<b>210</b>	<b>17 days</b>	<b>25 days</b>	<b>800</b>		
		<b>Grand total</b>	<b>800 hours</b>			<b>42 days</b>		<b>800 hours</b>		

**2nd year**

Exams	Papers	Subjects	Lecture (in hours)	Institutional Academic Lab based Practical Training/ Demonstration (in hours)	Formative Exam		Summative exam		Total Hours
					Preparatory leave	Exam time	Preparatory leave	Exam time	
Teaching-learning both formative & summative assessment	I	Physics	40	30	7 days	10days	10 days	15days	70
	II	Chemistry	80	20					100
	III	Basic Microbiology & Parasitology	80	20					100
	IV	Functional Anatomy & Pathology	100	50					150
	V	Basic Prosthetics and Orthotics	100	300					400
		<b>Total</b>	<b>400</b>	<b>420</b>	<b>17 days</b>	<b>25 days</b>	<b>820</b>		
		<b>Grand total</b>	<b>820 hours</b>			<b>42 days</b>		<b>820 hours</b>	

### 3rd year

Exams	Papers	Subjects	Lecture (in hours)	Institutional Academic Lab based Practical Training/ Demonstratio n (in hours)	Formative Exam		Summative exam		Total Hours
					Preparator y leave	Exam time	Preparator y leave	Exam time	
Teaching-learning both formative & summative assessment	I	Basic Rehabilitation Science	100	50	7 days	10 days	10 days	15 days	150
	II	Prosthetics and Orthotics Science	100	425					525
	III	Laboratory Management for Prosthetics & Orthotics	55	20					75
		<b>Total</b>	<b>255</b>	<b>495</b>	17 days		25 days		750
		<b>Grand total</b>	<b>750 hours</b>		<b>42 days</b>				<b>750 hours</b>

### 4<sup>th</sup> Year

Exams	Papers	Subjects	Lecture (in hours)	Institutional Academic Lab based Practical Training/ Demonstratio n (in hours)	Special attachmen t at relevant lab based advance training (in hours)	Formative Exam		Summative exam		Total Hours
						Preparatory leave	Exam time	Preparatory leave	Exam time	
Teaching-learning both formative & summative assessment	I	Prosthetic Science	100	200	150	7 days	10 days	10 days	15 days	450
	II	Orthotic Science	100	100	150					350
		<b>Total</b>	<b>200</b>	<b>300</b>	<b>300</b>	17 days		25 days		800
		<b>Grand total</b>	<b>800 hours</b>			<b>42 days</b>				<b>800 hours</b>

## **F. Teaching & learning methods, media and faculty members**

**The following teaching and learning methods will be followed:**

1. Large Group Teaching Lecture aided by –
  - Multimedia
  - Computer
  - Chalk board
  - OHP/ Slide projector
  - Handouts
2. Small Group Teaching-
  - Tutorial/ Demonstration
  - Students interaction
3. Practical session-
  - Use of practical manual Chalk board
  - Performing the task/examination by the student
  - Writing the practical note book
  - Log book
4. Lab Placement-
  - In small groups for performing activities by the student themselves
5. Faculty members-
  - Subject oriented teacher (Professor/ Associate professor/ Assistant professor/Lecturer/Instructor will be illegible to perform lecture/theoretical class.
  - Subject oriented instructors will be illegible to perform practical/demonstration class.

## **G. Assessment**

- Examination will be held on month of January & July of every year.

### ***Assessment Methods:***

- There will be in-course/formative (card/ item) and end-course/summative (terminal) assessment for the students in each part (1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> & 4<sup>th</sup> year) of the course i.e. formative and year final examination.
- There will be year final examination at the end of each academic year and one supplementary examination 6 months after each regular year-final examination.
- Formative assessment will be done through items and cards ending exam.

In the year-final examination marks allocation will be as follows:

- 50% from year-final written examination
- 10% from the formative examinations (Card final examination/Item marks).
- 40% from the oral and practical examinations.
- In written assessment Short Answer Question (SAQ) and Multiple choice question (MCQ)-true/false, in practical along with traditional objective structure practical examination (OSPE) & in oral structure oral examination (SOE) will be utilized

**Eligibility for appearing in the year-final examination:**

- Certificate from the respective head of institutes regarding students obtaining at least 75% attendance in all aspects (theory, practical, tutorial, residential field practice) during one academic year.
- Obtaining at least 50% marks in the formative examinations.
- No objection Certificate from the respective head of institutes regarding taking part any activities contrary to the discipline of the institute.
- No student shall be allowed to appear in the Year II, Year III and Year IV Final examinations unless the student passes all the subjects of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> year Final examinations respectively.

**Carry on**

- One can be eligible to attend the classes of 2<sup>nd</sup> year after passing at least 3 subjects among 5 subjects of 1<sup>st</sup> year.
- One can be eligible to attend the classes of 3<sup>rd</sup> year after passing at least 3 subjects among 5 subjects of 2<sup>nd</sup> year.
- One can be eligible to attend the classes of 4<sup>th</sup> year after passing at least 2 subjects among 3 subjects of 3<sup>rd</sup> year.

**Assessment personnel:**

- Subject oriented teacher (Professor/ Associate professor/ Assistant professor/Lecturer will be illegible to be an examiner, moderator and able to evaluate the examination script.
- Subject oriented instructors will be illegible to undertake the practical examinations

**Grading**

<b>Numerical percentage of Marks</b>	<b>GPA letter Grade</b>	<b>GPA Numerical Grade (Grade points)</b>
85% and above	A <sup>+</sup>	4
81% to less than 85%	A	3.75
76% to less than 80%	A <sup>-</sup>	3.5
71% to less than 75%	B <sup>+</sup>	3.25
66% to less than 70%	B	3.00
61% to less than 65%	B <sup>-</sup>	2.75
Only 60%	C	2.50
Less than 60%	F	0

**Pass Marks/Grade-C****Written Exam - 60%****Practical - 60%**

Oral - 60%

Student shall have to pass written, oral, practical and formative separately in each paper of the examination.

Results will be published in GPA system and number of the subjects will be reflected in the academic transcript.

## H. Examinations & distribution of marks as per each year

### 1st Year Examination

Paper	Subjects	Written Exam	Oral Exam	Practical Exam	Formative Exam	Total Marks
I	English	75	15	-	10	100
II	Basic Anatomy	100	40	40	20	200
III	Basic Physiology	100	40	40	20	200
IV	Basic Community Medicine & Behavioral Science	100	40	40	20	200
V	Basic computer science	50	--	40	10	100
	<b>Total</b>	<b>425</b>	<b>135</b>	<b>160</b>	<b>80</b>	<b>800</b>

### 2nd Year Examination

Paper	Subjects	Written Exam	Oral Exam	Practical Exam	Formative exam	Total Marks
I	Physics	75	10	15	--	100
II	Chemistry	75	10	15	--	100
III	Basic Microbiology & Parasitology	100	40	40	20	200
IV	Functional Anatomy and Pathology	100	40	40	20	200
V	Basic Prosthetics and Orthotics	100	40	40	20	200
	<b>Total</b>	<b>450</b>	<b>140</b>	<b>150</b>	<b>60</b>	<b>800</b>

### 3rd Year Examination

Paper	Subjects	Written Exam	Oral Exam	Practical Exam	Formative exam	Total Marks
I	Basic Rehabilitation Science	100	40	40	20	200
II	Prosthetics and Orthotics Science	100	40	40	20	200
III	Laboratory Management for Prosthetics & Orthotics	100	40	40	20	200
	<b>Total</b>	<b>300</b>	<b>120</b>	<b>120</b>	<b>60</b>	<b>600</b>

### 4<sup>th</sup> Year Examination

Paper	Subjects	Written Exam	Oral Exam	Practical Exam	Formative exam	Total Marks
I	Prosthetic Science	100	40	40	20	200
II	Orthotic Science	100	40	40	20	200
	<i>Special Lab Attachment</i>					
	<b>Total</b>	<b>200</b>	<b>80</b>	<b>80</b>	<b>40</b>	<b>400</b>

**I. This curriculum is meant for the guidance of four groups for people --**

- Students to guide them in what to learn and how to learn
- Teachers to guide them in what to teach and how to teach
- Examiners to guide them in what to evaluated and how to evaluated
- Concerned policy persons to guide how to implement this curriculum with proper--
  - Governance
  - Guidelines
  - Faculty members with updated organogram
  - Institutional academic lab
  - Attached OPD
  - Special lab attachment as per future job
  - Appropriate students friendly academic environment
  - Teachers to be oriented about the implementation of curriculum
  - Log book to be prepared

**J. Required faculty members of the concerned subject/discipline are as follows to implement this curriculum --**

- Professor..... 1
- Associate Professor..... 1
- Assistant Professor..... 2
- Lecturer..... 3
- Instructor..... 4
- Technologist..... 5

# 1<sup>st</sup> Year

## Paper I: Subject - English

**Total hours: 100 hour**  
**Lecture: 66 hour**  
**Practical / Tutorial: 34 hours**

**Total marks-100**  
**Written-75**  
**Oral & practical- 15**  
**Formative 10**

### Objectives:

At the end of the course the students will be able to: -

- read & write any story in English and attain HSC level English proficiency
- show proficiency in English grammar (article, tense, voice, phrases & idioms)
- write letters in English (private, Official etc).
- translate & retranslate in English
- read and write essays on different topics in English
- demonstrate listening skills in English
- communicate with each other in English
- read and write laboratory reports/findings in English
- follow written and oral instructions in English of the seniors/authorities

### List of Competencies

Ability to--

- write Paragraph, Letter, Application & report in English
- show skill in reading, writing ,listening & Conversations in English
- understand & interpret any reports or manuals in English
- read & write any story in English and attain HSC level English proficiency
- write letters in English (private, Official etc.).
- translate & retranslate in English
- read and write essays on different topics in English
- develop listening skills in English
- communicate with each other in English



Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture	Tutorial
1.	<p><b>Text book: English for Today-Published by N.C.T.B. (Intermediate)</b></p> <p><b>Unit- Three: Learning English.</b></p> <ol style="list-style-type: none"> <li>1. Learning a language</li> <li>2. Why to learn English</li> <li>3. How to learn English</li> <li>4. Different learners, different ways</li> <li>5. Dealing with grammar</li> <li>6. Integrated skills development</li> <li>7. How to use dictionary</li> </ol> <p><b>Unit-Six: Our Environment.</b></p> <ol style="list-style-type: none"> <li>1. The environment and the ecosystem</li> <li>2. How the environment is polluted.</li> <li>3. The world is getting warmer.</li> <li>4. Let's not be cruel to them.</li> <li>5. Beware of pollution.</li> <li>6. Forests should stay.</li> <li>7. How to manage waste.</li> </ol> <p><b>Unit-Twenty-four: People, People Everywhere</b></p> <ol style="list-style-type: none"> <li>1. What's the problem?</li> <li>2. Kalim Majhee's boat.</li> <li>3. The rootless.</li> <li>4. Why is there discrimination?</li> <li>5-7. The Revenge.</li> </ol>	16	

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture	Tutorial
2.	<p><b>Grammar:</b></p> <p><b>Articles :</b></p> <ul style="list-style-type: none"> <li>▪ Indefinite &amp; definite articles</li> </ul> <p><b>Tense:</b></p> <ul style="list-style-type: none"> <li>▪ Present, Past &amp; Future tense</li> </ul> <p><b>Voice :</b></p> <ul style="list-style-type: none"> <li>▪ Active voice</li> <li>▪ Passive voice</li> <li>▪ Voice change</li> </ul> <p><b>Speeches:</b></p> <ul style="list-style-type: none"> <li>▪ Direct speeches</li> <li>▪ Indirect speeches</li> </ul> <p><b>Linkers</b></p> <ul style="list-style-type: none"> <li>▪ In addition</li> <li>▪ Besides</li> <li>▪ Moreover</li> <li>▪ However</li> <li>▪ Because</li> <li>▪ Either or , neither nor</li> </ul> <p><b>Idioms &amp; Phrases :</b></p> <p><b>Subjects &amp; predicate</b></p> <p><b>Parts of speech-</b></p> <ul style="list-style-type: none"> <li>▪ Noun &amp; its classification</li> <li>▪ Pronoun &amp; its classification</li> <li>▪ Adjective &amp; its classification</li> <li>▪ Verb-Adverb</li> </ul> <p><b>Conjugation</b></p> <p><b>Preposition</b></p> <p><b>Punctuation</b> (capitalization, fragment, end, comma, semi colon, colon, hyphen, underlining)</p> <p><b>Spelling</b></p> <p><b>Wrong words</b></p> <p><b>Translation</b> (Bengali to English, English to Bengali), short story writing, technical description, comprehension.</p>	22	
	<p><b>Paragraph writing :</b></p> <p><b>Letter writing:</b></p> <p><b>Application writing:</b></p> <p><b>Report writing :</b></p>	10	
	<b>Telegrams &amp; E-mail:</b>	2	

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture	Tutorial
	<b>Communicative English :</b> <ul style="list-style-type: none"> <li>▪ Reading skill</li> <li>▪ Writing skill</li> <li>▪ Listening skill</li> <li>▪ Conversations skill</li> </ul>	4 4 4 4	8 8 8 10
	<b>Total</b>	66	34

**Teaching Methods:**

Lecture  
Practical/ Tutorial/Communication

**Media:**

Multi media,  
Laptop,  
OHP,  
White Board/marker  
Black board/ chalk  
Wall chart  
VCD, DVD, CD

**Assessment:**

Written – SAQ -75 marks  
Reading, Listening & conversation-15 marks  
Formative -10 marks

## Paper II : Subject - Basic Anatomy

**Total hours: 200 hours**  
**Lecture: 70 hours**  
**Tutorial : 60 hours**  
**Practical/Demons: 70 hours**

**Total marks-200**  
**Written-100**  
**Oral-40**  
**Practical- 40**  
**Formative- 20**

### Objectives:

At the end of the course the students will be able to: -

- explain the anatomical terminologies
- describe comprehensively the major anatomical organ, system and structure of human body
- identify major anatomical organ, system and structure of human body
- identify the specific structures and organs and apply the knowledge in studying their individual disciplines.
- do surface marking of important organ of human body.

