

Curriculum for Diploma in Medical Technology on Cardiology

The State Medical Faculty of Bangladesh

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Curriculum for Diploma in Medical Technology on Cardiology

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 National Professor Brig (Rtd) Abdul Malik, President, National Heart Foundation Hospital & Research Institute for all sorts of support. 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. My special thanks to National Professor Brig (Rtd) Abdul Malik, President, National Heart Foundation Hospital & Research Institute for all sorts of support. 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 CME & DGME 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. My special thanks to National Professor Brig (Rtd) Abdul Malik, President, National Heart Foundation Hospital & Research Institute for all sorts of support.

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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List of Content

| Contents | | Page number |
|----------------------------------------------|------------------------------------------------|-------------|
| Course Overview | | 07 |
| Course Details | | 08 |
| 1st Year | | |
| I | English | 14 |
| II | Basic Anatomy | 18 |
| III | Basic Physiology | 20 |
| IV | Basic Community Medicine & Behavioural Science | 22 |
| V | Basic computer science | 26 |
| 2nd Year | | |
| I | Physics | 31 |
| II | Chemistry | 33 |
| III | Basic Microbiology & Parasitology | 35 |
| IV | Radio-anatomy & Radio-physics | 37 |
| V | Non-invasive Cardiac Diagnostic Methods | 42 |
| 3rd Year | | |
| I | Cardiac Catheterization I | 45 |
| II | Clinical- Cardiovascular Technology I | 47 |
| III | Clinical- Cardiovascular Technology II | 50 |
| 4th Year | | |
| I | Catheterization Lab Fundamentals | 52 |
| II | Cardiac Catheterization II | 55 |
| | <i>Special Field Attachment</i> | |
| Outline of Institutional Academic Laboratory | | 57 |
| Outline of Special Laboratory Attachment | | 58 |
| Job description | | 59 |
| Bibliography | | 60 |

Course Overview

Course Aims:

To prepare the diploma 'Medical Technologists on Cardiology' with knowledge, skill and attitude to bring about behavioural changes for enabling them to perform assigned responsibilities in their individual working stations.

Course Objectives:

After successful completion of the four (04) Years Diploma course in 'Medical Technology on Cardiology' the students will be able to:

- Describe the purpose and basis of cardiac investigations and their role in the diagnosis and management of diseases.
- Describe the anatomy and physiological structural components of the human body particularly cardiovascular system.
- Explain basic concepts of behavioral sciences that are relevant to establishing good interpersonal relationship and sympathy.
- Explain basic mechanism of diseases, etiology, pathogenesis, morphological changes and co-relate between clinical findings and various cardiac investigations such as ECG, Holter Monitoring, ETT, ECHO, CAG, Ambulatory blood pressure etc.
- Execute theoretical procedure for the operation of cardiac equipments (ECG, ECHO, ETT, CATH Lab machine, FFR, IVUS, OCT) in order to activate, operate and maintain.
- Apply the proper technique and protocol for the better cardiac investigations & treatment (ECG, ETT, ECHO, Holter Monitoring, CAG, TPM, PPM, PTCA, PTA, PTMC, RDN, Device closure, Valvuloplasty, Rotablation, IVL).
- Prepare record, report and interpret result of the tests using computers and other technology.
- Select the radiation safety measures for patients, personal and environment.
- Develop attitude for continuous self-learning and self assessment throughout the whole period of training.

Course Details

A. **Course Title:** Diploma in Medical Technology on Cardiology

B. Course philosophy and rationale

- Cardio-vascular diseases are an emergent problem in our country and throughout the world. As patients with cardio-vascular diseases are increasing, to provide quality medical services a good cardiac team is essential.
- It consists of doctors, nurses, technicians, paramedics & other supporting staff. Technicians for ECG, ETT, Echo and Cath Lab are essential component of this cardiac team. They play an important role during various cardiac diagnostic & therapeutic procedures.
- With increasing cardiac patients, numbers of cardiac health care center and Cath Lab are increasing in the country but numbers of trained ECG, Echo and Cath Lab technicians are not sufficient. To meet this demand National Heart Foundation Hospital & Research Institute started cardiac technology & cardiac perfusion technology certificate course with permission of the Ministry of Health and Family Welfare, Government of Bangladesh since 2003.
- From 2015 National Heart Foundation Hospital & Research Institute started diploma in medical technology (cardiology) course in line with other diploma courses in medical technology under The State Medical Faculty of Bangladesh.
- This course finds it rationale to develop adequate number of Medical Technologists (Cardiology) to cope up with growing demand in the field of cardiology.

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 three 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.

A. 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-1st year, 2nd year, 3rd year and 4th 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.

| Year | Duration |
|----------------------|-----------|
| 1 st Year | 12 months |
| 2 nd Year | 12 months |
| 3 rd Year | 12 months |
| 4 th 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 07 years after admission in 1st year

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 Anatomy | 70 | 60 | 70 | | | | | 200 |
| | III | Basic Physiology | 75 | 60 | 65 | | | | | 200 |
| | IV | Basic Community Medicine & Behavioral Science | 150 | 50 | - | | | | | 200 |
| | V | Basic computer science | 25 | - | 75 | | | | | 100 |
| | | Total | 386 | 204 | 210 | 17 days | | 25 days | | 800 |
| | | Grand total | 800 hours | | | 42 days | | | | 800 hours |

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 | Radio-anatomy & Radio-physics | 100 | 150 | | | | | 250 | |
| | V | Non-invasive Cardiac Diagnostic Methods | 100 | 200 | | | | | 300 | |
| | | Total | 400 | 420 | 17 days | | 25 days | | 820 | |
| | | Grand total | 820 hours | | | 42 days | | | | 820 hours |

3rd 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 | Cardiac Catheterization I | 100 | 150 | 7 days | 10 days | 10 days | 15 days | 250 |
| | II | Clinical- Cardiovascular Technology I | 100 | 150 | | | | | 250 |
| | III | Clinical- Cardiovascular Technology II | 100 | 150 | | | | | 250 |
| | | Total | 300 | 450 | 17 days | | 25 days | | 750 |
| | | Grand total | 750 hours | | 42 days | | | | 750 hours |

4th Year

| Exams | Papers | Subjects | Lecture (in hours) | Institutional Academic Lab based Practical Training/ Demonstration (in hours) | Special attachment 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 | Catheterization Lab Fundamentals | 100 | 150 | 150 | 7 days | 10 days | 10 days | 15 days | 400 |
| | II | Cardiac Catheterization II | 100 | 150 | 150 | | | | | 400 |
| | | Total | 200 | 300 | 300 | 17 days | | 25 days | | 800 |
| | | Grand total | 800 hours | | | 42 days | | | | 800 hours |

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 as per log book
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.

B. Assessment Methods:

- There will be in-course/formative (card/ item) and end-course/summative (terminal) assessment for the students in each part (1st, 2nd, 3rd & 4th 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 1st, 2nd and 3rd year Final examinations respectively.

