MGM INSTITUTE OF HEALTH SCIENCES

Accredited by NAAC with 'A' Grade

(Deemed University u/s 3 of UGC Act, 1956)

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CHOICE BASED CREDIT SYSTEM (CBCS)

(With effect from 2018-19 Batches)

Curriculum for
B.Sc. Allied Health Sciences
B.Sc. Cardiac Care Technology

Dr. Rajesh B. Goel
Registrar
MGM Institute of Health Sciences
(Deemed University u/s 3 of UGC Act, 1956)
Navi Mumbai- 410 209

Approved as per BOM-52/2018, [Resolution no. 3.10.1], Dated 13/01/2018 &Approved as per BOM-53/2018, [Resolution no. 4.4.2], Dated 19/05/2018 **and amended upto BOM-57/2019, Dated 26/04/2019**

OUTLINE OF COURSE CURRICULUM

B.Sc. Cardiac Care Technology

Semester I

Code No.	Core Subjects	Credits/Week				Hrs/Semester				Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Total hrs.	Internal Assessment	Semester Exam	Total
Theory												
BCCT 101 L	Human Anatomy Part I	3	-	-	**3**	45	-	-	**45**	20	80	**100**
BCCT 102 L	Human Physiology Part I	3	-	-	**3**	45	-	-	**45**	20	80	**100**
BCCT 103 L	General Biochemistry Nutrition	3	1	-	**4**	45	15	-	**60**	20	80	**100**
BCCT 104 L	Introduction to National Health Care System (Multidisciplinary/ Interdisciplinary)	3	-	-	**3**	45	-	-	**45**	20	80	**100**
Practical												
BCCT 101 P	Human Anatomy Part I	-	-	4	-	-	-	60	**60**	-	-	-
BCCT 102 P	Human Physiology Part I	-	-	4	-	-	-	60	**60**	-	-	-
BCCT 103 P	General Biochemistry	-	-	4	-	-	-	60	**60**	-	-	-
BCCT105 P	Community Orientation & Clinical Visit (Including related practicals to the Parent course)	-	-	8	-	-	-	120	**120**	-	-	-
Ability Enhancement Elective Course												
AEC 001 L	English & Communication skills	3	-	-	**3**	45	-	-	**45**	100	-	**100**
AEC 002 L	Envioronmental Sciences											
Total		**15**	**1**	**20**	**16**	**225**	**15**	**300**	**540**	**180**	**320**	**500**

OUTLINE OF COURSE CURRICULUM

B.Sc. Cardiac Care Technology

Semester II

Code No.	Core Subjects	Credits/Week				Hrs/Semester				Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Total hrs.	Internal Assessment	Semester Exam	Total
Theory												
BCCT 106 L	Human Anatomy Part II	2	-	-	**2**	30	-	-	**30**	10	40	**50**
BCCT 107 L	Human Physiology Part II	2	-	-	**2**	30	-	-	**30**	10	40	**50**
BCCT 108 L	General Microbiology	3	-	-	**3**	45	-	-	**45**	20	80	**100**
BCCT 109 L	Basic Pathology & Hematology	3	1	-	**4**	45	15	-	**60**	20	80	**100**
BCCT 110 L	Introduction to Quality and Patient safety (Multidisciplinary/Interdisciplinary)	3	-	-	**3**	45	-	-	**45**	20	80	**100**
Practical												
BCCT 106 P	Human Anatomy Part II	-	-	4	-	-	-	60	**60**	-	-	-
BCCT 107 P	Human Physiology Part II	-	-	2	-	-	-	30	**30**	-	-	-
BCCT 108 P	General Microbiology	-	-	4	-	-	-	60	**60**	-	-	-
BCCT 109 P	Basic Pathology & Hematology	-	-	4	-	-	-	60	**60**	-	-	-
BCCT 111 P	Community Orientation & Clinical Visit (Including related practicals to the parent course)	-	-	8	-	-	-	120	**120**	-	-	-
Skill Enhancement Elective Course												
SEC 001 L	Medical Bioethics & IPR	3	-	-	**3**	45	-	-	**45**	100	-	**100**
SEC 002 L	Human Rights & Professional Values											
Total		**16**	**1**	**22**	**17**	**240**	**15**	**330**	**585**	**180**	**320**	**500**