### List of Competencies:

Ability to--

- demonstrate a comprehensive knowledge base about the major anatomical organ, system and structure of human body
- identify major anatomical organ, system and structure of human body
- identify the specific structures and organs and application of such knowledge in studying their individual disciplines.
- do surface marking of important organ of human body.

### Course Contents of Basic Anatomy

Sl. No	Topics/Lessons	Teaching/learning Hours		
		Lecture	Tutorial	Practical/ Demonstration
1.	<b>Introductory Anatomy :</b> a) Anatomical Terminologies : i) Definition of Anatomy ii) Anterior, Posterior, superior, inferior, medial, lateral & median plane. b) i) Systems of Human body ii) Human cell: structure and classification. iii) Cell division: types. Phases of mitosis iv) Tissue: Types of tissues.	10	05	10
2.	<b>Musculoskeletal system:</b> <ul style="list-style-type: none"> <li>▪ component</li> <li>▪ Types of bones &amp; joints</li> <li>▪ short description of important bones</li> </ul>	10	10	05
3.	<b>Cardio-vascular system.</b> <ul style="list-style-type: none"> <li>▪ Location &amp; Basic structure of cardiovascular system</li> <li>▪ Short description of heart, major arteries, capillaries/veins</li> </ul>	10	05	10
4.	<b>Respiratory system</b> <ul style="list-style-type: none"> <li>▪ Basic structure of respiratory system</li> <li>▪ Description of larynx, trachea, bronchi, bronchioles and alveoli</li> <li>▪ Gross Anatomy of lung</li> </ul>	06	06	10

Sl. No	Topics/Lessons	Teaching/learning Hours		
		Lecture	Tutorial	Practical/ Demonstration
5.	<b>Gastro-intestinal and Hepatobiliary system:</b> <ul style="list-style-type: none"> <li>▪ Short description of the different parts of alimentary system: mouth, tongue, esophagus, stomach, small and large intestine, rectum &amp; anal canal</li> <li>▪ Anatomy of salivary glands, pancreas, liver, gall bladder</li> </ul>	10	10	10
6.	<b>Genito –urinary system:</b> <ul style="list-style-type: none"> <li>▪ Anatomy of urinary system</li> <li>▪ Male genital system:</li> <li>▪ Female genital system</li> </ul>	10	10	10
7.	<b>Nervous system and Endocrine system.</b> <ul style="list-style-type: none"> <li>▪ Basic structure of nervous system</li> <li>▪ Parts of nervous system and short description of brain, spinal cord, cranial nerves, peripheral nerves</li> <li>▪ Autonomy of nervous system and short description of sense organs-eye, ear, nose, throat, tongue and skin</li> <li>▪ Important endocrine glands</li> </ul>	12	12	10
8.	<b>Lymphatic System :</b> <ul style="list-style-type: none"> <li>▪ Anatomy of lymph nodes and vessels</li> </ul>	02	02	05
	<b>Total</b>	70	60	70

**Teaching Methods:**

Lecture  
 Tutorial  
 Practical/ Demonstration

**Media:**

Multimedia,  
 Laptop,  
 OHP,  
 White Board/Marker,  
 Black/board  
 Skeleton

Wall chart  
Microscope

**Assessment:**

Written – SAQ= 80 marks, MCQ=20 marks

Practical or OSPE 40 marks, Oral-40 marks, Formative-20 marks

## Paper III : Subject - Basic Physiology

**Total hours: 200 hours**

**Lecture:75 hours**

**Tutorial: 60**

**Practical: 65**

**Total marks-200**

**Written-100**

**Oral -40**

**Practical- 40**

**Formative- 20**

### Objectives:

At the end of the course the students will be able to: -

- Describe comprehensively the on functional aspects of different important components, organs and systems of human body.
- Apply the knowledge of human physiology in studying and performing the allotted tasks in their individual discipline.

### List of competencies

- Ability to demonstrate a comprehensive knowledge on functional aspects of different important components, organs and systems of human body.
- Ability to apply the practical knowledge of human physiology in studying and performing the allotted tasks in their individual discipline.

### Course Contents of Basic Physiology

Sl. No	Topics/Lessons	Teaching/learning Hours		
		Lecture	Tutorial	Practical/ Demonstration
1.	<b>Introductory Physiology:</b> <ul style="list-style-type: none"> <li>▪ Physiological terminologies</li> <li>▪ Basic structure and organizations of human body</li> <li>▪ Cell physiology and metabolism/multiplication of living cells</li> <li>▪ General functions of different systems of the body: Musculoskeletal/Respiratory/Circulatory/Digestive/Urinary/Nervous/Endocrine/Immune/ Reproductive</li> </ul>	10	04	10
2.	<b>Musculoskeletal system :</b> <ul style="list-style-type: none"> <li>▪ Physiological components of musculoskeletal system</li> <li>▪ Functions of important muscles, bones &amp; joints of human body</li> <li>▪ Movements of joints</li> </ul>	10	10	05
3.	<b>Cardiovascular System:</b> <ul style="list-style-type: none"> <li>▪ Functions of circulatory system</li> <li>▪ Composition of Blood and their Functions</li> <li>▪ Conductive system of heart &amp; Cardiac cycle</li> <li>▪ Physiology of Blood Pressure</li> </ul>	10	05	10

Sl. No	Topics/Lessons	Teaching/learning Hours		
		Lecture	Tutorial	Practical/ Demonstration
4	<b>Respiratory system :</b> <ul style="list-style-type: none"> <li>▪ Functions of respiratory system</li> <li>▪ Mechanism of breathing</li> </ul>	05	05	10
5	<b>Digestive and hepatobiliary system:</b> <ul style="list-style-type: none"> <li>▪ Definition of digestion, absorption, metabolism</li> <li>▪ Digestion, absorption &amp; metabolism of carbohydrate, fat &amp; protein</li> <li>▪ Nutritional deficiency disorders : anemia, iodine deficiency, vitamin deficiencies</li> <li>▪ Functions of liver, pancreas and gall bladder</li> <li>▪ Composition &amp; functions of different digestive juices &amp; bile</li> </ul>	10	10	10
6	<b>Genitourinary system:</b> <ul style="list-style-type: none"> <li>▪ Functions of Kidney</li> <li>▪ Formation, appearance and composition of urine</li> <li>▪ Functions of reproductive organs of both sexes: uterus/ovary/fallopian tube/vagina/penis/testes/scrotum/vas deferens/prostate</li> </ul>	10	10	10
7	<b>Nervous system, organs of special sense:</b> <ul style="list-style-type: none"> <li>▪ Functions of motor, sympathetic &amp; parasympathetic nervous system</li> <li>▪ Functions of cranial nerves</li> <li>▪ Cerebrospinal fluid formation, composition &amp; function</li> <li>▪ Functions of special sense organs-eye, ear, nose, tongue and skin</li> <li>▪ Functions of the endocrine glands &amp; hormones secreted by them: Pituitary / thyroid / parathyroid / adrenal /gonads/pancreas/placenta</li> </ul>	12	10	10
8	<b>Immune System :</b> <ul style="list-style-type: none"> <li>▪ Definition/classification and components of immune system</li> <li>▪ Cells and tissues of immune system &amp; their functions</li> </ul>	05	05	
9	<b>Lymphatic System :</b> <ul style="list-style-type: none"> <li>▪ Structure &amp; functions of lymph nodes and vessels</li> </ul>	03 05	01	
	<b>Total</b>	75	60	65

**Teaching Methods:** Lecture, Tutorial, Practical/ Demonstration

**Media:**

Multimedia, Laptop, OHP, White Board/Marker, Black board/chalk, Wall chart, Lab. Reagent & Apparatus, Microscope

**Assessment:**

Written – SAQ= 80 marks, MCQ=20 marks

Practical or OSPE 40 marks, Oral-40 marks, Formative-20 marks



## **Paper IV : Subject – Basic Community Medicine & Behavioural Science**

**Total hours: 200 hour**  
**Lecture: 150 hour**  
**Practical / Tutorial: 50 hours**

**Total marks-200**  
**Written-100**  
**Oral-40**  
**Practical- 40**  
**Formative- 20**

### **Objectives**

**At the end of the course the students will be able to: -**

- describe the general aspects of community medicine
- describe the basic concepts of epidemiology
- explain the concept of primary health care
- define organizations of health services and major health program in Bangladesh
- carry on elementary bio-statistics
- describe the concept of Demography and Family Planning
- define Maternal and Child Health (MCH), describe its objectives and explain the importance of ante-natal and post-natal care for mother and children
- define food and nutrition and explain of nutritional problems in Bangladesh
- acquaint themselves with occupational health hazards and their preventive and protective measures
- describe the principles of health education and their application in the community
- explain environmental pollution and methods of prevention and control of pollution
- explain the basic concept of Essential Service Package (ESP)

### **List of Competencies:**

Ability to --

- describe the general aspects of community medicine
- describe the basic concepts of epidemiology
- explain the concept of primary health care
- define organizations of health services and major health program in Bangladesh
- carry on elementary bio-statistics
- describe the concept of Demography and Family Planning
- define Maternal and Child Health (MCH), describe its objectives and explain the importance of ante-natal and post-natal care for mother and children
- define food and nutrition and be aware of nutritional problems in Bangladesh
- acquaint themselves with occupational health hazards and their preventive and protective measures
- describe the principles of health education and their application in the community
- acquaint themselves with environmental pollution and methods of prevention and control of pollution
- explain the basic concept of Essential Service Package (ESP)

### Course Contents of Basic Community Medicine

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture	Practical/ Demonstration
1.	<b>Introductory community medicine:</b> <ul style="list-style-type: none"> <li>▪ Definition of Community Medicine</li> <li>▪ Concept of health : Definition / Dimensions / Spectrum / Determinants / Indicators</li> <li>▪ Concept of general principles for prevention and control of communicable and Non-communicable diseases</li> <li>▪ Concept of health promotion: Definition / Interventions</li> </ul>	16	10
2.	<b>Primary health care:</b> <ul style="list-style-type: none"> <li>▪ Definition/Elements/ Principles/Scope</li> </ul>	05	02
3.	<b>Health care services and organization:</b> <ul style="list-style-type: none"> <li>▪ Primary/Secondary/Tertiary Health Care services</li> <li>▪ WHO/UNDP/UNICEF/CARE/ International Red Crescent / BIRDEM / ICDDR,B</li> </ul>	06	02
4.	<b>Basic Epidemiology:</b> <ul style="list-style-type: none"> <li>▪ Definition /Aims/Methods/Scope</li> <li>▪ Definition of epidemiological terms eg. Epidemic/Endemic/Pandemic/Sporadic/ Zoonotic disease/ Incubation period/ period of communicability/ Epidemiological Triad/ Infection/ Contamination/ Infestation etc.</li> <li>▪ Major health programs in Bangladesh</li> <li>▪ Medical Information system (MIS)</li> </ul>	12	06
5.	<b>Basic Bio-statistics :</b> <ul style="list-style-type: none"> <li>▪ Definition /Scope/Functions/Importance and uses of Biostatistics, Medical statistics, Health statistics, Vital statistics</li> <li>▪ Definition of vital events</li> <li>▪ Definition/types/characteristics/functions/importance/sources/collection and presentation of data</li> <li>▪ Morbidity/Mortality/Fertility statistics</li> </ul>	17	04