Carry on

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

C. 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

| Numerical percentage of Marks | GPA letter Grade | GPA Numerical Grade (Grade points) |
|-------------------------------|------------------|------------------------------------|
| 85% and above | A ⁺ | 4 |
| 81% to less than 85% | A | 3.75 |
| 76% to less than 80% | A ⁻ | 3.5 |
| 71% to less than 75% | B ⁺ | 3.25 |
| 66% to less than 70% | B | 3.00 |
| 61% to less than 65% | B ⁻ | 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 |
| | Total | 425 | 135 | 160 | 80 | 800 |

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 | Radio-anatomy & Radio-physics | 100 | 40 | 40 | 20 | 200 |
| V | Noninvasive Cardiac Diagnostic Methods | 100 | 40 | 40 | 20 | 200 |
| Total | | 450 | 140 | 150 | 60 | 800 |

3rd Year Examination

| Paper | Subjects | Written Exam | Oral Exam | Practical Exam | Formative exam | Total Marks |
|--------------|----------------------------------------|--------------|------------|----------------|----------------|-------------|
| I | Cardiac Catheterization I | 100 | 40 | 40 | 20 | 200 |
| II | Clinical- Cardiovascular Technology I | 100 | 40 | 40 | 20 | 200 |
| III | Clinical- Cardiovascular Technology II | 100 | 40 | 40 | 20 | 200 |
| Total | | 300 | 120 | 120 | 60 | 600 |

4th Year Examination

| Paper | Subjects | Written Exam | Oral Exam | Practical Exam | Formative exam | Total Marks |
|--------------|----------------------------------|--------------|-----------|----------------|----------------|-------------|
| I | Catheterization Lab Fundamentals | 100 | 40 | 40 | 20 | 200 |
| II | Cardiac Catheterization II | 100 | 40 | 40 | 20 | 200 |
| | <i>Special Lab Attachment</i> | | | | | |
| Total | | 200 | 80 | 80 | 40 | 400 |

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

1st 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
- develop 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 & conversions 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>Text book: English for Today-Published by N.C.T.B. (Intermediate)</p> <p>Unit- Three: Learning English.</p> <ol style="list-style-type: none"> 1. Learning a language 2. Why to learn English 3. How to learn English 4. Different learners, different ways 5. Dealing with grammar 6. Integrated skills development 7. How to use dictionary <p>Unit-Six: Our Environment.</p> <ol style="list-style-type: none"> 1. The environment and the ecosystem 2. How the environment is polluted. 3. The world is getting warmer. 4. Let's not be cruel to them. 5. Beware of pollution. 6. Forests should stay. 7. How to manage waste. <p>Unit-Twenty-four: People, People Everywhere</p> <ol style="list-style-type: none"> 1. What's the problem? 2. Kalim Majhee's boat. 3. The rootless. 4. Why is there discrimination? 5-7. The Revenge. | 16 | |

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

Course Contents of English (Part -II)**Marks = 25+25**

| Sl. No | Topics/Lessons | Teaching/learning Hours | |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-------------------|
| | | Lecture | Tutorial |
| | Communicative English : <ul style="list-style-type: none">▪ Reading skill▪ Writing skill▪ Listening skill▪ Conversations skill | 4 4 4 4 | 8 8 8 10 |
| | Total | 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
Practical - Reading, Listening & conversation & oral -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: -

- acquaint with the anatomical terminologies
- 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

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. | Introductory Anatomy : 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. | Musculoskeletal system: ▪ Component ▪ Types of bones & joints ▪ Short description of important bones | 10 | 10 | 05 |
| 3. | Cardio-vascular system. ▪ Location & Basic structure of cardiovascular system ▪ Short description of heart, major arteries, capillaries/veins | 10 | 05 | 10 |
| 4. | Respiratory system ▪ Basic structure of respiratory system ▪ Description of larynx, trachea, bronchi, bronchioles and alveoli ▪ Gross Anatomy of lung | 06 | 06 | 10 |

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

Teaching Methods:

Lecture
Tutorial
Practical/ Demonstration

Media:

Multimedia
Laptop
OHP
White board/Marker
Black board/chalk
Skeleton
Wall chart
Microscope

Assessment:

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

- demonstrate a comprehensive knowledge on functional aspects of different important components, organs and systems of human body
- apply the practical 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. | Introductory Physiology: <ul style="list-style-type: none"> • Physiological terminologies • Basic structure and organizations of human body • Cell physiology and metabolism/multiplication of living cells • General functions of different systems of the body: Musculoskeletal/Respiratory/ Circulatory/Digestive/Urinary/Nervous/ Endocrine/Immune/ Reproductive | 10 | 04 | 10 |
| 2. | Musculoskeletal system : <ul style="list-style-type: none"> ▪ Physiological components of musculoskeletal system ▪ Functions of important muscles, bones & joints of human body ▪ Movements of joints | 10 | 10 | 05 |
| 3. | Cardiovascular System: <ul style="list-style-type: none"> ▪ Functions of circulatory system ▪ Composition of blood and their functions ▪ Conductive system of heart & cardiac cycle ▪ Physiology of blood pressure | 10 | 05 | 10 |

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

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. | Introductory community medicine: <ul style="list-style-type: none"> • Definition of Community Medicine • Concept of health : Definition / Dimensions / Spectrum / Determinants / Indicators • Concept of general principles for prevention and control of communicable and Non-communicable diseases • Concept of health promotion: Definition / Interventions | 16 | 10 |
| 2. | Primary health care: <ul style="list-style-type: none"> ▪ Definition/Elements/ Principles/Scope | 05 | 02 |
| 3. | Health care services and organization: <ul style="list-style-type: none"> ▪ Primary/Secondary/Tertiary Health Care services ▪ WHO/UNDP/UNICEF/CARE/ International Red Crescent / BIRDEM / ICDDR,B | 06 | 02 |
| 4. | Basic Epidemiology: <ul style="list-style-type: none"> ▪ Definition /Aims/Methods/Scope ▪ Definition of epidemiological terms eg. Epidemic/Endemic/Pandemic/Sporadic/ Zoonotic disease/ Incubation period/ period of communicability/ Epidemiological Triad/ Infection/ Contamination/ Infestation etc. ▪ Major health programs in Bangladesh ▪ Medical Information system (MIS) | 12 | 06 |
| 5. | Basic Bio-statistics : <ul style="list-style-type: none"> ▪ Definition /Scope/Functions/Importance and uses of Biostatistics, Medical statistics, Health statistics, Vital statistics ▪ Definition of vital events ▪ Definition/types/characteristics/functions/importance/sources/collection and presentation of data ▪ Morbidity/Mortality/Fertility statistics | 17 | 04 |
| 6. | Demography and family planning. <ul style="list-style-type: none"> ▪ Demography: Definition/Focus/Process/Stages/Cycle and how to conduct census ▪ Family Planning: Definition/ Objectives/ Scope/Health aspects/Benefits ▪ Contraceptive methods: Short description /Advantages/Disadvantages/Indications/ Contraindications/ Complications | 12 | 04 |

| Sl. No | Topics/Lessons | Teaching/learning Hours | |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------|
| | | Lecture | Practical/ Demonstration |
| 7. | Maternal and Child Health Care (MCH): <ul style="list-style-type: none"> ▪ Introduction/Definition/Aims & Objectives / Components of MCH ▪ Maternal health care: Antenatal/Intra natal/Postnatal ▪ Care of the New-born/Under 5 children ▪ Indicators of MCH care: MMR, IMR etc | 10 | |
| 8. | Food and nutrition: <ul style="list-style-type: none"> ▪ Food: Definition/Functions/Classification ▪ Sources/types/functions/daily requirements and deficiency of protein, fat, carbohydrate, vitamins and minerals ▪ Definition of nutrition /Balanced Diet ▪ Malnutrition: Definition/Forms/Causes and prevention ▪ Common nutritional problems of Bangladesh: low Birth Weight/Protein Energy Malnutrition/ Nutritional Blindness/ Nutritional Anemia/ Lathyrism | 15 | 06 |
| 9. | Occupational Health : <ul style="list-style-type: none"> ▪ Occupational health : Definition /Objectives ▪ Occupational Hazards: Introduction /Types ▪ Occupational diseases: Definition/Classification/Prevention and control | 08 | 02 |
| 10. | Health education behavioral science and Ethics: <ul style="list-style-type: none"> ▪ Health Education: Definition/Importance / Objectives / Components/ Principles/Methods /Media ▪ Communication Skills: Definition/Key elements /Barriers ▪ Behavioral Science : Introduction & concept ▪ Ethics: Introduction and concept | 12 | 04 |
| 11. | Environment and sanitation: <ul style="list-style-type: none"> ▪ Definition of environment, pollution, sanitation and environmental sanitation ▪ Water: Safe wholesome water/Source of water/water pollution/Hazards of water pollution /water borne diseases/Hardness of water/ Purification of water ▪ Air : Definition/Composition ▪ Air pollution : Sources, pollutants, indicators, health & other effects, prevention & control ▪ Ventilation: Definition/Standards/ Types/ Criteria of good ventilation / effects of good ventilation ▪ Solid waste: Definition/Types/Sources/Health hazards ▪ Disposal of solid waste: Dumping/Controlled tipping or sanitary land fill/ incineration/ composting/Manure pits/Burial ▪ Excreta or night soil: Public health importance/Health hazards/how disease occurs from it/Sanitation Barrier/ Methods of excreta disposal (Unsewered area/Sewered area) | 25 | 04 |

| | | | |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| 12. | First Aid : <ul style="list-style-type: none"> ▪ Definition / Principles of First Aid ▪ First Aid Box-List of contents and their uses ▪ First Aid of : Cuts, bleeding, burn, shock, dog bite, snake bite | 12 | 06 |
| | Total | 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/SOE-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: -