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture	Practical/ Demonstration
6.	<b>Demography and family planning.</b> <ul style="list-style-type: none"> <li>▪ Demography: Definition/Focus/Process/Stages/Cycle and how to conduct census</li> <li>▪ Family Planning: Definition/ Objectives/ Scope/Health aspects/Benefits</li> <li>▪ Contraceptive methods: Short description /Advantages/Disadvantages/Indications/ Contraindications/ Complications</li> </ul>	12	04
7.	<b>Maternal and Child Health Care (MCH):</b> <ul style="list-style-type: none"> <li>▪ Introduction/Definition/Aims &amp; Objectives / Components of MCH</li> <li>▪ Maternal health care: Antenatal/Intra natal/Postnatal</li> <li>▪ Care of the New-born/Under 5 children</li> <li>▪ Indicators of MCH care: MMR, IMR etc</li> </ul>	10	
8.	<b>Food and nutrition:</b> <ul style="list-style-type: none"> <li>▪ Food: Definition/Functions/Classification</li> <li>▪ Sources/types/functions/daily requirements and deficiency of protein, fat, carbohydrate, vitamins and minerals</li> <li>▪ Definition of nutrition /Balanced Diet</li> <li>▪ Malnutrition: Definition/Forms/Causes and prevention</li> <li>▪ Common nutritional problems of Bangladesh: low Birth Weight/Protein Energy Malnutrition/ Nutritional Blindness/ Nutritional Anemia/ Lathyrism</li> </ul>	15	06
9.	<b>Occupational Health :</b> <ul style="list-style-type: none"> <li>▪ Occupational health : Definition /Objectives</li> <li>▪ Occupational Hazards: Introduction /Types</li> <li>▪ Occupational diseases: Definition/Classification/Prevention and control</li> </ul>	08	02
10.	<b>Health education behavioral science and Ethics:</b> <ul style="list-style-type: none"> <li>▪ Health Education: Definition/Importance / Objectives / Components/ Principles/Methods /Media</li> <li>▪ Communication Skills: Definition/Key elements /Barriers</li> <li>▪ Behavioral Science : Introduction &amp; concept</li> <li>▪ Ethics: Introduction and concept</li> </ul>	12	04

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture	Practical/ Demonstration
11.	<b>Environment and sanitation:</b> <ul style="list-style-type: none"> <li>▪ Definition of environment, pollution, sanitation and environmental sanitation</li> <li>▪ Water: Safe wholesome water/Source of water/water pollution/Hazards of water pollution /water borne diseases/Hardness of water/Purification of water</li> <li>▪ Air : Definition/Composition</li> <li>▪ Air pollution : Sources, pollutants, indicators, health &amp; other effects, prevention &amp; control</li> <li>▪ Ventilation: Definition/Standards/ Types/ Criteria of good ventilation / effects of good ventilation</li> <li>▪ Solid waste: Definition/Types/Sources/Health hazards</li> <li>▪ Disposal of solid waste: Dumping/Controlled tipping or sanitary land fill/ incineration/ composting/Manure pits/Burial</li> <li>▪ Excreta or night soil: Public health importance/Health hazards/how disease occurs from it/Sanitation Barrier/ Methods of excreta disposal (Unsewered area/Sewered area)</li> </ul>	25	04
12.	<b>First Aid :</b> <ul style="list-style-type: none"> <li>▪ Definition / Principles of First Aid</li> <li>▪ First Aid Box-List of contents and their uses</li> <li>▪ First Aid of : Cuts, bleeding, burn, shock, dog bite, snake bite</li> </ul>	12	06
	<b>Total</b>	150	50

**Teaching Methods:**

Lecture  
Tutorial  
Practical/ Demonstration

**Media:**

Multi media, Laptop, OHP, White Board/Marker,  
Black board/chalk  
Wall chart  
Models & Samples

**Assessment:**

Written – SAQ= 80 marks, MCQ=20 marks  
Practical or OSPE 40 marks, Oral-40 marks, Formative-20 marks

## **Paper V : Subject - Basic Computer Science**

**Total hours: 100 hour**

**Lecture: 25 hour**

**Practical / Tutorial: 75hours**

**Total marks-100**

**Written-50**

**Practical- 40**

**Formative-10**

### **Objectives:**

**At the end of the course the students will be able to: -**

- Explain common terms of the modern computer technology
- start, Shutdown and restore the windows
- open, close & edit the file
- demonstrate skills in using the computer MS word, ms-excel, power point, internet
- create chart, graph , tables etc.
- install different programs & software
- prepare reports of various investigations
- do internet browsing & other applications of internet

### **List of Competencies**

Ability to--

- deal with the modern computer technology
- show skills in ms word, ms-excel, power point
- prepare reports of various investigations
- internet browsing & other applications of internet

## Course Contents of Basic Computer Science

Sl No	Topics/Lessons	Teaching/learning Hours	
		Lecture	Tutorial/ Practical
1.	<p><b>Detailed Contents :</b></p> <p><b>Relevant Instruction for Practical :</b></p> <ul style="list-style-type: none"> <li>▪ Information Technology -its concept and scope</li> <li>▪ Computers for information storage, information seeking, information processing and information transmission</li> <li>▪ Elements of computer system - computer hardware and software: data -numeric data, numeric data; contents of program, processing</li> <li>▪ Computer organization, block diagram of a computer, CPU, memory</li> <li>▪ Input devices; keyboard, mouse etc; output devices; VDU and Printer, scanner, Plotter</li> <li>▪ Electrical requirements, inter-connections between units, connectors and cables</li> <li>▪ Secondary storage; magnetic disks-tracks and sectors, optical disk (CD and DVD Memory), primary and secondary memory: RAM, ROM, PROM etc.</li> <li>▪ Capacity; device controllers, serial port, parallel port system bus 47</li> <li>▪ Exercises on file opening and closing; memory management; device management; device management and input-output (I/O) management with respect of windows</li> <li>▪ Installation concept and precautions to be observed while installing the system and software</li> <li>▪ Introduction about Operating systems such as and Windows</li> <li>▪ Special features, various commands of MS word and MS- Excel, Power -point</li> <li>▪ About the internet-server types, connectivity (TCOP/IP, shell); applications of internet like: e-mail and browsing</li> <li>▪ Various Browsers like WWW (World wide web); hyperlinks; HTTP (Hyper Text Transfer Protocol); FTP (File Transfer Protocol)</li> <li>▪ Basic of Networking -LAN, WAN, Topologies</li> </ul>	25	
	<ul style="list-style-type: none"> <li>▪ Give a PC, name its various components and list their functions</li> <li>▪ Identification of various parts of a computer and peripherals</li> <li>▪ Practice in installing a computer system by giving connection and loading the system software and application software</li> <li>▪ Installation of DOS and simple exercises on TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP commands</li> <li>▪ Exercises on entering text and data (Typing Practice)</li> <li>▪ Installation of Windows 98 or 2000 etc.</li> <li>▪ Features of windows as an operating system</li> <li>▪ Start</li> <li>▪ Shutdown and restore</li> <li>▪ Creating and operating on the icons</li> <li>▪ Opening, closing and sizing the windows</li> <li>▪ Using elementary job commands like-creating, saving, modifying, finding and deleting a file</li> <li>▪ Creating and operating on a folder</li> <li>▪ Changing setting like, date, time color (back ground and fore ground)</li> <li>▪ Using short cuts</li> <li>▪ Using on line help</li> </ul>		

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture	Tutorial/ Practical
	<ul style="list-style-type: none"> <li>▪ MS-WORD</li> <li>▪ File Management Opening, creating and saving a document, locating files, copying contents in some different file (s), protecting files, Giving password protection for a file</li> <li>▪ Page set up : Setting margins, tab setting, ruler, indenting</li> <li>▪ Editing a document : Entering text, Cut, copy, paste using tool-bars</li> <li>▪ Formatting a document : Using different fonts, changing font size and color, changing the appearance through bold/italic/underlines, highlighting a text, changing case, using subscript and superscript using different underline methods</li> <li>▪ Aligning of text in document, justification of document, Inserting bullets and numbering :</li> <li>▪ Formatting paragraph, inserting page breaks and column breaks</li> <li>▪ Use of headers, footers: Inserting footnote, end note, use of comments</li> <li>▪ Inserting date, time, special symbols, importing graphic images, drawing tools</li> <li>▪ Tables and Borders Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting row in a table</li> <li>▪ Print preview, zoom, page set up, printing options</li> <li>▪ Using Find, Replace options</li> <li>▪ Using Tools like: Spell checker, help, use of macros, mail merge, word content and statistics, printing envelopes</li> <li>▪ Using shapes and drawing toolbar</li> <li>▪ Working with more than one window in MS Word,</li> <li>▪ How to change the version of the document from one window OS to another</li> <li>▪ Conversion between different text editors, software and MS word</li> </ul>		30

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture	Tutorial/ Practical
	<p><b>MS -Excel :</b></p> <ul style="list-style-type: none"> <li>▪ Starting excel, open worksheet, enter, edit, data, formulas to calculate values, format data, create chart, printing chart, save worksheet, switching from another spread sheet</li> <li>▪ <b>Menu Commands :</b> Create, format charts, organize, manage data, solving problem by analyzing data, exchange with other applications. Programming with MS Excel, getting information while working</li> <li>▪ <b>Work Books :</b> Managing workbooks (create, open, close, save) working in work books, selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations, working with arrays</li> <li>▪ Editing a worksheet, copying, moving cells, pasting, inserting, deleting cells, rows, columns, find and replace text, numbers of cells, formatting worksheet :</li> <li>▪ <b>Creating a chart :</b> Working with chart types, changing data in chart, formatting a chart, use chart to analyze data</li> <li>▪ <b>Using a list to organize data, sorting and filtering data in list</b></li> <li>▪ <b>Retrieve data with MS -Query: Create a pivot table, customizing a pivot table. Statistical analysis of data.</b></li> <li>▪ <b>Customize MS-Excel:</b> How to change view of worksheet, outlining a worksheet, customize workspace, using templates to create default workbooks, protecting work</li> <li>▪ <b>Exchange data with other application: linking and embedding, embedding objects, linking to other applications, import, export document</b></li> </ul>		20
	<p><b>Power Point :</b></p> <ul style="list-style-type: none"> <li>▪ Making Slide following the rules &amp; principles</li> <li>▪ Slide Projection</li> </ul>		10
	<p><b>Internet and its Applications :</b></p> <ul style="list-style-type: none"> <li>▪ Log -in to internet</li> <li>▪ Navigation for information seeking on internet</li> <li>▪ Browsing and down loading of information from internet</li> <li>▪ Sending and receiving e-mail</li> <li>▪ Creating a message</li> <li>▪ Creating and address book</li> <li>▪ Attaching a file with e-mail message</li> <li>▪ Receiving a message</li> <li>▪ Deleting message</li> </ul>		15
	<b>Total=</b>	<b>25</b>	<b>75</b>



**Teaching Methods:**

Lecture  
Practical

**Media:**

Computer  
Multi media  
Computer lab.  
Internet connection  
White Board  
Marker

**Assessment:**

Written – SAQ- 50 marks  
Oral and Practical – 40 marks  
Formative – 10 marks

## 2<sup>nd</sup> Year

### Paper I : Subject - Physics

Total hours: 70 hour  
Lecture : 40hour  
Practical/Tutorial: 30 hours

Total marks -100  
Written – 75  
Oral -10  
Practical - 15

#### Objectives:

At the end of the course, the students will be able to-

- define Physics and state the importance of Physics in the Health Care System.
- describe the different systems of measurement and weights.
- demonstrate basic knowledge & skills on measurement of density and specific gravity of a substance.
- demonstrate basic knowledge on fundamental aspects of heat and temperature, sound, light, electricity and magnetism.

#### List of Competencies:

Ability to

- define Physics and state the importance of Physics in the Health Care System.
- describe the different systems of measurement and weights.
- demonstrate basic knowledge on measurement of density and specific gravity of a substance.
- demonstrate basic knowledge on fundamental aspects of heat and temperature, sound, light, electricity and magnetism.

#### Course Contents of Physics

Sl.No	Topic/Lessons তত্ত্বীয়	Teaching/Learning Hours	
		Lecture	Practical
১।	<b>বলবিদ্যা ও পদার্থের ধর্ম :</b> ➤ সরল রেখার গতি, গতির সমীকরণ, নিউটনের গতির সূত্র ত্বরণ ও বল, খাত বল, ভেকটর ও সেলের রাশি। ➤ কৌণিক গতি, কৌণিক বেগ ও ত্বরণ বৃত্তাকার পথে গতি, কেন্দ্রভিগ বল। ➤ কাজ, ক্ষমতা ও শক্তি, শক্তির সংরক্ষণ নীতি। ➤ সরল দোল গতি, সরল দোলক ➤ আর্কিমিডিসের সূত্র ও তার প্রয়োগ আপেক্ষিক গুরুত্ব নির্ণয়।	০৮ ঘন্টা	
২।	<b>তাপ :</b> তাপমিতি, তাপের একক, আপেক্ষিক তাপ, তাপীয় ক্ষমতা পানিসম ও সুপ্ততাপ এবং ইহাদের নির্ণয় পদ্ধতিঃ সরলীয় পদ্ধতিতে তাপের পরিবাহিতা নির্ণয়।	৫ ঘন্টা	
৩।	<b>শব্দ :</b> ➤ শব্দের উৎপত্তি ও শব্দ সালন, আড় তরঙ্গ ও দীঘল তরঙ্গ শব্দের ব্যভিচার ও বীট। বীটের সাহায্যে কম্পন সংখ্যা নির্ণয়। ➤ শব্দের বেগ নির্ণয়। ➤ টানা তারের আড় কম্পন, সূত্রের প্রমাণ।	৫ ঘন্টা	

৪।	আলোকঃ ➤ গোলায় পৃষ্ঠে প্রতিফলন। ➤ সমতল ও গোলায় পৃষ্ঠে প্রতিফলন। সম্পূর্ণ প্রতিফলন, প্রতিসরাংক, প্রিজম প্রতিসারণ। ➤ লেন্সঃ উত্তল ও অবতল লেন্স। লেন্সের শক্তি ও বিবর্ধন লেন্স সংযোজন। চোখের ত্রুটি সমূহ ও প্রতিকার। ➤ আলোক যন্ত্র-মাইক্রোস্কোপ।	৫ ঘন্টা	
৫।	চুম্বকঃ ➤ চুম্বকনের বিভিন্ন পদ্ধতিঃ চুম্বকের মতবাদ, চুম্বকের ক্ষেত্র ও প্রবাল্য। বিপরীত বর্গীয় সূত্র প্রান্তমুখী ও প্রস্থমুখী অবস্থানে চুম্বকের প্রাবল্য। বিক্ষেপী চুম্বকমান যন্ত্র ও ইহার ব্যবহার। ➤ ভূচুম্বকত্ব।	৪ ঘন্টা	
৬।	তড়িৎঃ ➤ স্থির তরিৎ, চার্জের অস্তিত্ব ও প্রকৃতি নির্ণয়। বৈদ্যুতিক আবেশ, কুলম্বের সূত্র, ধারকত্ব, তড়িৎ বিভব। সমান্তরাল পাত ধারক। ➤ বিদ্যুৎ কোষ, তাদের কেন্দ্রে উৎপন্ন চুম্বকক্ষেত্র। বিদ্যুৎ প্রবাহ ও চার্জের একক। ➤ ওহমের সূত্র, বিভব বৈষম্যের একক। রোধ ও আপেক্ষিক রোধ, রোধের একক, রোধ সংযোজন, এমিটার, ভোল্ট মিটার। ➤ বৈদ্যুতিক পরিমাপ, হুইট স্টেম ব্রিজ, মিটার ব্রিজ, পোস্ট অফিস বক্স ও পাটেন শিও মিটার। ➤ তড়িৎ প্রবাহ ও উত্তাপ, জুলের সূত্র, বৈদ্যুতিক পদ্ধতিতে নির্ণয়। ➤ তড়িৎ প্রবাহে রাসায়নিক ক্রিয়া, তড়িৎ বিশেষণ, সূত্র ও ইহাদের প্রমাণ। ➤ তড়িৎ চুম্বকীয় আবেশ।	১৩ ঘন্টা	
	ব্যবহারিক	৪০	

Sl.No	Topic/Lessons	Teaching/Learning Hours	
		Lecture	Practical
৭।	১। শাইড ক্যালিপার্স, স্ক্রজ ও স্পেরোমিটারের ব্যবহার শিক্ষা। ২। পানি অপেক্ষা হালকা/ভারি তরল ও কঠিন পদার্থের হাইড্রো-স্টেটিক ব্যালেন্স, নিকলসন হাইড্রোমিটার ও আঃ হাইড্রো বোতলের সাহায্যে আপেক্ষিক গুরুত্ব নির্ণয়। ৩। সরল দোলকের সাহায্যে জি এর মান নির্ণয়। ৪। একটি ক্যালরিমিটারের সাহায্যে পানিসম নির্ণয়। ৫। কঠিন ও তরলের আপেক্ষিক তাপ নির্ণয়। ৬। অবতল দর্পনের ফোকাস দূরত্ব নির্ণয়। ৭। প্যারালাক্স পদ্ধতিতে উত্তল লেন্স ফোকাস দূরত্ব নির্ণয়। ৮। একখানা কাচ ফলকের প্রতিসরাংক নির্ণয়। ৯। ওহমের সূত্রের সত্যতা নির্ণয়। ১০। যে কোন দৈর্ঘের তারে আপেক্ষিক রোধ নির্ণয়। ১১। নাল পদ্ধতিতে দুইখানা দৃশ্য চুম্বকের চৌম্বক ড্রামকের তুলনা।		৩ ঘন্টা ৩ ঘন্টা ৩ ঘন্টা ২ ঘন্টা ৩ ঘন্টা ২ ঘন্টা ২ ঘন্টা ৩ ঘন্টা ৩ ঘন্টা ৩ ঘন্টা ৩ ঘন্টা
	মোটঃ ৭০ ঘন্টা	৪০	৩০

মান বন্টনঃ

তত্ত্বীয় = ৬০

১। পদার্থের সাধারণ ধর্ম, আলোক ও তড়িৎ প্রতিটি শাখা থেকে ৮ নম্বরের দুটি ও ৪ নম্বরের ২টি করে মোট (৬টি + ৬টি) = ১২টি প্রশ্ন আকারে। তন্মধ্যে ৮ নম্বরের ১টি করে ৩ শাখায় ৩টি ও ৪ নম্বরের ১টি করে ৩ শাখার ৩টি অর্থাৎ মোট ৬টি প্রশ্নের উত্তর দিতে হবে।

$$8 \times 1 \times 3 = 24$$

$$4 \times 1 \times 3 = 12$$

২। শব্দ ও তাপ ও চুম্বকতত্ত্বঃ প্রতিটি শাখা থেকে ৪ নম্বরের ৪টি করে মোট ১২টি প্রশ্ন থাকবে। সেগুলোর মধ্যে থেকে ২টি করে মোট ৬টি প্রশ্নের উত্তর দিতে হবে।

$$4 \times 2 \times 3 = 24$$

দ্রষ্টব্যঃ বলবিদ্যা ও পদার্থের ধর্ম থেকে ও অন্য যে কোন শাখা থেকে ১টি পরীক্ষণ করতে হবে।

ব্যবহারিকঃ ক্লাস রেকর্ড ৯+১ নং ও ২নং পরীক্ষণ ৮ করে = ১৫ মার্কস

মৌখিক ও ফরমেটিভ = ১০, লিখিত = ৭৫ মার্কস

মোটঃ তত্ত্বীয়+ব্যবহারিক+মৌখিক = ১০০ মার্কস

## Paper II: Subject - Chemistry

**Total hours: 100 hour**  
**Lecture : 80 hour**  
**Practical/Tutorial: 20 hours**

**Total marks -100**  
**Written – 75**  
**Oral - 10**  
**Practical - 15**

### Objectives:

At the end of the course, the students should be able to:

- describe fundamentals in physical chemistry.
- explain common laboratory process.
- identify organic and inorganic chemical compounds.
- describe the different aspects of metals, non-metal and gaseous substances.

### List of Competencies:

Ability to--

- describe fundamentals in physical chemistry.
- explain common laboratory process.
- identify organic and inorganic chemical compounds.
- describe the different aspects of metals, non-metal and gaseous substances.

### Course contents of Chemistry

Sl.No	Topic/Lessons	Teaching/Learning Hours	
		Lecture	Practical
	গ্রুপ -ক ভৌত রসায়ন		
১।	ভৌত ও রাসায়নিক পরিবর্তন ও এদের মধ্যে পার্থক্য।	১ ঘন্টা	
২।	পদার্থের গঠনঃ অণু ও পরমাণু-অণুর সংজ্ঞা, আন্তঃআণবিক দূরত্ব, আন্তঃআণবিক, কঠিন, তরল, গ্যাস, পরমাণু, পারমাণবিক ও আনবিক ওজন।	৫ ঘন্টা	
৩।	সাধারণ পরীক্ষাগার প্রণালীঃ দ্রবণ, অভিস্রবণ, পরিস্রাবণ ও অতিপৃক্ত দ্রবণ, দ্রাব্যতা, বাষ্পীভবন, পাতন, আংশিক পাতন, উর্ধ্বপাতন, কেলাসন।	৪ ঘন্টা	
৪।	প্রতীক, সংকেতঃ প্রতীক, আনবিক সংকেত, যোজ্যতা, রেডিক্যাল এবং তাদের যোজনী, যোজনী থেকে আনবিক সংকেত নির্ণয়, গাঠনিক সংকেত।		
৫।	রাসায়নিক বিক্রিয়াঃ বিভিন্ন প্রকারের রাসায়িক ক্রিয়া, রাসায়নিক বিক্রিয়া ঘটানোর উপায় সমূহ।	৪ ঘন্টা	
৬।	অম্ল, ক্ষারক ও লবন।		
৭।	গ্যাসের ধর্ম-বয়েলের সূত্র, চার্লসের সূত্র।	৪ ঘন্টা	
৮।	মৌলের রাসায়নিক তুল্যাংক বা যোজন ভার।	২ ঘন্টা	
৯।	পরমানুর গঠন এবং যোজ্যতার ইলেকট্রনীয় মতবাদ। বিভিন্ন রাসায়নিক বন্ধন।	২ ঘন্টা ২ ঘন্টা	
১০।	ক) এভোগ্যাড্রে সূত্র খ) ভরক্রিয়া সূত্র।		
১১।	রাসায়নিক সংযোগ বিধিঃ ক) ভরের নিত্যতা সূত্র।      খ) নির্দিষ্ট অনুপাত সূত্র। গ) শূন্যানুপাত বিধি।      ঘ) বিপরীত অনুপাত সূত্র। ঙ) গ্যাস আয়তন সূত্র।	৪ ঘন্টা ২ ঘন্টা ৫ ঘন্টা	
	গ্রুপ -খ অধাতুঃ		

Sl.No	Topic/Lessons	Teaching/Learning Hours	
		Lecture	Practical
১।	নিম্নোক্ত পদার্থ গুলোর উৎস, প্রস্তুতি, ধর্ম এবং ব্যবহারঃ	৭ ঘন্টা	
ক)	অক্সিজেন, ওজোন, পানি ও হাইড্রোজেন পার অক্সাইড।		
খ)	হোলাজেন সমূহঃ ক্লোরিন, রোমিন, আয়োডিন ও হাইড্রো ক্লোরিক এসিড।		
গ)	নাইট্রোজেন, হাইড্রোজেন সালফাইট, সালফার ডাইঅক্সাইড।		
ঘ)	সালফার, হাইড্রোজেন সালফাইট, সালফার ডাইঅক্সাইড, সালফিউরিক এসিড।		
ঙ)	ফসফরাস চ) জারন-বিজারনঃ জারক ও বিজারক পদার্থ		
২।	ধাতুঃ নিম্নোক্ত পদার্থ গুলোর উৎস, প্রস্তুতি, ধর্ম এবং ব্যবহারঃ	৬ ঘন্টা	
ক)	সোডিয়াম-সোডিয়াম হাইড্রোঅক্সাইড, সোডিয়াম কার্বনেট, সোডিয়াম ক্লোরাইড।		
খ)	ক্যালসিয়াম-ক্যালসিয়াম কার্বনেট, ক্যালসিয়াম ফ্লোরাইড, ক্যালসিয়াম সালফেট, বি-চিং পাউডার।	১ ঘন্টা	
৩।	কপার -কপার অক্সাইড, কপার সালফেট, কপার ফ্লোরাইড	১ ঘন্টা	
৪।	জিংক - জিংক অক্সাইড, জিংক ফ্লোরাইড, জিংক সালফেট।		
৫।	এলুমিনিয়াম - এলুমিনিয়াম ফ্লোরাইড, এলুমিনিয়াম সালফেট।	১ ঘন্টা	
৬।	আয়রন - আয়রন সালফেট।	১ ঘন্টা	
৭।	লেড - লেড অক্সাইড।	১ ঘন্টা	
৮।	সিলভার - সিলভার নাইট্রেট।	১ ঘন্টা	
	গ্রুপ - গ জৈব রসায়ন		
১।	জৈব রসায়নের সংজ্ঞা, জৈব ও অজৈব যৌগের মধ্যে পার্থক্য জৈব যৌগের গঠন, শ্রেণী বিভাগ, কার্যকরী বা ত্রিাশীল মূলক।	৪ ঘন্টা	
২।	জৈব যৌগের নিষ্কাশন ও বিশুদ্ধকরণ	১ ঘন্টা	
৩।	সম্পৃক্ত ও অসম্পৃক্ত হাইড্রোকার্বনঃ প্রস্তুত প্রণালী, ধর্ম এবং ব্যবহার -মিথেন, ইথেন, ইথিলিন, এসিটাইলিন।	২ ঘন্টা	
৪।	এলকোহল হ্যালাজেন জাতকঃ মিথাইল ফ্লোরাইড, ক্লোরোফর্ম এর প্রস্তুতি, ধর্ম ও ব্যবহার।	৪ ঘন্টা	
৫।	এলকোহলঃ শ্রেণী বিভাগ, মিথাইল এলকোহল, ইথানল এলকোহল ও গিসারিনের প্রস্তুতি, ধর্ম ও ব্যবহার।	২ ঘন্টা	
৬।	ডাই-ইথাইল ইথারঃ প্রস্তুতি, ধর্ম ও ব্যবহার।	১ ঘন্টা	
৭।	এলডিহাইড ও কিটোল সমূহঃ নিম্নলিখিত যৌগসমূহের প্রস্তুতি, ধর্ম ও ব্যবহার, ফরমালডিহাইড, এসিটালডিহাইড ও এসিটোন।	৩ ঘন্টা	
৮।	কার্বিলিক এসিডঃ এসেটিক এসিড ও সাইট্রিক এসিসেডের প্রস্তুতি, ধর্ম ও ব্যবহার।	৩ ঘন্টা	
৯।	এলকোহল এ্যামাইনঃ এ্যামাইনের শ্রেণী বিভাগ, মিথাইল এ্যামাইন ও ইথাইল এ্যামাইনের প্রস্তুতি, ধর্ম ও ব্যবহার।	২ ঘন্টা	
১০।	এ্যারোমেটিক যৌগঃ নিম্নলিখিত যৌগসমূহের প্রস্তুতি, ধর্ম ও ব্যবহার। বেনজিন, টলুইন, ফ্লোরোবেজিন নাইট্রোবেজিন, অ্যানিলিন, কার্বিলিক এসিড, বেনজালডিহাইড, বেনজোয়িক এসিড ও স্যালিসাইলিক এসিড।	৪ ঘন্টা	
	ব্যবহারিক :		
১।	অম্ল ও ক্ষারের মাত্রা নির্ণয়।		২০ ঘন্টা
২।	হাইড্রোজেন ও অক্সিজেনের প্রস্তুতি।		
৩।	সহজ জৈব ও অজৈব যৌগের আঙ্গিক বিশেষণ।		
	মোট : ১০০ ঘন্টা	৮০ ঘন্টা	২০ ঘন্টা