- acquaint with the modern computer technology
- start, shutdown and restore the windows
- open, close & edit the file
- develop skills in 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>Detailed Contents :</p> <p>Relevant Instruction for Practical :</p> <ul style="list-style-type: none"> ▪ Information Technology -its concept and scope ▪ Computers for information storage, information seeking, information processing and information transmission ▪ Elements of computer system - computer hardware and software: data -numeric data, numeric data; contents of program, processing ▪ Computer organization, block diagram of a computer, CPU, memory ▪ Input devices; keyboard, mouse etc.; output devices; VDU and Printer, scanner, Plotter ▪ Electrical requirements, inter-connections between units, connectors and cables ▪ Secondary storage; magnetic disks-tracks and sectors, optical disk (CD and DVD Memory), primary and secondary memory: RAM, ROM, PROM etc. ▪ Capacity; device controllers, serial port, parallel port system bus 47 ▪ Exercises on file opening and closing; memory management; device management; device management and input-output (I/O) management with respect of windows ▪ Installation concept and precautions to be observed while installing the system and software ▪ Introduction about Operating systems such as and Windows ▪ Special features, various commands of MS word and MS- Excel, Power -point ▪ About the internet-server types, connectivity (TCOP/IP, shell); applications of internet like: e-mail and browsing ▪ Various Browsers like WWW (World wide web); hyperlinks; HTTP (Hyper Text Transfer Protocol); FTP (File Transfer Protocol) ▪ Basic of Networking -LAN, WAN, Topologies | 25 | |
| | <ul style="list-style-type: none"> ▪ Give a PC, name its various components and list their functions ▪ Identification of various parts of a computer and peripherals ▪ Practice in installing a computer system by giving connection and loading the system software and application software ▪ Installation of DOS and simple exercises on TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP commands ▪ Exercises on entering text and data (Typing Practice) ▪ Installation of Windows 98 or 2000 etc. ▪ Features of windows as an operating system ▪ Start ▪ Shutdown and restore ▪ Creating and operating on the icons ▪ Opening, closing and sizing the windows ▪ Using elementary job commands like-creating, saving, modifying, finding and deleting a file ▪ Creating and operating on a folder ▪ Changing setting like, date, time color (back ground and fore ground) ▪ Using short cuts ▪ Using on line help | | |

| Sl. No | Topics/Lessons | Teaching/learning Hours | |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------|
| | | Lecture | Tutorial/ Practical |
| | <ul style="list-style-type: none"> ▪ MS-WORD ▪ 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 ▪ Page set up : Setting margins, tab setting, ruler, indenting ▪ Editing a document : Entering text, Cut, copy, paste using tool-bars ▪ 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 ▪ Aligning of text in document, justification of document, Inserting bullets and numbering : ▪ Formatting paragraph, inserting page breaks and column breaks ▪ Use of headers, footers: Inserting footnote, end note, use of comments ▪ Inserting date, time, special symbols, importing graphic images, drawing tolls ▪ 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 ▪ Print preview, zoom, page set up, printing options ▪ Using Find, Replace options ▪ Using Tools like: Spell checker, help, use of macros, mail merge, word content and statistics, printing envelops ▪ Using shapes and drawing toolbar ▪ Working with more than one window in MS Word, ▪ How to change the version of the document from one window OS to another ▪ Conversion between different text editors, software and MS word | | 30 |

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

Teaching Methods:

Lecture
Practical

Media:

Computer
Multi media
Computer lab.
Internet connection
White board
Marker

Assessment:

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

2nd 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 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। | বলবিদ্যা ও পদার্থের ধর্মঃ ➤ 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। | তাপঃ তাপমিতি, তাপের একক, আপেক্ষিক তাপ, তাপীয় ক্ষমতা পানিসম ও সুপ্ততাপ এবং ইহাদের নির্ণয় পদ্ধতিঃ সরলীয় পদ্ধতিতে তাপের পরিবাহিতা নির্ণয়। | ৫ ঘন্টা | |
| ৩। | শব্দঃ ➤ 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। | চুম্বক : <ul style="list-style-type: none"> চুম্বকের বিভিন্ন পদ্ধতিঃ চুম্বকের মতবাদ, চুম্বকের ক্ষেত্র ও প্রবাল্য। বিপরীত বর্গীয় সূত্র প্রাপ্তমুখী ও প্রস্থমুখী অবস্থানে চুম্বকের প্রাবল্য। বিক্ষেপী চুম্বকমান যন্ত্র ও ইহার ব্যবহার। ভূচুম্বকত্ব। | ৪ ঘন্টা | |
| ৬। | তড়িৎ : <ul style="list-style-type: none"> 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, স্ক্রুজ 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 দৈর্ঘ্যের 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 |
| | মোট : ৭০ ঘন্টা | ৪০ | ৩০ |

মান বন্টন : তৃতীয় = 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

মোট : তৃতীয়+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। | ৪ ঘন্টা | |
| ১১। | রাসায়নিক সংযোগ বিধিঃ ক) ভরের নিত্যতা সূত্র। খ) নির্দিষ্ট অনুপাত সূত্র। গ) শূন্যানুপাত বিধি। ঘ) বিপরীত অনুপাত সূত্র। ঙ) গ্যাস আয়তন সূত্র। | 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। | সম্পূর্ণ ও অসম্পূর্ণ 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। | | |
| | মোটঃ ১০০ ঘন্টা | ৮০ ঘন্টা | ২০ ঘন্টা |

মান বন্টনঃ 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 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
- mention knowledge about PPE
- 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. | Introduction to microorganisms: <ul style="list-style-type: none"> ▪ Definition and classification of microorganisms ▪ Microbiological terminology ▪ Characteristics of Eukaryotic prokaryotic & sub cellular groups of microorganisms ▪ Microbiological articles, equipment's apparatus ▪ Microscope: Different parts of microscope, & maintenance of microscope | 08 | 03 |
| 2. | Destruction of microorganism: <ul style="list-style-type: none"> ▪ Cleaning, Washing, decontamination disinfection & procedures ▪ Sterilization of different laboratory articles, instruments, glass wares etc. | 07 | 03 |

| | | | |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|
| 3. | Bacteria: <ul style="list-style-type: none"> ▪ Anatomy of Bacteria, chemical composition of different structures of bacteria ▪ Bacterial Spore: Definition & function spores, Spores bearing bacteria of medical importance ▪ Bacterial toxin: Definition & types of bacterial toxin, characteristics of endotoxin & exotoxin, Toxin producing organism of medical importance, use of bacterial toxins in diseases prevention ▪ Biology of bacteria: Growth & multiplication of bacteria, bacteria growth curve, bacteria growth requirements. Definition & classification of culture media ▪ Classifying bacteria in terms of morphology, staining, spore, flagella, capsule & Pathogenicity. ▪ Staining bacteria: Gram's staining, AFB staining, Albert staining | 15 | 04 |
| | Virus: <ul style="list-style-type: none"> ▪ General characters of virus ▪ Morphology & classification of virus ▪ List of viruses of medical importance & diseases produced by them | 10 | 01 |
| | Fungus: <ul style="list-style-type: none"> ▪ General character, Morphology and classification of fungus ▪ List of fungus list medical important and the diseases produced by them | 10 | 02 |
| | Parasite: <ul style="list-style-type: none"> ▪ Definition /Classification of parasite | 03 | 01 |
| | Helminth: <ul style="list-style-type: none"> ▪ General characteristics of helminths ▪ Classification /Morphology of helminths | 08 | 02 |
| | Protozoa: <ul style="list-style-type: none"> ▪ General characteristics of protozoa ▪ Definition /Classification of protozoa | 10 | 02 |
| | PPE: <i>Personal protective equipment (PPE)</i> for different healthcare activities | 04 | 01 |
| | Immunity: Basic Concept of immunity and immunization Schedule. | 05 | 01 |
| | Total | 80 | 20 |