মান বন্টন : লিখিত পরীক্ষা=৭৫ মার্কস, ব্যবহারিক = ১৫ মার্কস, মৌখিক/ফরমেটিভ =১০ মার্কস

গ্রুপ - ক- ২০ নম্বর

গ্রুপ - খ - ২০ নম্বর

গ্রুপ - গ - ২০ নম্বর

গ্রুপ -ক থেকে ৩টি, গ্রুপ -খ থেকে ৩টি এবং গ্রুপ -গ থেকে ৩টি মোট ৯টি প্রশ্ন থাকবে। তন্মধ্যে প্রত্যেক গ্রুপ থেকে অন্ততঃপক্ষে ২ টি করে মোট ৬টি প্রশ্নের উত্তর দিতে হবে।

## **Paper III: Subject - Basic Microbiology & Parasitology**

**Total hours: 100-hour**

**Lecture: 80 hour**

**Practical: 20 hours**

**Total marks-200**

**Written-100**

**Oral-40**

**Practical- 40**

**Formative- 20**

### **Learning objectives:**

At the end of the course the students will be able to –

- define and classify microorganisms, define and explain microbiological terminologies.
- identify, use and maintain microbiological articles, equipment, apparatus including microscope and mention the parts when applicable.
- clean, wash, decontaminate, disinfect & sterilization microbiological articles, instruments, glass wares etc.
- define, classify, and mention morphology of bacteria, virus, fungus, parasite and helminth.
- name medically important bacteria, virus, fungus, parasite, helminth and diseases caused by them.
- explain anatomy bacteria and bacterial spores: pathogenicity of medically important bacteria, growth & multiplication of bacteria.
- identify, staining and culture medically important bacteria.
- demonstrate knowledge and skills on PPE use
- demonstrate basic knowledge of immunity.

### **List of Competencies:**

1. demonstrate basic knowledge on common microbiological and parasitological issues.
2. perform identification of different microorganisms particularly bacteria & fungus of medical importance ensuring laboratory safety using microbiological, reagents, equipment and apparatus.
3. provide best services to the stakeholders using the knowledge and skills.

**Course Contents of Basic Microbiology & Parasitology**

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture / Tutorial on Theories	Practical/ Demonstration/Field visit
1.	<b>Introduction to microorganisms:</b> <ul style="list-style-type: none"> <li>▪ Definition and classification of microorganisms</li> <li>▪ Microbiological terminology</li> <li>▪ Characteristics of Eukaryotic prokaryotic &amp; sub cellular groups of microorganisms</li> <li>▪ Microbiological articles, equipment's apparatus</li> <li>▪ Microscope: Different parts of microscope, &amp; maintenance of microscope</li> </ul>	08	03
2.	<b>Destruction of microorganism:</b> <ul style="list-style-type: none"> <li>▪ Cleaning, Washing, decontamination disinfection &amp; procedures</li> <li>▪ Sterilization of different laboratory articles, instruments, glass wares etc.</li> </ul>	07	03
3.	<b>Bacteria:</b> <ul style="list-style-type: none"> <li>▪ Anatomy of Bacteria, chemical composition of different structures of bacteria</li> <li>▪ Bacterial Spore: Definition &amp; function spores, Spores bearing bacteria of medical importance</li> <li>▪ Bacterial toxin: Definition &amp; types of bacterial toxin, characteristics of endotoxin &amp; exotoxin, Toxin producing organism of medical importance, use of bacterial toxins in diseases prevention</li> <li>▪ Biology of bacteria: Growth &amp; multiplication of bacteria, bacteria growth curve, bacteria growth requirements. Definition &amp; classification of culture media</li> <li>▪ Classifying bacteria in terms of morphology, staining, spore, flagella, capsule &amp; Pathogenicity.</li> <li>▪ Staining bacteria: Gram's staining, AFB staining, Albert staining</li> </ul>	15	04
	<b>Virus:</b> <ul style="list-style-type: none"> <li>▪ General characters of virus</li> <li>▪ Morphology &amp; classification of virus</li> <li>▪ List of viruses of medical importance &amp; diseases produced by them</li> </ul>	10	01

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture / Tutorial on Theories	Practical/ Demonstration/Field visit
	<b>Fungus:</b> <ul style="list-style-type: none"> <li>▪ General character, Morphology and classification of fungus</li> <li>▪ List of fungus list medical important and the diseases produced by them</li> </ul>	10	02
	<b>Parasite:</b> <ul style="list-style-type: none"> <li>▪ Definition /Classification of parasite</li> </ul>	03	01
	<b>Helminth:</b> <ul style="list-style-type: none"> <li>▪ General characteristics of helminths</li> <li>▪ Classification /Morphology of helminths</li> </ul>	08	02
	<b>Protozoa:</b> <ul style="list-style-type: none"> <li>▪ General characteristics of protozoa</li> <li>▪ Definition /Classification of protozoa</li> </ul>	10	02
	<b>PPE:</b> <i>Personal protective equipment (PPE)</i> for different healthcare activities	04	01
	<b>Immunity:</b> <b>Basic Concept of immunity and immunization Schedule.</b>	05	01
	<b>Total</b>	<b>80</b>	<b>20</b>

#### Teaching Methods:

- Lecture
- Tutorial
- Practical/ Demonstration
- Field visit

#### Media:

- Multimedia and Laptop
- OHP and transparencies
- White Board and markers
- Blackboards and chalk
- Online and computer based teaching learning materials
- Laboratory: (Microscope, Autoclave, Hot Air Oven, Incubator, Haemocytometer, Haemoglobin meter, Analytical balance, Centrifuge machine, Rotator, Refrigerator, Photometer, Electrolyte analyzer, Electrophoresis apparatus, ELISA reader, PCR machine, Cell counter etc.)
- Hospital/ Health complex

#### Assessment:

Written – SAQ= 80 marks, MCQ=20 marks

Practical or OSPE 40 marks, Oral-40 marks, Formative-20 marks



## **Paper IV: Subject – Functional Anatomy and Pathology**

**Total hours: 150 hours**  
**Lecture: 100 hours**  
**Practical / Tutorial: 50 hours**

**Total marks-200**  
**Written-100**  
**Oral- 40**  
**Practical- 40**  
**Formative-20**

### **Objectives:**

#### **At the end of the course the students will be able to:**

- Describe essential components of anatomy of the spine, trunk, upper and lower limbs
- Describe essential component of pathology of human body and how it works
- Describe essential components of systemic pathology of human body and their applications in prosthetic and orthotic science
- Describe functional anatomy of the upper limbs, lower limbs and the spine
- Describe relationship between functional anatomy and prosthetic and orthotic component
- Describe pathology of orthopedic diseases, their etiology, progress, medical and prosthetic and orthotic treatment
- Describe different orthopedic conditions and its management
- Describe the process of amputation surgery and its care

### **List of competencies**

#### **On successful completion of the subject the students should be able to:**

1. Explain the purpose of the functional anatomy of specific topic
2. Describe the importance of the general pathology and specific pathology
3. Explain the process of amputation surgery for different level of amputation
4. Apply the theory in to practice
5. Describe different orthopedic conditions and their management

**Course Contents of Functional Anatomy and Pathology**

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture	Tutorial/ Practical
1	<b>Functional anatomy</b> <ul style="list-style-type: none"> <li>• Muscular system of the trunk and spine</li> <li>• Muscular system of the upper limb</li> <li>• Muscular system of lower limb</li> <li>• Spine and thorax</li> <li>• Joints of upper limb</li> <li>• Joints of lower limb</li> <li>• Joints of spine</li> </ul>	20	30
2	<b>General pathology</b> <ul style="list-style-type: none"> <li>• Introduction to pathology and general pathology</li> <li>• Inflammation- (Acute &amp; Chronic inflammation</li> <li>• Infections – pyogenic infection, fungal infection, viral infection</li> <li>• Control of infection, cross infection &amp; prevention</li> <li>• Asepsis and sterilization</li> <li>• Venereal disease - syphilis, gonorrhea</li> <li>• Wounds and types of healing process</li> <li>• Ischemia, necrosis, gangrene thrombosis, embolism</li> </ul>	10	5
3	<b>Specific pathology</b> <ul style="list-style-type: none"> <li>• Spinal cord injury, Peripheral nerve Injury,</li> <li>• Cerebral palsy ,Hemiplegia, Paraplegia,</li> <li>• Tuberculosis,</li> <li>• Leprosy,</li> <li>• Burns,</li> <li>• Chronic arthritis, Rheumatoid arthritis, Osteoarthritis, Neuropathic arthritis,</li> <li>• Metabolic diseases,</li> <li>• Muscular Dystrophy.</li> <li>• Guillain barre syndrome,</li> <li>• Traumatic Brain Injury, Stroke</li> </ul>	20	5

4	<b>Amputation surgery</b> <ul style="list-style-type: none"> <li>• Indications of amputation</li> <li>• Principles of amputation, types, techniques</li> <li>• Postoperative care of the stump properties of good Stump.</li> <li>• Examination &amp; prescription</li> <li>• Stump dermatology</li> <li>• Common skin diseases and their management</li> <li>• Care of Stump</li> </ul>	20	5
5	<b>Orthopedic conditions</b> <ul style="list-style-type: none"> <li>• Introduction to orthopedics, principles of orthopedics,</li> <li>• Congenital Deformities- Talipes equino varus (CTEV), Spina Bifida</li> <li>• Spinal deformities- Scoliosis, Kyphosis</li> <li>• Deformities of the lower limbs- Flat foot, Calcaneovalgus foot, Leg length discrepancy. Rickets, Avitaminosis, Bone tumors, Trauma,</li> <li>• Fractures –fracture of upper and lower extremity, fracture healing process •</li> <li>• Diseases of the pelvis and hip - Perthes disease, Lumbar Herniated Nucleus Pulpous (HNP), Lumbar Osteoarthritis (Degenerative Joint Disease), Osteoarthritis of the Hip, Sacroiliac (SI) Joint dysfunction</li> <li>• Diseases of the foot- Plantar Fasciitis. Retrocalcaneal Bursitis</li> <li>• Diseases of the shoulder- Frozen Shoulder, Subluxed &amp; dislocated Shoulder</li> <li>• Elbow - Tennis Elbow, Golfer’s Elbow</li> <li>• Hand - De-quervan tenosynivitis, carpal tunnel Syndrome</li> </ul>	30	5
<b>Total</b>		<b>100</b>	<b>50</b>

**Teaching Methods:**

- Lecture, Tutorial and Practical/ Demonstration

**Media:**

- Multimedia and Laptop
- OHP and accessories, white Board and markers
- Online and computer based teaching learning materials
- Different teaching models and samples