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/SOE-40 marks, Formative-20 marks

Paper IV: Subject- Radio-anatomy & Radio-physics

Total hours: 250 hours
Lecture : 100 hours
Practical : 150 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 different systems of human body
- identify different organs of human body
- described the relation of bones, joints and viscera with neighboring structures
- apply above anatomical knowledge in the activities related to the field of radiological technology and imaging
- describe different components of general Physics and Electronic Physics
- apply the knowledge of Electromagnetic Physics in the field of radiology & imaging
- describe biological effects of ionizing radiation
- take safety measure for patients, environment and also personal from ionized radiation
- apply the knowledge of radiation safety in the field of radiology and imaging
- describe the construction and working principles of radiological instruments
- enumerate the function of different parts of various types of radiological equipments
- maintain radiological equipments in the radiology and imaging technology field

List of Competencies:

Ability to -

- apply radio-anatomical knowledge in the activities related to the field of radiological technology and imaging
- apply the knowledge of Electromagnetic Physics in the field of radiology & imaging
- take safety measure for patients, environment and also personal from ionized radiation
- apply the knowledge of radiation safety in the field of radiology and imaging
- enumerate the function of different parts of various types of radiological equipments
- maintain radiological equipments in the radiology and imaging technology field

Course Contents of Radio-anatomy

| Sl. No | Topics/Lessons | Teaching/learning Hours | |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|---------------------------------------------|
| | | Lecture | Practical/ Demonstration/ Field visit |
| 1 | Anatomical terms: <ul style="list-style-type: none"> □ Human body planes: Median plane, coronal plane, saggital plane, para median plane. □ Anatomical position: Anterior, posterior, superficial ventral, cranial, caudal, proximal, distal, medial, lateral, supine, prone, oblique, horizontal and transverse anatomical position. | 03 | P-02 |
| 2 | Surface Anatomy- Surface markings of: <ul style="list-style-type: none"> □ Trachea □ Esophagus □ Lung □ Mediastinum □ Heart □ Diaphragm □ Aorta □ Thorax □ Ribs □ Spine □ Kidney | 04 | P-05 |
| 3 | Skeletal and Loco motor system: <ul style="list-style-type: none"> □ Bone-Definition □ Short description of the bones of superior and inferior extremity □ Thorax □ Vertebra | 04 | P-05 |
| 4 | Respiratory system: Definition, name of the different parts and short description of different parts of respiratory system | 04 | P-05 |
| 5 | Cardiovascular system: <ul style="list-style-type: none"> □ Definition, name of the different parts and short description of different parts of respiratory system | 04 | P-05 |
| 6. | Urinary system: Definition, name of the different parts and short description of different parts of respiratory system | 04 | P-05 |

Course Contents of Radio-physics –

| Sl. No | Topics/Lessons | Teaching/learning Hours | |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------------------------------------------|
| | | Lecture | Practical/ Demonstration/ Field visit (each 02 hours) |
| 1 | The physical concepts of Matter and Energy: <ul style="list-style-type: none"> □ Atomic structure □ Atomic number □ Mass number □ Energy, types of energy □ Laws of conservation of energy | 03 | P-02 |

| | | | |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|------|
| 2 | Electromagnetism: <ul style="list-style-type: none"> <input type="checkbox"/> Definition <input type="checkbox"/> Electromagnetic phenomena <input type="checkbox"/> Electromagnet <input type="checkbox"/> Electromagnetic induction <input type="checkbox"/> Self induction <input type="checkbox"/> Electromagnetism and useful of electromagnet. | 03 | P-02 |
| 3 | Production and control of high voltage regulation of current: <ul style="list-style-type: none"> <input type="checkbox"/> Transformer <input type="checkbox"/> Principle and construction of transformer <input type="checkbox"/> Regulation of high voltage <input type="checkbox"/> Types of transformer <input type="checkbox"/> Control of filament current and tube current <input type="checkbox"/> Control of high frequency <input type="checkbox"/> Methods of rectifying current. | 03 | P-02 |
| 4 | Electric generator and motors: <ul style="list-style-type: none"> <input type="checkbox"/> Types of electric generator and motors <input type="checkbox"/> Principles of electric generator and motors <input type="checkbox"/> Components and function of electric generator and motors <input type="checkbox"/> Construction of transformer | 03 | P-02 |
| 5 | Introduction and production of X-rays: <ul style="list-style-type: none"> <input type="checkbox"/> Definition of X-rays <input type="checkbox"/> Discovery of X-ray <input type="checkbox"/> Nature of X-ray <input type="checkbox"/> Sources of X-ray <input type="checkbox"/> Condition necessary for the production of X-ray <input type="checkbox"/> Hard and soft X-rays <input type="checkbox"/> Properties of X-ray | 04 | P-06 |
| 6 | Physical characteristics of X-ray: <ul style="list-style-type: none"> <input type="checkbox"/> X-ray exposure <input type="checkbox"/> Quality and quantity of X-rays <input type="checkbox"/> Controlling of X-ray exposure | 02 | P-02 |
| 7 | Radiation and radioactivity: <ul style="list-style-type: none"> <input type="checkbox"/> Introduction <input type="checkbox"/> Types of radiation <input type="checkbox"/> Ionizing radiation <input type="checkbox"/> Detection of ionizing radiation <input type="checkbox"/> Unstable atoms <input type="checkbox"/> Radio-active series <input type="checkbox"/> Radium, radium series <input type="checkbox"/> Radio-active decay <input type="checkbox"/> Half life <input type="checkbox"/> Whole life <input type="checkbox"/> Average life | 04 | P-02 |
| 8 | Cellular biology: <ul style="list-style-type: none"> <input type="checkbox"/> DNA <input type="checkbox"/> RNA <input type="checkbox"/> Gens <input type="checkbox"/> Chromosomes <input type="checkbox"/> Germ cell <input type="checkbox"/> Gonads <input type="checkbox"/> Zygote <input type="checkbox"/> Normal cell morphology | 02 | P-02 |