**Assessment:**

- Written – SAQ= 80 marks, MCQ=20 marks
- Practical or OSPE 40 marks, Oral/SOE-40 marks, Formative-20 marks

## **Paper V: Subject - Basic Prosthetics and Orthotics**

**Total hours: 400**  
**Lecture: 100 hour**  
**Practical: 300 hours**

**Total marks-200**  
**Written-100**  
**Oral-40**  
**Practical- 40**  
**Formative- 20**

### **Learning objectives:**

At the end of the course the students will be able to-

- Explain the basic concepts and terminology and detailed consideration of biomechanics of human locomotion
- Explain biomechanics of upper and lower limb
- Explain basic concepts of mechanics and their application in biomechanics and workshop practice.
- Explain statics and kinetics and their application in prosthetics and orthotics; physical laws, their mathematical derivation and application; problem solving methods
- Explain basic mathematics for use in mechanics and biomechanics.
- Explain the characteristics, properties and the processing of commonly used materials (steel & its alloys, non-ferrous metals & their alloys, plastics, wood, leather, plaster of paris, adhesives) with particular reference to their applications in prosthetics and orthotics.
- Explain and apply knowledge of hand tools selection & use, measuring instruments use & methods of application, machine tools selection & use, welding process equipment for metals and plastics, sewing machines use & maintenance, general equipment, workshop layout, healthy & safety regulations & practice in the field of prosthetics and orthotics.
- Perform orthotic measurement techniques as applied in Foot Orthosis (FO) and Ankle Foot Orthosis (AFO)
- Explain the interaction of anatomical joints and orthotic joints.
- Describe the orthotic components and their selection for the specific devices.
- Describe interface forces and orthotic design as applied Foot Orthosis (FO) and Ankle Foot Orthosis (AFO)
- Describe pathological gait and its application of appropriate orthotics treatment for to Foot Orthosis (FO) and Ankle Foot Orthosis (AFO)
- Perform prosthetic measurement techniques as applied to Partial Foot (PF) and Ankle Disarticulation (AD) devices
- Explain the interaction of anatomical joints and prosthetic joints.
- Describe the prosthetic components and their selection for the specific devices.
- Explain the socket interface forces and lower limb prosthetic design as applied to pf and ad devices.
- Describe the bench, static and dynamic alignment of PF and ad prostheses and the biomechanical implications.
- Explain the prosthetic gait deviations, causes and solutions related to PF and ad devices
- The shoe, its uses and modification for various foot disorders and its biomechanical functions
- Assures the various foot problems, prescription fabrication and fitting of different shoe modifications

## List of Competencies:

1. Explain the basic concepts on prescription of specific prosthetic and orthotic device
2. Apply the basic concepts of fabrication procedure in order to make the different prosthetic and orthotic devices
3. Compare between the pathological gait with the normal gait
4. Apply theory in to practice
5. Explain the different alignments of prosthetic and orthotic devices
6. Describe the basic mechanical principles of anatomical joints and prosthetic and orthotic joints
7. Perform effective prosthetic and orthotic prescription to the service user. Apply biomechanical principles to achieve optimum alignment, solving fitting problems and providing biomechanical solutions for Foot Orthosis (FO), Ankle Foot Orthosis (AFO), Partial Foot (PF) and Ankle Disarticulation (AD) devices
8. Perform general prosthetic and orthotic service user assessment
9. Adopt the basic concepts of biomechanical principles to fabricate the prosthetics and orthotics devices
10. Acknowledge the understanding of basic concept on fabrication of different prosthetic and orthotic devices

## Course Contents of Basic Prosthetics and Orthotics

Sl. No	a. Topics/Lessons	Teaching/learning Hours	
		Lecture / Tutorial on Theories	Practical/ Demonstration/Field visit
1.	<b>Material Technology</b> <ul style="list-style-type: none"> <li>▪ Introduction to workshop technology</li> <li>▪ Rubber and synthetics different types ,uses, density, resilience ,utility in prosthetic &amp; Orthotics</li> <li>▪ Ferrous metals – Steel variety &amp; uses</li> <li>▪ Non–ferrous metals and alloys, aluminium, various suitability</li> <li>▪ Wood composition, characteristics/properties, processing</li> <li>▪ Leather composition, characteristics/properties, processing</li> <li>▪ Fabrics, characteristics/properties, processing</li> <li>▪ Leather ,characteristics/properties, processing</li> <li>▪ Plaster of Paris composition, characteristics/properties, processing</li> <li>▪ Adhesive &amp; Fasteners</li> <li>▪ Plastics-types, strength impregnation, lamination colouring &amp; utility</li> <li>▪ Special tools &amp; equipments used in prosthetic &amp; orthotic work</li> <li>▪ Procedure of Welding of plastics</li> </ul>	10	25

2.	<p><b>Workshop Technology</b></p> <ul style="list-style-type: none"> <li>▪ Drilling-Machine operation, tools holding devices, types of drill, reamers and uses, cutting internal- external threads, by using taps and dies, counter sinking, counter boring</li> <li>▪ Bench work-bench vice, leg vice, hand vice, hammers of different types, Files of various types, Chisels, Scrappers &amp; their uses. Hack saws, wrenches, surface plate, angle plate, V-block Centre Punches, dividers &amp; trammels, feeler &amp; surface gauges, etc</li> <li>▪ Vacuum pump and dust collection equipment</li> <li>▪ Measuring Tools – scales &amp; tapes, callipers, Micrometer, Vernier callipers, gauges, plug gauges, dial gauges, Vernier, protractors sine bars, indicators</li> <li>▪ Forging (black smithy) -the forge &amp; tools used in smithy&amp; forging processes</li> <li>▪ Fundamentals of riveting, soldering, brazing and welding</li> <li>▪ Machinery &amp; tools for plastic materials</li> <li>▪ Gluing and adhesion</li> <li>▪ Lathe work-parts of centre lathe and their uses, turning of centre, taper burning screw cutting in lathe, cutting tools, used in lathe, tools speed, feed and depth of cut</li> <li>▪ Sewing machines- selection, use and maintenance</li> <li>▪ Workshop layout</li> <li>▪ Health and safety regulations and practice</li> <li>▪ Milling types of milling machines, Milling cutter, Up-cut &amp; cone cut milling dividing head, set-up and operation on milling machine</li> <li>▪ Shaping – Shaping machine and their use</li> <li>▪ Grinding – The grinding wheels, abrasives, wheel bends, grit &amp; grade, wheel structure, shape, selection, hand grinders, speed &amp; feed, types of grinding &amp; different types of grinding machines</li> <li>▪ Finishing process polishing, buffing, electroplating, and copper, nickel and chromium</li> </ul>	20	25
	<p><b>Intro to Mechanics</b></p> <ul style="list-style-type: none"> <li>▪ Introduction and Units of fundamental quantities of Work, power and energy</li> <li>▪ Scalar and Vector quantities</li> <li>▪ Linear/angular motion and motion of a solid body</li> <li>▪ Resolution of forces and moments in two dimensions</li> <li>▪ Equations of equilibrium</li> <li>▪ Free body diagrams</li> <li>▪ calculations of centre of gravity and mass;</li> <li>▪ Newton's Laws of Motion</li> </ul>	10	

3.	<b>Basic Biomechanics</b> <ul style="list-style-type: none"> <li>▪ Definition of Kinesiology &amp; Bio-mechanics</li> <li>▪ Definition of Kinetics &amp; Kinematics</li> <li>▪ Centre of gravity of human body</li> <li>▪ Segment masses &amp; the density of parts</li> <li>▪ Segment of centers of gravity</li> <li>▪ Human movements &amp; its significance</li> <li>▪ Human movements &amp; its significance</li> <li>▪ Forms of human movement their characteristics &amp; Factors affecting them</li> <li>▪ Analysis of movement</li> <li>▪ Body links and motion of parts</li> <li>▪ Closed and Open chain systems</li> <li>▪ Four bar mechanism</li> <li>▪ Measurement of joint motion</li> <li>▪ Electrogonio-metric method</li> <li>▪ Mechanics of the spine</li> <li>▪ Lumbar dissymmetry</li> <li>▪ Human Locomotion</li> <li>▪ Bio-mechanics of lower extremity</li> <li>▪ Bio-mechanics of upper extremity</li> <li>▪ Gait analysis (Pathological gait)</li> <li>▪ Bio-mechanics of squatting</li> <li>▪ Posture – Definition, factors responsible for posture, relationship of gravity on posture</li> <li>▪ Postural imbalance – factors responsible for imbalance in Static and dynamic positions including ergonomics</li> <li>▪ 3 points control system, 4 points control system,</li> <li>▪ Pressure, Body / Devices Interface</li> </ul>	10	20
4.	<b>Introduction to Orthotics</b>		
	<b>Foot Orthotics (FO )</b> <ul style="list-style-type: none"> <li>▪ Review of basic anatomy, Biomechanical principles, orthotic components, FO design and materials, patient assessment, casting and measurement techniques, modification techniques, joint alignment and check out procedures</li> </ul>	10	20
	<b>Ankle Foot Orthotics (AFO)</b> <ul style="list-style-type: none"> <li>▪ Review of basic anatomy, Biomechanical principles, orthotic components, AFO design and materials, patient assessment, casting and measurement techniques, modification techniques, joint alignment and check out procedures</li> </ul>	10	100
5.	<b>Introduction to Prosthetics</b>		
	<b>Partial Foot (PF)prosthetics</b> <ul style="list-style-type: none"> <li>▪ Review of basic anatomy ,Biomechanical principles, prosthetic components, socket design and materials, patient assessment, casting and measurement techniques, modification techniques, PF prosthetic alignment (bench, static and dynamic) check out procedures</li> </ul>	10	40
	<b>Ankle Disarticulation (AD)prosthetics</b> <ul style="list-style-type: none"> <li>▪ Review of basic anatomy, Biomechanical principles, prosthetic components, socket design and materials, patient assessment, casting and measurement techniques, modification techniques, AD prosthetic alignment (bench, static and dynamic) check out procedures</li> </ul>	10	40

6.	<b>Shoe Modifications</b> <ul style="list-style-type: none"> <li>▪ Introduction to shoe, Functions, types, parts and Biomechanical principles, materials, patient assessment, measurement and modification techniques and check out procedures</li> <li>▪ Fabrication of various shoe modifications</li> </ul>	10	30
	<b>Total</b>	<b>100</b>	<b>300</b>

**Teaching Methods:**

- Lecture, Tutorial, Practical/ Demonstration & Field visit

**Media:**

- Multimedia and Laptop
- OHP and transparencies
- White Board and markers
- Blackboards and chalk
- Online and computer based teaching learning materials
- Laboratory
- Different teaching models of FO, AFO, PF, and AD

**Assessment:**

- Written – SAQ= 80 marks, MCQ=20 marks
- Practical or OSPE 40 marks, Oral/SOE-40 marks, Formative-20 marks



## **3<sup>rd</sup> Year**

### **Paper I: Subject – Basic Rehabilitation Science**

**Total hours: 150 hours**  
**Lecture: 100 hours**  
**Practical / Tutorial: 50 hours**

**Total marks-200**  
**Written-100**  
**Oral- 40**  
**Practical- 40**  
**Formative-20**

#### **Objectives:**

**At the end of the course the students will be able to understand:**

- Describe rehabilitation process
- Describe the community based rehabilitation (CBR) and institution based rehabilitation (IBR)
- Describe roles and importance of multidisciplinary team (MDT) members
- Describe wheel chair and different assistive devices and its uses

#### **List of Competencies**

**On successful completion of the subject the students should be able to:**

- Define rehabilitation
- Differentiate between the CBR and IBR
- Explain the importance of multidisciplinary team and role of each members
- Explain the importance of appropriate assistive devices and its use
- Apply theory in to practice
- Perform taking the measurement for different assistive devices
- Acknowledge the understanding on importance of comprehensive rehabilitation process
- Perform vocational assessment