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|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|--------------|
| 9 | Biological effects of ionizing radiation: <ul style="list-style-type: none"> <input type="checkbox"/> Deterministic effect <input type="checkbox"/> Stochastic effect <input type="checkbox"/> Acute effect <input type="checkbox"/> Late effect <input type="checkbox"/> Somatic effect <input type="checkbox"/> Genetic effect <input type="checkbox"/> Dose and effect relationship <input type="checkbox"/> Mechanism of tissue damage | 05 | P-04 |
| 10 | Radiation protection and radiation doses: <ul style="list-style-type: none"> <input type="checkbox"/> Background radiation <input type="checkbox"/> Dose equivalent limits <input type="checkbox"/> Occupation limits <input type="checkbox"/> General public limits <input type="checkbox"/> Patients limits <input type="checkbox"/> Pregnant women's limits <input type="checkbox"/> ALARA concept for the protection of radiation in diagnostic radiology <input type="checkbox"/> Personal protection <input type="checkbox"/> Patient protection <input type="checkbox"/> Environmental protection <input type="checkbox"/> General principles of radiation protection in fluoroscopic radiography | 04 | P-10 |
| 11 | Radiation measuring devices and dosimeter: <ul style="list-style-type: none"> <input type="checkbox"/> Half life <input type="checkbox"/> Whole life <input type="checkbox"/> Average life <input type="checkbox"/> HPD & MPD <input type="checkbox"/> RAD, REM, Millicievert, Gray, Roentgen and relation among different units <input type="checkbox"/> Dosimeter, TLD and film badge | 04 | P-05 |
| 12 | NSRC Acts and rules of Bangladesh: <ul style="list-style-type: none"> <input type="checkbox"/> NSRC Act and NSRC rules of Bangladesh and its effectiveness for the control of radiation in the diagnostic radiology of Bangladesh | 02 | F-02 |
| 13 | Radiation protection surveys in Bangladesh: <ul style="list-style-type: none"> <input type="checkbox"/> Present status of radiation control in the diagnostic field and future plan <input type="checkbox"/> Activities of AECB and IAEA for the radiation safety, role of RCO in the radio-diagnostic department | 02 | F-02 |
| 14 | Electric devices: <ul style="list-style-type: none"> <input type="checkbox"/> Construction, function and working principles of voltage stabilizer <input type="checkbox"/> Construction, function and working principles of IPS <input type="checkbox"/> Construction, function and working principles of UPS <input type="checkbox"/> Construction, function and working principles of rectifier | 04 | P-02 |
| 15 | General X-Ray equipments: <ul style="list-style-type: none"> <input type="checkbox"/> Generations of X-Ray <input type="checkbox"/> X-Ray tube and its constructions <input type="checkbox"/> Types of X-Ray tube <input type="checkbox"/> Types of different X-Ray machine <input type="checkbox"/> Grid-its type, construction and function <input type="checkbox"/> Collimator-construction of collimator and function of collimator <input type="checkbox"/> Filter-construction and function of filter <input type="checkbox"/> X-Ray control panel and its components <input type="checkbox"/> Rectification of X-Ray | 12 | P-11 F-50 |

| | | | |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------|
| 16 | Ultrasound Equipments: <input type="checkbox"/> Types Components and construction of ultrasound machine <input type="checkbox"/> Working principles of ultrasound machine <input type="checkbox"/> Function of different components | 02 | P-02 |
| 17 | Fluoroscopy equipments: <input type="checkbox"/> Types of fluoroscopy screen <input type="checkbox"/> Construction and function of fluoroscopic screen | 02 | P-02 |
| 18 | CT scanning equipments: <input type="checkbox"/> Introduction of CT scan machine <input type="checkbox"/> Construction of CT scan machine <input type="checkbox"/> Types of CT scan machine <input type="checkbox"/> Different between manual and computed tomography machine <input type="checkbox"/> Detector types of detector and function of detector <input type="checkbox"/> Construction and mechanism of CR console | 04 | P-03 F-03 |
| 19 | MRI equipments: <input type="checkbox"/> Introduction <input type="checkbox"/> Typical structure of MRI unit <input type="checkbox"/> Construction of MRI machine <input type="checkbox"/> Types of MRI machine <input type="checkbox"/> Components of MRI machine <input type="checkbox"/> Principles of MRI | 04 | P-02 |
| 20 | Angiogram Equipments: <input type="checkbox"/> Construction <input type="checkbox"/> Components <input type="checkbox"/> Working principles and function of angiogram equipments | 02 | P-02 |
| 21 | Organization of X-ray unit: <input type="checkbox"/> Planning and designing construction of X-ray unit <input type="checkbox"/> Building essential and radiation protection of X-ray unit <input type="checkbox"/> Equipments setup and positioning | 04 | P-02 |
| 22 | PACS, System: <input type="checkbox"/> Components <input type="checkbox"/> Construction and function of PACS system | 02 | P-01 |
| | Total = | 100 | 150 |

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 types X-Ray, Imaging equipments and accessories, X-ray machine, Fluoroscopic machine, pressure injector for the administration of contrast study)
- Hospital/Health complex

Assessment:

Written – SAQ= 80 marks, MCQ=20 marks

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

Paper V: Subject – Non-invasive Cardiac Diagnostic Methods

Total hours: 300 hours
Lecture: 100 hours
Practical: 200 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 –

- prepare patient for ECG, Holter monitoring & Ambulatory BP monitoring
- perform ECG recording
- prepare patient for ETT
- explain the indications, contraindications of ETT
- perform ETT
- prepare patient for ECHO
- explain the necessity of various types of echocardiographic modalities & its importance

List of Competencies:

Ability to -

- prepare patient for ECG, ETT, ECHO, Holter monitoring & Ambulatory BP monitoring
- perform ECG recording
- perform ETT
- explain the necessity of various types of echocardiographic modalities & its importance

Course Contents of Non-invasive Cardiac Diagnostic Methods

| Sl. No | Topics/Lessons | Teaching/learning Hours | |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------|
| | | Lecture | Practical / Demonstration / Field visit |
| 1 | Introduction to non-invasive cardiac diagnostic methods: <ul style="list-style-type: none"> <input type="checkbox"/> ECG <input type="checkbox"/> ECG monitoring <input type="checkbox"/> Holter monitoring <input type="checkbox"/> Ambulatory blood pressure monitoring <input type="checkbox"/> ETT <input type="checkbox"/> Echocardiography | 06 | - |

| | | | |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|-----|
| 2 | <p>ECG-basics:</p> <ul style="list-style-type: none"> ❑ Basic terminology of ECG ❑ Pathways of conduction and the electrocardiogram ❑ Patient's history, document and record keeping <p>ECG recording:</p> <ul style="list-style-type: none"> ❑ Electrodes ❑ Leads ❑ Paper, paper speed ❑ Patient preparation- leads placement <p>Normal ECG:</p> <ul style="list-style-type: none"> ❑ P wave ❑ PR interval ❑ QRS complex ❑ Pathological Q waves ❑ T wave ❑ QT interval ❑ ST segment ❑ U wave <p>ECG abnormalities:</p> <ul style="list-style-type: none"> ❑ Left ventricular hypertrophy ❑ Right ventricular hypertrophy ❑ Left bundle branch block ❑ Right bundle branch block ❑ Heart block ❑ Arrhythmias – Ectopics, SVT, AF, VT, VF ❑ ECG changes in chronic coronary syndrome ❑ ECG changes in acute coronary syndrome | 25 | 50 |
| 3 | <p>ECG monitoring</p> <ul style="list-style-type: none"> ❑ ECG monitor ❑ Basics of ECG monitoring ❑ Indications ❑ ECG abnormalities | 07 | 15 |
| 4 | <p>Holter monitoring:</p> <ul style="list-style-type: none"> ❑ Basics of Holter monitoring ❑ Indications ❑ Patient preparation | 06 | 10 |
| 5 | <p>Ambulatory blood pressure monitoring:</p> <ul style="list-style-type: none"> ❑ Basics of Ambulatory BP monitoring ❑ Indications ❑ Patient preparation | 06 | 10 |
| 6 | <p>ETT:</p> <ul style="list-style-type: none"> ❑ Basic terminology of ETT ❑ Indications, contraindications of ETT ❑ Patient preparation ❑ ECG leads and lead systems ❑ Patient's history, document and record keeping ❑ Exercise protocols ❑ Procedure ❑ Indications to terminate test ❑ Target heart rate ❑ METs ❑ Patient safety ❑ Complications during ETT & its management | 25 | 100 |

| | | | |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| 7 | <i>Echocardiography:</i> <input type="checkbox"/> Basic terminology of echocardiography <input type="checkbox"/> Types of scan: B-mode, M-mode, Two-Dimensional ('Real Time') <input type="checkbox"/> Indications of various types of echocardiographic modalities <input type="checkbox"/> Patient preparation <input type="checkbox"/> Patient's history, document and record keeping <input type="checkbox"/> Color-Doppler echocardiography <input type="checkbox"/> Transoesophageal Echocardiography <input type="checkbox"/> Stress Echocardiography | 25 | 15 |
| | Total= | 100 | 200 |