### Course Contents of Basic Rehabilitation Science

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture / Tutorial on Theories	Practical/ Demonstration/ Field visit
1	<b>Introduction to rehabilitation</b> <ul style="list-style-type: none"> <li>• Visit to various department of CRP and Community Based Rehabilitation centers which are present in Bangladesh.</li> <li>• Understanding the function of different departments of visited rehabilitation institute.</li> </ul>	05	10
2	<b>Rehabilitation</b> <ul style="list-style-type: none"> <li>• Concept of Rehabilitation</li> <li>• Total Rehabilitation/Comprehensive rehabilitation</li> <li>• Rehabilitation team and role of each member of the team</li> </ul>	05	
3	<b>Social &amp; Vocational Aspects</b> <ul style="list-style-type: none"> <li>• Disability and social effects</li> <li>• Home environment of disabled</li> <li>• Disability and social effects</li> <li>• Home environment of disabled</li> <li>• CBR and IBR – concept and application</li> <li>• Attitude of the society</li> <li>• Vocational problems</li> <li>• Vocational assessment</li> <li>• Vocational counseling and guidance</li> </ul>	20	
4	<b>Introduction to Physical Medicine and Rehabilitation</b> <ul style="list-style-type: none"> <li>• Introduction to Physical Medicine &amp; Rehabilitation</li> <li>• Muscle charting</li> <li>• Electro-therapy</li> <li>• Hydro-therapy</li> <li>• Neuro muscular diseases types and management</li> <li>• Inflammatory disease and its management</li> <li>• Bandaging of stumps, TF/TT, Knee, Elbow, Hand, Wrist and Ankle</li> <li>• Crutches and uses, different mobility and assistive devices measurement technique.</li> <li>• Pathological gait</li> <li>• Assessment procedure for various orthopedic conditions</li> <li>• Basic wheel chair - introduction, prescription, types, use and simple modification (As per WHO guidelines).</li> </ul>	70	40
	<b>Total</b>	<b>100</b>	<b>50</b>

#### Teaching Methods:

- Lecture, Tutorial and Practical/ Demonstration

#### Media:

- Multimedia and Laptop
- OHP and accessories
- White Board and markers
- Online and computer based teaching learning materials
- Different teaching models of assistive devices

#### Assessment:

- Written – SAQ= 80 marks, MCQ=20 marks
- Practical or OSPE 40 marks, Oral/SOE-40 marks, Formative-20 marks

## **Paper II: Subject – Prosthetics and Orthotics Science**

**Total hours: 525 hours**  
**Lecture: 100 hours**  
**Practical / Tutorial: 425 hours**

**Total marks-200**  
**Written-100**  
**Oral- 40**  
**Practical- 40**  
**Formative-20**

### **Objectives:**

**At the end of the course the students will be able to understand and apply the following area of knowledge:**

- Describe the prosthetic and orthotic measurement techniques as applied to Transtibial prosthesis (TT), Knee Ankle Foot Orthosis (KAFO) and Knee Orthosis (KO)
- Explain the interaction of anatomical joints and prosthetic and orthotic joints
- Describe the prosthetics and orthotics components and their selection for specific devices
- Explain the interface forces on prosthetic and orthotic design as applied to different devices
- Describe the pathological gait and gait with prosthesis and its application for appropriate prosthetic and orthotic treatment for different types of prosthetic and orthotic devices
- Describe the bench, static and dynamic alignment of TT, KAFO and KO devices and the biomechanical implications
- Describe the prosthetic and orthotic gait deviations, causes and solutions related to TT, KAFO and KO devices

### **List of Competencies**

**On successful completion of the subject the students should be able to:**

- Explain the basic concepts on prescription of specific prosthetic and orthotic device
- Apply the basic concepts of fabrication procedure in order to make the different prosthetic and orthotic devices
- Compare between the pathological gait with the normal gait
- Apply theory in to practice
- Explain the different alignments of prosthetic and orthotic devices
- Describe the basic mechanical principles of anatomical joints and prosthetic and orthotic joints
- Perform effective prosthetic and orthotic prescription to the service user
- Apply biomechanical principles to achieve optimum alignment, solving fitting problems and providing biomechanical solutions for Transtibial Prosthesis (TT), Knee Ankle Foot Orthosis (KAFO) and Knee Orthosis (KO)
- Perform general prosthetic and orthotic service user assessment
- Adopt the basic concepts of biomechanical principles to fabricate the prosthetics and orthotics devices
- Acknowledge the understanding of basic concept on fabrication of different prosthetic and orthotic devices

## *Course Contents of Prosthetics and Orthotics Science*

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture / Tutorial on Theories	Practical/ Demonstration/ Field visit
1	<b>Revision of lower limb prosthetics and orthotics</b> <ul style="list-style-type: none"> <li>Revision of lower limb anatomy, biomechanical principles and anatomical reference points on previously thought prosthetic and orthotic devices.</li> </ul>	10	
2	<b>Transtibial (TT) prosthetics</b> <ul style="list-style-type: none"> <li>Review of basic anatomy. Biomechanical principles, prosthetic components, socket design and materials, patient assessment, casting and measurement techniques, modification technique, TT prosthetic alignment (bench, static and dynamic) and check out procedure.</li> </ul>	35	195
3	<b>Knee Ankle Foot Orthotics (KAFO)</b> <ul style="list-style-type: none"> <li>Review of basic anatomy. Biomechanical principles, orthotic components, KAFO design and materials, patient assessment, casting and measurement techniques, modification technique, joint alignment and check out procedure.</li> </ul>	35	195
4	<b>Knee Orthotics (KO)</b> <ul style="list-style-type: none"> <li>Review of basic anatomy. Biomechanical principles, orthotic components, KO design and materials, patient assessment, casting and measurement techniques, modification techniques, joint alignment and checkout procedure.</li> </ul>	20	35
	<b>Total</b>	<b>100</b>	<b>425</b>

### **Teaching Methods:**

- Lecture, Tutorial and Practical/ Demonstration

### **Media:**

- Multimedia and Laptop
- OHP and accessories
- White Board and markers
- Online and computer based teaching learning materials
- Different teaching models of TT, KAFO and KO

### **Assessment:**

- Written – SAQ= 80 marks, MCQ=20 marks
- Practical or OSPE 40 marks, Oral/SOE-40 marks, Formative-20 marks

### **Paper III: Laboratory Management for Prosthetics and Orthotics**

**Total hours: 75 hour**  
**Lecture: 55 hour**  
**Practical/Tutorial: 20 hours**

**Total marks -200**  
**Written- 100**  
**Oral -40**  
**Practical- 40**  
**Formative- 20**

#### **Objectives:**

**At the end of the course, the students will be able to-**

- Perform understand Clinic management, care and maintenance
- Perform the workforce management
- Describe the materials acquisition, handling and stock control
- Describe the production cost calculations
- Describe the budgeting, invoicing, receipting and accounting
- Explain the property care and maintenance
- Explain the numerical sequences and limiting values, differential and integral calculus and their application, functions
- Explore the new ideas and finding the solutions

#### **List of Competencies:**

- Ability to demonstrate basic understanding about management and its principles
- Apply management principles in prosthetics and orthotics laboratory management.
- Explain professional ethics and professional profiles.
- Describe the importance about quality and be able to maintain quality standard in service delivery.

### Course Contents of Laboratory Management for Prosthetics and Orthotics

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture / Tutorial on Theories	Practical/ Demonstration/Field visit
1.	<b>Management and leadership</b> <ul style="list-style-type: none"> <li>▪ Management functions and their application to P&amp;O</li> <li>▪ Leadership and its application to P&amp;O</li> <li>▪ Human resource management and its application to P&amp;O</li> </ul>	15	
2.	<b>Laboratory management (Financial &amp; material resource)</b> <ul style="list-style-type: none"> <li>▪ Stock control</li> <li>▪ Financial accounting system <ul style="list-style-type: none"> <li>⇒ Book keeping</li> <li>⇒ Budget planning, invoicing, receipting and accounting</li> <li>⇒ Cost calculation - direct and indirect costs</li> <li>⇒ Economic goals, pricing, profitability (Introduction to Entrepreneurship)</li> </ul> </li> <li>▪ Inventory procedures - Property management - care and maintenance</li> <li>▪ Documentation/record keeping</li> <li>▪ Safety - Industrial accidents, safety and hazards Planning</li> </ul>	20	15
3.	<b>Quality assurance</b> <ul style="list-style-type: none"> <li>▪ Definition of quality assurance</li> <li>▪ Quality control measures in P&amp;O</li> <li>▪ Principles of quality assurance and quality improvement</li> <li>▪ Quality assessment, monitoring and evaluation</li> <li>▪ Health care and performance audit</li> </ul>	10	5
4.	<b>Professional practice / Ethics</b> <ul style="list-style-type: none"> <li>▪ Ethics and Medical Ethics</li> <li>▪ Morals, values, ethical principles and beliefs</li> <li>▪ Professional profile and ISPO Code of Ethics</li> <li>▪ Professional regulatory bodies and P&amp;O organizations</li> <li>▪ Malpractice and management, dealing with poor practice and ethical and moral dilemma</li> </ul>	10	
	<b>Total</b>	<b>55</b>	<b>20</b>

#### Teaching Methods:

- Lecture, Tutorial, Practical/ Demonstration & Field visit

#### Media:

- Multimedia and Laptop
- OHP and transparencies
- White Board and markers
- Blackboards and chalk
- Online and computer based teaching learning materials
- Hospital/ Health complex

#### Assessment:

Written – SAQ= 80 marks, MCQ=20 marks

Practical or OSPE 40 marks, Oral/SOE-40 marks, Formative-20 marks

## 4<sup>th</sup> Year

### Paper I: Subject –Prosthetics Science

**Total hours: 450-hour**

**Lecture: 100 hours**

**Practical: 200 hours**

**Special Lab Attachment:150 hours**

**Total marks-200**

**Written-100**

**Oral-40**

**Practical- 40**

**Formative- 20**

#### **Learning objectives:**

At the end of the course the students will be able to understand and apply the following area of knowledge:

- Describe the prosthetic measurement techniques as applied to Trans femoral (TF), Knee disarticulation (KD), Hip disarticulation (HD) and Upper extremity devices
- Describe the interaction of anatomical joints and prosthetic joints.
- Describe the prosthetic components and their selection for the specific devices.
- Describe the socket interface forces and lower limb prosthetic design as applied to Trans femoral (TF), Knee disarticulation (KD), Hip disarticulation (HD) and Upper extremity Prostheses
- Describe the bench, static and dynamic alignment of Trans femoral (TF), Knee disarticulation (KD), Hip disarticulation (HD) and upper extremity Prostheses
- Describe the prosthetic gait deviations, causes and solutions related to Trans Femoral (TF), Knee Disarticulation (KD), Hip Disarticulation (HD) and Upper Extremity Prostheses

#### **List of Competencies:**

1. Demonstrate basic knowledge on common prosthetic intervention.
2. Demonstrate basic ideas prosthetic components and their selection for the specific devices.
3. Identify different prosthetic gait deviations and Perform correction of identified deviations related to Trans Femoral (TF), Knee Disarticulation (KD), Hip Disarticulation (HD) and Upper Extremity Devices.
4. Provide best services to the stakeholders using the knowledge and skills.

### Course Contents of Prosthetics Science

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture / Tutorial on Theories	Practical/ Demonstration/Field visit
1.	<b>Transfemoral (TF) prosthetics</b> <ul style="list-style-type: none"> <li>▪ Review of basic anatomy, Biomechanical principles, prosthetic components, socket design and materials, patient assessment, casting and measurement techniques, modification techniques, TF prosthetic alignment (bench, static and dynamic) check out procedures</li> </ul>	50	120
2.	<b>Knee Disarticulation (KD) prosthetics</b> <ul style="list-style-type: none"> <li>▪ Review of basic anatomy, Biomechanical principles, prosthetic components, socket design and materials, patient assessment, casting and measurement techniques, modification techniques, KD prosthetic alignment (bench, static and dynamic) check out procedures</li> </ul>	10	20
3.	<b>Hip Disarticulation (HD) prosthetics</b> <ul style="list-style-type: none"> <li>▪ Review of basic anatomy, Biomechanical principles, prosthetic components, socket design and materials, patient assessment, casting and measurement techniques, modification techniques, HD prosthetic alignment (bench, static and dynamic) check out procedures</li> </ul>	15	10
4	<b>Upper Extremity Prosthetics (TR &amp; TH)</b> <ul style="list-style-type: none"> <li>▪ Review of basic anatomy, Biomechanical principles, prosthetic components, UE design and materials, patient assessment, casting and measurement techniques, modification techniques and check out procedures</li> </ul>	25	50
	<b>Total</b>	<b>100</b>	<b>200</b>

#### Teaching Methods:

- Lecture, Tutorial, Practical/ Demonstration & Field visit

#### Media:

- Multimedia and Laptop.
- OHP and transparencies
- White Board and markers
- Online and computer based teaching learning materials

#### Assessment:

Written – SAQ= 80 marks, MCQ=20 marks

Practical or OSPE 40 marks, Oral/SOE-40 marks, Formative-20 marks



## Paper II: Subject – Orthotics Science

**Total hours: 350 hours**

**Lecture: 100 hours**

**Practical: 100 hours**

**Special Lab Attachment:150 hours**

**Total marks-200**

**Written-100**

**Oral-40**

**Practical- 40**

**Formative- 20**

### **Learning objectives:**

At the end of the course the students will be able to –

- Perform the orthotic measurement techniques as applied to Hip Orthoses (HO) and Hip Knee Ankle Foot Orthoses (HKAFO).
- Perform the orthotic measurement techniques as applied to Upper Extremity Orthosis and spinal Orthosis
- Explain the interaction of anatomical joints and orthotic joints.
- Describe the orthotic components and their selection for the specific devices.
- Describe the interface forces and orthotic design as applied to Hip Orthoses (HO) and Hip Knee Ankle Foot Orthoses (HKAFO).
- Describe the interface forces and orthotic design as applied to Upper Extremity Orthosis and spinal Orthosis
- Describe the pathological gait and its application of appropriate orthotics treatment for Hip Orthoses (HO) and Hip Knee Ankle Foot Orthoses (HKAFO)
- Apply appropriate biomechanical and mechanical principles in Upper Extremity Orthosis and spinal Orthosis intervention.