Teaching Methods:

- Lecture
- Tutorial
- Practical/ Demonstration
- Field visit

Teaching Learning Media:

- Multimedia and laptop
- OHP and transparencies
- White board and markers
- Blackboards and chalk
- Online and computer based teaching learning materials
- Laboratory: (Surface ECG leads, ECG machine, ETT machine, Echo probe, Echo machine, oxygen cylinder, TEE probe, infusion pump, defibrillator, Holter monitoring machine, ECG monitor & ambulatory BP monitoring machine, Computer)
- Hospital/ Health complex

Assessment:

Written – SAQ= 80 marks, MCQ=20 marks

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

3rd Year
Paper I: Subject– Cardiac Catheterization I

Total hours : 250 hours
Lecture : 100 hours
Practical : 150 hours

Total marks : 200
Written : 100
Oral & Practical : 40+40
Formative : 20

Objectives:

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

- communicate the patient preparation
- apply the proper technique and exposure factor for all cardiac investigations
- describe the patient preparation, positioning technique, indication and contraindication of various procedures
- take coronary angiographic views, views during various cardiac procedures

List of Competencies:

Ability to -

- apply the proper technique and exposure factor for all cardiac investigations
- describe the patient preparation, positioning technique, indication and contraindication of various procedures
- take coronary angiographic views, views during various cardiac procedures
- prepare CAG and cath reports under supervision of interventional cardiologist

Course Contents of Cardiac Catheterization I

| Sl. No | Topics/Lessons | Teaching/learning Hours | |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------|
| | | Lecture | Practical / Demonstration / Field visit |
| 1 | <p>Introduction to catheterization laboratory:</p> <ul style="list-style-type: none"> ❑ Departmental organization planning and technical procedure ❑ Equipments used in Cath Lab ❑ Equipment safety ❑ Instruments used in emergency cardiac procedure ❑ Local anesthesia for femoral, radial/ulnar and distal radial approach ❑ Vascular access sheath ❑ Manifold ❑ Short guide wire ❑ Long guide wire – Types, size ❑ Left sided diagnostic catheter- Types, size, indication ❑ Right sided diagnostic catheter- Types, size, indication ❑ Patient preparation ❑ Patient position ❑ Coronary angiographic views, interpretation ❑ Ventriculography- views, contrast doses ❑ Pressure hemodynamics ❑ Cardiac cath. | 97 | 140 |

| | | | |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| 7. | CT angiogram: <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Complications <input type="checkbox"/> Advantages <input type="checkbox"/> Disadvantages | 03 | 10 |
| | Total = | 100 | 150 |

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: (Fluoroscopic machine, Image obtaining technique, pressure injector for the administration of contrast study, pulse oximetry, defibrillator, ET tube, Umbo bag, laryngoscope, blood oximetry)
- Cath lab, Hospital

Assessment:

Written – SAQ= 80 marks, MCQ=20 marks

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

Paper II: Subject - Clinical- Cardiovascular Technology I

Total hours: 250 hours
Lecture : 100 hours
Practical: 150 hours

Total marks : 200
Written: 100
Oral & Practical : 80
Formative: 20

Objectives:

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

- take care of patients in an emergency management of cardiology and imaging hazards
- communicate with patients and patient's attendant
- acquire knowledge regarding various congenital heart diseases as medical technologist

List of Competencies:

Ability to -

- perform DC shock, CPR
- maintain personal and patient's hygiene
- prepare tools for TPM and pericardiocentesis
- acquire knowledge regarding various congenital heart diseases as medical technologist

Course Contents of Clinical- Cardiovascular Technology I

| Sl. No | Topics/Lessons | Teaching/learning Hours | |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------|
| | | Lecture | Practical / Demonstration / Field visit |
| 1. | General hygiene: <input type="checkbox"/> Definition <input type="checkbox"/> Methods and maintain of personal hygiene and patients hygiene | 03 | 04 |
| 2. | Care of patients-care of the: <input type="checkbox"/> Anaesthetized patient and management <input type="checkbox"/> Ventilated patient and management <input type="checkbox"/> Cardiac arrest patient and management | 03 | 04 |
| 3. | Transportation of patients: <input type="checkbox"/> Transportation rules and procedure of cardiac patient in Cath Lab | 03 | 04 |
| 4. | Sterilization: <input type="checkbox"/> Definition <input type="checkbox"/> Types <input type="checkbox"/> Methods of sterilization | 03 | 04 |
| 5. | Instrumentation: <input type="checkbox"/> Name <input type="checkbox"/> Storage <input type="checkbox"/> Care <input type="checkbox"/> Use <input type="checkbox"/> Maintenance record collection | 03 | 04 |
| 6. | Patient's privacy and secrecy maintain: <input type="checkbox"/> Patient's privacy <input type="checkbox"/> Patient's secrecy | 03 | 04 |

| | | | |
|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| 7. | Patient preparation: Preparation for- <input type="checkbox"/> TPM <input type="checkbox"/> PPM <input type="checkbox"/> CAG <input type="checkbox"/> PTA <input type="checkbox"/> PTCA <input type="checkbox"/> Cardiac cath <input type="checkbox"/> PTMC | 3 | 10 |
| 8. | Drug and oxygen administration: <input type="checkbox"/> Name of the drugs used in Cath Lab, side effect, adverse reaction and management methods | 10 | 20 |
| 9 | Contrast media: <input type="checkbox"/> Classification <input type="checkbox"/> Adverse reactions <input type="checkbox"/> Selection of contrast media | 03 | 04 |
| 10 | First aid and resuscitation procedure (CPR): <input type="checkbox"/> Cardiac arrest <input type="checkbox"/> BLS <input type="checkbox"/> ALS <input type="checkbox"/> Drugs used during cardiac arrest | 06 | 10 |
| 11 | Catheterization and intubations: <input type="checkbox"/> Technique <input type="checkbox"/> Procedure and care | 03 | 04 |
| 12 | Nursing procedure of imaging patients: <input type="checkbox"/> Nursing procedure <input type="checkbox"/> Technique <input type="checkbox"/> Care and rules | 03 | 04 |
| 13 | Patient's management protocol: <input type="checkbox"/> Management of post procedural patients <input type="checkbox"/> Management of procedural complications | 03 | 04 |
| 14 | Emergency cardiac procedures: <input type="checkbox"/> TPM <input type="checkbox"/> Pericardiocentesis | 10 | 20 |
| 15 | Acyanotic congenital heart diseases: <input type="checkbox"/> Atrial septal defect <input type="checkbox"/> Ventricular septal defect <input type="checkbox"/> Patent ductus arteriosus <input type="checkbox"/> Coarctation of aorta | 23 | 25 |
| 16 | Cyanotic congenital heart diseases: <input type="checkbox"/> Tetralogy of Fallot <input type="checkbox"/> Transposition of great arteries <input type="checkbox"/> Truncus arteriosus <input type="checkbox"/> TAPVD <input type="checkbox"/> PAPVD <input type="checkbox"/> PLSVC | 18 | 25 |
| Total= | | 100 | 150 |

Teaching Methods:

- Lecture
- Tutorial
- Practical/ Demonstration
- Field visit

Teaching Learning Media:

- Multimedia and laptop
- OHP and transparencies

- White board and markers
- Blackboards and chalk
- Online and computer based teaching learning materials
- Laboratory: (Patients, ECG machine, ECG monitor, TPM generator, TPM lead, Defibrillator, Laryngoscope, ET tube, Umbo bag, pulse oximetry, Fluoroscopic machine)
- Cath lab, Hospital