### **List of Competencies:**

1. Demonstrate basic knowledge on HKAFO, HO, Upper Extremity Orthosis and Spinal Orthosis.
2. Perform identification of different components and their application in fabricating HKAFO, HO, Upper Extremity Orthosis and Spinal Orthosis.
3. Able to fabricate, fit different designs of HKAFO, HO, Upper Extremity Orthosis and Spinal Orthosis and train service users about their application.
4. Provide best services to the stakeholders using the knowledge and skills.

## Course Contents of Orthotics Science

Sl. No	Topics/Lessons	Teaching/learning Hours	
		Lecture / Tutorial on Theories	Practical/ Demonstration/Field visit
1.	<b>Hip Orthotics (HO)</b> <ul style="list-style-type: none"> <li>▪ Review of basic anatomy,</li> <li>▪ Different conditions and deformities of Hip joint</li> <li>▪ Biomechanical principles,</li> <li>▪ Orthotic components,</li> <li>▪ HO design and materials,</li> <li>▪ Patient assessment, casting and measurement techniques, modification techniques, joint alignment and check out procedures</li> </ul>	15	10
2.	<b>Hip Knee Ankle Foot Orthotics (HKAFO)</b> <ul style="list-style-type: none"> <li>▪ Review of basic anatomy,</li> <li>▪ Biomechanical principles,</li> <li>▪ orthotic components,</li> <li>▪ HKAFO design and materials,</li> <li>▪ Patient assessment, casting and measurement techniques, modification techniques, joint alignment and check out procedures</li> </ul>	15	30
3.	<b>Introduction to Upper Extremity and Spinal Orthotics</b> <ul style="list-style-type: none"> <li>▪ Revision of upper limb and spinal anatomy,</li> <li>▪ Biomechanical principles and anatomical reference points</li> <li>▪ Major deformities of upper limb and spine</li> </ul>	10	
4.	<b>Upper Extremity Orthotics (WHO, EWHO, SEWHO)</b> <ul style="list-style-type: none"> <li>▪ Biomechanical principles,</li> <li>▪ Orthotic components and prescription principles of upper limb orthosis,</li> <li>▪ Different designs of ULO and materials,</li> <li>▪ Patient assessment, casting and measurement techniques, modification techniques, joint alignment and check out procedures, patient instructions and training</li> </ul>	30	30
5.	<b>Spinal Orthotics (SO, LSO, TLSO, CTLSO, CO)</b> <ul style="list-style-type: none"> <li>▪ Biomechanical principles,</li> <li>▪ Orthotic components,</li> <li>▪ SO design and materials,</li> <li>▪ Patient assessment, casting and measurement techniques, modification techniques, joint alignment and check out procedures , patient instructions and training</li> </ul>	30	30
	<b>Total</b>	<b>100</b>	<b>100</b>

### Teaching Methods:

- Lecture, Tutorial, Practical/ Demonstration & Field visit

### Media:

- Multimedia, Laptop, OHP and transparencies
- White Board and markers
- Online and computer based teaching learning materials
- Laboratory: (Work bench, alignment jig, router machine, drill machine, vacuum suction machine, air compressor, Hot Air Oven, etc.)
- Hospital/ Health complex

### Assessment:

Written – SAQ= 80 marks, MCQ=20 marks

Practical or OSPE 40 marks, Oral/SOE-40 marks, Formative-20 marks

## Outline of Institutional Academic Laboratory

The institute should be equipped with the standard tools and machineries that are necessary to develop the skills required for the students to understand about the theory into practice. They should perform various common essential prosthetic and orthotic devices fabrications fitting and evaluation.

The institute should have a well equipped laboratory with following equipments-

Sl. No	Name of Tools and machines
01.	Hot Air Oven
02.	Buffing machine 2 HP 3 phase motor.
03.	Bench Grinder 0.5 HP, single phase motor, Abrasive
04.	Drilling Machine(Pillar)
05.	Bench Drilling Machine with stand, Capacity ½ inch
06.	Hand Drilling Machine
07.	Shearing machine gear type Cutting blade length 14 inch
08.	Industrial Sewing Machine with ¼ HP motor
09.	Universal Band Saw Machine, Working table size 24"x36" Maximum depth of cut 5½" with 3 HP motor 3 phase
10.	Belt and Disc Sander Disc dia. 10 inches, belt size 6"x48" with 1 HP 3 phase motor
11.	Weighing machine
12.	Hot Air Gun Temperature range 100-600 degrees C, Power input 2000W
13.	Jig Saw Machine sawing depth in wood 54 mm, rated input 350 W
14.	Suction machine/ Vacuum Pump
15.	Router Machine (adjustable / static) with accessories
16.	Hand Drill machine (Cordless)
17.	Computers
18.	LCD Projectors
19.	Laptop
20.	Tussle board for drawing (01 for each student)
21.	Band saw machine for metal
22.	Bench Grinder-cum-Sander 0.75 HP 1 phase
23.	Hot Water oven for low temperature thermoplastic sheet
24.	Work benches fixed with vices (with 2 inches wooden table top)
25.	Ceramic benches for plaster work fixed with vices
26.	Sewing machines (Electrical)
27.	Sewing machines (manual heavy duty)
28.	Cast carter (oscillating machine)
29.	AC welding
30.	Alignment frames
31.	Alignment Gig
32.	Sit casting machine
33.	Plaster casting apparatus
34.	Compressor Machine

## **Infrastructural Facilities Requirements**

- i. One room for clinical meeting
- ii. One trial fitting room with cabins (for men & for women)
- iii. Three measurement rooms (One for men & one for women)
- iv. One plaster room for casting/modification
- v. One plastic lamination/Draping section
- vi. One welding room
- vii. One prosthetic workshop
- viii. One orthotic workshop
- ix. One upholstery room
- x. Gait training facility
- xi. One store room
- xii. One waiting hall for the service users
- xiii. Two machine rooms

## Outline of Special Laboratory Attachment

Practical field placements are a great opportunity for the students to begin to gain hands-on experience and build a network of industry contacts. This will ensure that students can secure employment and perform their job responsibilities after successful completion of the course. Students will work with special equipment's and alongside experienced Prosthetics and Orthotics personnel and this will exceptionally be learning and networking opportunities.

Following lab equipments should be there for laboratory attachment sites-

Sl. No	Name of Tools and machines
01.	Hot Air Oven
02.	Buffing machine 2 HP 3 phase motor.
03.	Bench Grinder 0.5 HP, single phase motor, Abrasive
04.	Drilling Machine(Pillar)
05.	Bench Drilling Machine with stand, Capacity ½ inch
06.	Hand Drilling Machine
07.	Shearing machine gear type Cutting blade length 14 inch
08.	Industrial Sewing Machine with ¼ HP motor
09.	Universal Band Saw Machine, Working table size 24"x36" Maximum depth of cut 5½" with 3 HP motor 3 phase
10.	Belt and Disc Sander Disc dia. 10 inches, belt size 6"x48" with 1 HP 3 phase motor
11.	Weighing machine
12.	Hot Air Gun Temperature range 100-600 degrees C, Power input 2000W
13.	Jig Saw Machine sawing depth in wood 54 mm, rated input 350 W
14.	Suction machine/ Vacuum Pump
15.	Router Machine (adjustable / static) with accessories
16.	Hand Drill machine (Cordless)
17.	Computers
18.	LCD Projectors
19.	Laptop
20.	Tussle board for drawing (01 for each student)
21.	Band saw machine for metal
22.	Bench Grinder-cum-Sander 0.75 HP 1 phase
23.	Hot Water oven for low temperature thermoplastic sheet
24.	Work benches fixed with vices (with 2 inches wooden table top)
25.	Ceramic benches for plaster work fixed with vices
26.	Sewing machines (Electrical)
27.	Sewing machines (manual heavy duty)
28.	Cast carter (oscillating machine)
29.	AC welding
30.	Alignment frames
31.	Alignment Gig
32.	Sit casting machine
33.	Plaster casting apparatus
34.	Compressor Machine

## **Infrastructural Facilities Requirements**

- i. One room for clinical meeting
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- iii. Three measurement rooms (One for men & one for women)
- iv. One plaster room for casting/modification
- v. One plastic lamination/Draping section
- vi. One welding room
- vii. One prosthetic workshop
- viii. One orthotic workshop
- ix. One upholstery room
- x. Gait training facility
- xi. One store room
- xii. One waiting hall for the service users
- xiii. One machine rooms

## **Job description of Medical Technologists (Prosthetics and Orthotics)**

### **A. General Job**

#### *a. Formulation of treatment*

- In the absence of a Category I professional participates as full member of the clinic team; takes part in the examination and prescription; and advises on the design of the prosthetic/orthotic device interface, suspension and selection of the proper components.
- Assists and advises on relevant aspects of pre-surgical, post-surgical, medical and therapeutic management of individuals requiring prosthetic/ orthotic devices.
- Records and reports any pertinent information regarding patients/users and their families, including a determination of expectations and needs.
- Communicates appropriate information to patients/users and their families.
- Fitting and fabrication of different Prosthetic and Orthotic devices.
- Identifies physical and other relevant characteristics of the patient/user.
- Formulates a range of prosthetic or orthotic designs including selection of materials, components and additional aids.
- Takes all casts and measurements required for proper fabrication and fitting.
- Modifies positive and/or negative models and/or layouts of design to obtain optimal fit and alignment.
- Carries out fitting, static and dynamic alignment and, where appropriate, preliminary training and initial check-out.
- Performs and/or supervises fabrication of the prosthesis or Orthosis.

#### *a. Evaluation and follow-up*

- Advises the team and participates directly in final check-out and evaluation of fit, function and cosmesis.
- Instructs the patient/user or family in the use and care of the device
- Takes part in follow-up procedures as well as maintenance, repair and replacement of the appliance
- Recognizes the need to repeat any of the identified steps in order to
- Optimize fit and function.
- Collaborates and consults with others engaged in the management of the patient/user.

#### *b. Management and supervision*

- Supervises the activity of supporting staff as appropriate.
- Manages clinical and laboratory/workshop activities assigned to him/her, including:
  - use and maintenance of tools and equipment
  - maintenance of safe working environment and procedures
  - inventory and stock control
  - personnel matters
  - financial matters
  - appropriate record keeping
  - total quality management
- Devises improved job methods for increasing efficiency.
- Interacts with professional groups (as well as) and, where appropriate, governmental and non-governmental agencies.
- Takes part in planning and implementation of technical orthopaedic care systems.

- c. *Community services*
  - Makes a professional contribution to and takes part in community rehabilitation programmes.
- d. *Medical, legal and ethical requirements*
  - Provides patient/user care within a recognized prosthetics/orthotics code of ethics.
  - Provides patient/user care, which complies with medical/legal requirements

## **B. At the Teaching Institutes:**

At the teaching Institutes the Medical Technologists (Prosthetics and Orthotics) personnel are positioned at three levels:

- a. Lecturers
  - b. Instructors
  - c. Technologists
- a. *Lecturers:*
    - They shall perform small group teaching in tutorial, demonstration, and practical classes.
    - Facilitate practical demonstration and work of the students in the Prosthetics and Orthotics demonstration room as a ‘facilitator’ of practical ‘teaching group’.
    - Senior lecturers can perform large group teaching as well.
  - b. *Instructors:*
    - They will perform tutorial and demonstration classes relevant to practical items.
    - Ensure and guide the students to prepare practical note books.
    - Demonstrate elaborately procedures and methods of the practical works in the demonstration room and follow students’ performance in the practical classes.
    - Supervise practical classes as a ‘Team leader’.
  - c. *Technologists:*
    - They shall perform practical in all practical classes.
    - Run practical demonstration and works for the students.
    - Perform small group demonstration relevant to practical.
    - Maintain instruments, tools, machines and other laboratory material and logistics.
    - Responsible for demonstration room set up and organisation including maintenance of registers, records and stock knowledge under guidance of the supervisors.
    - Responsible for the security and safety of the demonstration room especially in respect to fire, electric hazards and disposal of wastes.



## **Bibliography**

- Diploma in Medical Technology of Prosthetics and Orthotics course curriculum 2017
- ISPO Education Standards for Prosthetic/Orthotic Occupations
- Handbook of Research on Improving Allied Health Professions Education
- Tanzanian Training Centre for Orthopaedic Technologists, Tanzania