Assessment:

Written – SAQ= 80 marks, MCQ=20 marks

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

Paper III: Subject – Clinical- Cardiovascular Technology II

Total hours: 250 hours

Lecture: 100 hours

Practical: 150 hours

Total marks: 200

Written : 100

Oral & Practical : 40+40

Formative: 20

Objectives:

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

- describe various cardiac diseases & its management as medical technologist
- take care of patients in an emergency management of cardiology and imaging hazards
- acquire knowledge regarding prevention of acquired cardiac diseases

List of Competencies:

- take care of patients in an emergency management of cardiology
- acquire knowledge regarding various cardiac diseases & its management as medical technologist

Course Contents of Clinical- Cardiovascular Technology II

| Sl. No | Topics/Lessons | Teaching/learning Hours | |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------|
| | | Lecture | Practical / Demonstration / Field visit |
| 1 | <i>Coronary artery disease (CAD):</i> <input type="checkbox"/> Risk factors <input type="checkbox"/> Emerging risk factors <input type="checkbox"/> Patho-physiology <input type="checkbox"/> Chronic coronary syndrome <input type="checkbox"/> Acute coronary syndrome <input type="checkbox"/> Diagnosis & management <input type="checkbox"/> Prevention of CAD | 40 | 80 |
| 2 | <i>Arrhythmias:</i> <input type="checkbox"/> Brady-arrhythmias <input type="checkbox"/> Tachy-arrhythmias <input type="checkbox"/> Diagnosis <input type="checkbox"/> Management | 10 | 30 |
| 3 | <i>Heart failure:</i> <input type="checkbox"/> Acute heart failure <input type="checkbox"/> Chronic heart failure <input type="checkbox"/> Diagnosis <input type="checkbox"/> Management | 10 | 20 |
| 4 | <i>Cardiomyopathies:</i> <input type="checkbox"/> Dilated cardiomyopathy <input type="checkbox"/> Hypertrophic cardiomyopathy <input type="checkbox"/> Restrictive cardiomyopathy | 05 | 05 |

| | | | |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| 5 | <i>Peripheral vascular disease:</i> <input type="checkbox"/> Clinical features <input type="checkbox"/> Diagnosis <input type="checkbox"/> Management | 05 | 05 |
| 6 | <i>Acute rheumatic fever:</i> <input type="checkbox"/> Etio-pathogenesis <input type="checkbox"/> Clinical features <input type="checkbox"/> Diagnosis <input type="checkbox"/> Management | 05 | - |
| 7 | <i>Valvular heart disease:</i> <input type="checkbox"/> Mitral stenosis <input type="checkbox"/> Mitral regurgitation <input type="checkbox"/> Aortic stenosis <input type="checkbox"/> Aortic regurgitation <input type="checkbox"/> Pulmonary stenosis | 05 | 10 |
| 8 | <i>Infective Endocarditis:</i> <input type="checkbox"/> Etio-pathogenesis <input type="checkbox"/> Clinical features <input type="checkbox"/> Diagnosis <input type="checkbox"/> Management | 05 | - |
| 9 | <i>Pericardial disease:</i> <input type="checkbox"/> Acute pericarditis <input type="checkbox"/> Pericardial effusion <input type="checkbox"/> Pericardial tamponade | 05 | - |
| 10 | <i>Pregnancy and heart disease</i> | 03 | - |
| 11 | <i>Pulmonary hypertension</i> | 03 | - |
| 12 | <i>Sudden cardiac death</i> | 02 | - |
| 13 | <i>COVID-19 & cardiovascular disease</i> | 02 | - |
| | Total= | 100 | 150 |

Teaching Methods:

- Lecture
- Tutorial
- Practical/ Demonstration
- Field visit

Teaching Learning Media:

- Multimedia and laptop
- OHP and transparencies
- White board and markers
- Blackboards and chalk
- Online and computer based teaching learning materials
- Laboratory: (Patients, ECG machine, Echo machine, CCU, defibrillator, laryngoscope, ET tube, Umbo bag, laryngoscope, oxygen cylinder, pulse oximetry)
- Hospital/Health complex

Assessment:

Written – SAQ= 80 marks, MCQ=20 marks

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

4th Year

Paper I: Subject - Catheterization Lab Fundamentals

Total hours : 250 hours

Lecture : 100 hours

Practical : 150 hours

Total marks : 200

Written : 100

Oral & Practical : 80

Formative : 20

Objectives:

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

- describe advanced cardiac investigations as medical technologist
- prepare patient for various advanced cardiac procedures
- apply positioning technique
- apply the proper technique of radiological imaging

List of Competencies:

Ability to -

- prepare instruments for advanced cardiac procedures (IVUS, FFR, OCT, IVL, Rotablation)
- apply the proper technique of cardiac imaging
- prepare tools for FFR, IVUS, OCT, IVL, Rotablation, EP study

Course Contents of Catheterization Lab Fundamentals

| Sl. No | Topics/Lessons | Teaching/learning Hours | |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------|
| | | Lecture | Practical / Demonstration / Field visit |
| 1 | <i>Electro-Physiological Study:</i> <ul style="list-style-type: none"><input type="checkbox"/> Indications<input type="checkbox"/> Contraindications<input type="checkbox"/> Procedure<input type="checkbox"/> Instruments<input type="checkbox"/> Complications | 05 | 08 |
| 2. | <i>Radiofrequency ablation:</i> <ul style="list-style-type: none"><input type="checkbox"/> Indications<input type="checkbox"/> Contraindications<input type="checkbox"/> Procedure<input type="checkbox"/> Instruments<input type="checkbox"/> Complications | 05 | 07 |

| | | | |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| 3. | <i>Permanent pacemaker:</i> <input type="checkbox"/> Types <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications <input type="checkbox"/> Subclavian puncture | 20 | 30 |
| 4. | <i>CRT:</i> <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications | 10 | 15 |
| 5. | <i>ICD:</i> <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications | 10 | 15 |
| 6. | <i>IABP:</i> <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications <input type="checkbox"/> Weaning of the patient <input type="checkbox"/> Size of balloon. | 10 | 15 |
| 7 | <i>IVUS:</i> <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications <input type="checkbox"/> Advantages | 10 | 15 |
| 8 | <i>FFR:</i> <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications <input type="checkbox"/> Advantages | 10 | 15 |
| 9 | <i>OCT:</i> <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications <input type="checkbox"/> Advantages | 10 | 15 |
| 10 | <i>Rotablation:</i> <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications <input type="checkbox"/> Advantages | 05 | 08 |

| | | | |
|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|
| 11 | <i>IVL:</i> <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Mechanism <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications <input type="checkbox"/> Advantages | 02 | 05 |
| 12 | <i>Mechanical circulatory support</i> | 03 | 03 |
| | Total = | 100 | 150 |

Teaching Methods:

- Lecture
- Tutorial
- Practical/ Demonstration
- Field visit

Teaching Learning Media:

- Multimedia and laptop
- OHP and transparencies
- White board and markers
- Blackboards and chalk
- Online and computer based teaching learning materials
- Laboratory: (TPM generator, TPM lead, EP lab, EP catheters, FFR console, IVUS catheter, IVUS console, OCT catheter, OCT console, rotablator, rota wire, rota burr, IABP balloon, IVL catheter, ECMO, Fluoroscopic machine, Image obtaining technique)
- Cath lab, Hospital

Assessment:

Written – SAQ= 80 marks, MCQ=20 marks

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

Paper II: Subject - Cardiac Catheterization II

Total hours : 250 hours
Lecture : 100 hours
Practical : 150 hours

Total marks : 200
Written : 100
Oral & Practical : 80
Formative : 20

Objectives:

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

- acquire knowledge regarding various interventional cardiac management as medical technologist
- prepare patient for various advanced cardiac procedures
- apply positioning technique
- apply the proper technique of radiological imaging

List of Competencies:

- prepare instruments for advanced cardiac procedures (PTCA, PTMC, PTA, RDN, valvuloplasty, device closure)
- apply the proper technique of cardiac imaging
- prepare PTCA report under supervision of interventional cardiologist

Course Contents of Cardiac Catheterization II

| Sl. No | Topics/Lessons | Teaching/learning Hours | |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------|
| | | Lecture | Practical / Demonstration / Field visit |
| 1 | PTCA: <input type="checkbox"/> Introduction <input type="checkbox"/> Types <input type="checkbox"/> Procedures <input type="checkbox"/> Catheters <input type="checkbox"/> Guide wire <input type="checkbox"/> Micro catheters <input type="checkbox"/> Suction catheter <input type="checkbox"/> Complications | 20 | 45 |
| 2 | Stents: <input type="checkbox"/> BMS - size, components, its use, advantages, disadvantages <input type="checkbox"/> DES- size, components, its use, advantages, disadvantages | 10 | - |
| 3 | PTMC: <input type="checkbox"/> Introduction <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications <input type="checkbox"/> Balloon size | 20 | 30 |

| | | | |
|---|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
| 4 | Renal Denervation (RDN): <input type="checkbox"/> Introduction <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications | 10 | 15 |
| 5 | PTA: <input type="checkbox"/> Introduction <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications | 10 | 15 |
| 6 | Valvoplasty: <input type="checkbox"/> Introduction <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications | 10 | 15 |
| 7 | Device closure: <input type="checkbox"/> Introduction <input type="checkbox"/> Indications <input type="checkbox"/> Contraindications <input type="checkbox"/> Procedure <input type="checkbox"/> Instruments <input type="checkbox"/> Complications | 20 | 30 |

Teaching Methods:

- Lecture
- Tutorial
- Practical/ Demonstration
- Field visit

Teaching Learning Media:

- Multimedia and laptop
- OHP and transparencies
- White board and markers
- Blackboards and chalk
- Online and computer based teaching learning materials
- Laboratory: (Guide catheters, PTCA wires, PTCA balloons, Stents, inflation device, Echo machine, TEE probe, TPM lead, generator, Inoe balloon, defibrillator, laryngoscope, ET tube, Umbo bag, oxygen cylinder, ECG monitor, pulse oximetry, device delivery system, Fluoroscopic machine, Image obtaining technique)
- Cath lab, Hospital

Assessment:

Written – SAQ= 80 marks, MCQ=20 marks

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

Special Lab Attachment

Outline of Institutional Academic Laboratory

The institute should be equipped with the standard and instruments that are necessary to develop the skills required for the students to understand equipment and instruments name, name of parts, operational use and maintenance. They should perform CPR, ECG recording, ETT, take coronary angiographic views and views during various cardiac procedures.

The following equipment and instruments will be there:

| Sl. No | Name of Equipment and instruments |
|---------------|------------------------------------------|
| 01 | Cathlab |
| 02 | ECG machine |
| 03 | ETT machine |
| 04 | Echo machine |
| 05 | Defibrillator |
| 06 | Laryngoscope |
| 07 | ET tube |
| 08 | Umbo bag |
| 09 | TPM lead |
| 10 | TPM generator |
| 11 | ECG monitor |
| 12 | Diagnostic catheters |
| 13 | Guiding catheters |
| 14. | Inflation device |
| 15 | Oxygen cylinder |
| 16. | Inoe balloon |
| 17. | Vascular access sheaths |
| 18. | Manifold |
| 19. | Lead apron |
| 20 | Thyroid shield |
| 21 | Guide wires |
| 22 | Pulse oximetry |
| 23 | Microscope |
| 24 | Autoclave |
| 25 | Centrifuge machine |
| 26 | Electrolyte analyzer |
| 27 | Haemoglobin meter |
| 28 | Refrigerator |

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 cath lab personnel and this will exceptionally be learning and networking opportunities.

Institutional academic laboratory equipment and instruments with the special following equipment and instruments will be there:

| Sl. No | Name of Equipment and instruments |
|---------------|------------------------------------------|
| 01 | Holter monitoring machine |
| 02 | Ambulatory BP monitoring machine |
| 03 | Pulmonary valvuloplasty balloon |
| 04 | TEE probe |
| 05 | FFR console |
| 06 | FFR wire |
| 07 | EP lab |
| 08 | EP catheters |
| 09 | IVUS catheters |
| 10 | IVUS console |
| 11 | OCT catheters |
| 12 | OCT console |
| 13 | IVL catheters |
| 14 | Rotablator |
| 15 | Rota wire |
| 16 | Rota burr |
| 17 | RDN catheter |
| 18 | RDN console |
| 19 | IABP console |
| 20 | IABP balloon |
| 21 | ECMO |
| 22 | Scoring balloons |
| 23 | Cutting balloons |
| 24 | Device delivery system |
| 25 | Blood oximetry |

Job description of Diploma Medical Technologist (Cardiology)-MTC

The MTC is the expert in integrating different areas of key importance in the Cardiology departments. The areas include care, use of technology, clinical responsibility, organization, education and training. The role of the MTC in each of these areas is outlined.

PATIENT CARE

- The patient has been properly identified.
- The patient giving informed consent to the required procedures such as ETT, CAG, TPM, Cardiac cath, PTCA, PTA, PPM, PTMC, Device closure, ICD, CRT, RDN.
- The MTC making appropriate arrangements for the patient's general safety and comfort.
- The MTC has both a direct and a supervisory role with regard to the welfare of the patient in his care. This is a prime responsibility of the MTC. The welfare of the patient will depend upon recognition by the MTC of relevant physical and psychological factors which may affect the patient, together with an understanding of the patient's social culture needs and a reporting of these when necessary.
- The MTC fulfilling the requirement to use all appropriate facilities and methods to prevent cross-infection.

Clinical Responsibility

The MTC's prime expertise and responsibility is to undertake the whole range of techniques in cardiac diagnostic & therapeutic procedures and subsequently of his work. The MTC must be professionally accountable for his actions, make judgments as to his professional limitations and maintain confidentiality of information.

It is the responsibility of the MTC to cooperate with the cardiologist with various procedures such as:

- Diagnostic- ECG, Holter Monitoring, ECHO, ETT, TPM, CAG, Cardiac cath, IVUS, FFR, OCT.
- Therapeutic- PTCA, PTA, PPM, PTMC, Device closure, ICD, CRT, RDN, IABP, IVL.

ORGANIZATION/MANAGEMENT

Depending upon the level in the organization to which an MTC is appointed, he must have the responsibility for proper and efficient organization of his work, use of resources and the application of departmental policies for the area for which he is responsible.

EQUIPMENT MAINTAINANCE

The MTC must be able to use and care for equipment in such a way that:

- There are is minimum possible hazard to patient, staff or to any other person
- There is no unnecessary irradiation of the patient, staff or any other person
- Any error in the final radiographic image is not due to incorrect use of equipment
- The equipment is used safely and correctly
- The performance of the equipment is constantly monitored.

JOB IN THE EDUCATION AND TRAINING SITE

As a professional practitioner the MTC has duty to update and maintain his practice in line with developments and to apply proven research results that benefit patients. At the teaching Institutes the Medical Technologists (Cardiology) personnel are positioned at two levels: Instructors and Technologists.

The MTC working in the clinical situation must be involved with the clinical education of the MTC student. The MTC's qualifications, abilities and role enable him to advice, instruct and supervise other staff in appropriate circumstances. In addition, he may be required to participate in the theoretical training/ practical training/demonstration of the students other professionals and the general public.

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- Diploma in Medical Technology (Cardiology) Course Curriculum for 2015
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