OUTLINE OF COURSE CURRICULUM

B.Sc. Cardiac Care Technology

Semester III

Code No.	Core Subjects	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing /Rotation	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total hrs.	Internal Assessment	Semester Exam	Total
Theory														
BCC T112 L	Applied Anatomy,Physiology, Pharmacology in Cardiac care	3	1	-	-	4	60	-	-	-	60	20	80	100
BCCT 113 L	Basic Electrocardiography	3	-	-	-	3	45	-	-	-	45	20	80	100
BCCT114 L	Basic Echocardiography	2	-	-	-	2	30	-	-	-	30	20	80	100
BCCT115 CP	CCT Directed Clinical Education-I	-	-	-	27	9	-	-		405	405	50	-	50
Practical														
BCCT113 P	Basic Electrocardiography	-	-	2	-	1	-	-	30	-	30	10	40	50
BCCT114 P	Basic Echocardiography	-	-	4	-	2	-	-	60	-	60	10	40	50
Generic Elective Course														
GEC 001 L	Pursuit of Inner Self Excellence (POIS)	3	-	-	-	3	45	-	-	-	45	100	-	100
GEC 002 L	Organisational Behaviour													
Total		11	1	6	27	24	180	0	90	405	675	230	320	550

OUTLINE OF COURSE CURRICULUM

B.Sc. Cardiac Care Technology

Semester IV

Code No.	Core Subjects	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing /Rotation	Total hrs.	Internal Assessment	Semester Exam	Total
Theory														
BCCT 116 L	Development of Cardiovascular system : Fetal & Neonatal	2	1	-	-	3	45	-	-	-	45	20	80	100
BCCT 117 L	Cardiovascular diseases pertinent to Cardiac care technology	2	1	-	-	3	45	-	-	-	45	20	80	100
BCCT 118 L	Medical Instrumentation relevant to Cardiac care	1	1	-	-	2	30	-	-	-	30	20	80	100
BCCT 119 CP	CCT Directed Clinical Education-II	-	-	-	27	9	-	-	-	405	405	50	-	50
Practical														
BCCT 118 P	Medical Instrumentation relevant to Cardiac care	-	-	8	-	4	-	-	60	-	60	20	80	100
Ability Enhancement Elective Course														
AEC 003 L	Computer and Applications	3	-	-	-	3	45	-	-	-	45	100	-	100
AEC 004 L	Biostatistics and Research Methodology													
Total		8	3	8	27	24	165	0	60	405	630	230	320	550

OUTLINE OF COURSE CURRICULUM

B.Sc. Cardiac Care Technology

Semester V

Code No.	Core Subjects	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total hrs.	Internal Assessment	Semester Exam	Total
Theory														
BCCT 120 L	Advanced Electrocardiography	2	-	-	-	**2**	30	-	-	-	**30**	20	80	**100**
BCCT 121 L	Advanced Echocardiography	2	-	-	-	**2**	30	-	-	-	**30**	20	80	**100**
BCCT 122 L	Invasive Cardiology	2	1	-	-	**3**	45	-	-	-	**45**	20	80	**100**
BCCT 123 CP	CCT Directed Clinical Education-III	-	-	-	24	**8**	-	-	-	360	**360**	50	-	**50**
Practical														
BCCT 120 P	Advanced Electrocardiography	-	-	4	-	**2**	-	-	60	-	**60**	10	40	**50**
BCCT 121 P	Advanced Echocardiography	-	-	4	-	**2**	-	-	60	-	**60**	10	40	**50**
Core Elective Course														
CEC 005 L	Basics of Clinical Skill Learning	3	-	-	-	**3**	45	-	-	-	**45**	100	-	**100**
CEC 006 L	Hospital Operation Management													
Total		**9**	**1**	**8**	**24**	**22**	**150**	**0**	**120**	**360**	**630**	**230**	**320**	**550**

OUTLINE OF COURSE CURRICULUM

B.Sc. Cardiac Care Technology

Semester VI

Code No.	Core Subjects	Credits/Week					Hrs/Semester					Marks		
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total Credits (C)	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/ Rotation	Total hrs.	Internal Assessment	Semester Exam	Total
Theory														
BCCT 124 L	Cardiac Catheterization	2	-	-	-	**2**	30	-	-	-	**30**	20	80	**100**
BCCT 125 L	Pediatric Interventions	2	-	-	-	**2**	30	-	-	-	**30**	20	80	**100**
BCCT 126 L	CCT Directed Clinical Education-IV	-	-	-	30	**10**	-	-	-	450	**450**	50	-	**50**
Practical														
BCCT 124 P	Cardiac Catheterization	-	-	4	-	**2**	-	-	60	-	**60**	10	40	**50**
BCCT 125 P	Pediatric Interventions	-	-	4	-	**2**	-	-	60	-	**60**	10	40	**50**
Total		**4**	**0**	**8**	**30**	**18**	**60**	**0**	**120**	**450**	**630**	**110**	**240**	**350**

OUTLINE OF COURSE CURRICULUM

B.Sc. Cardiac Care Technology (Internship)

Semester VII & Semester VIII

Code No.	Core Subjects	Credits/Week				Hrs/Semester				
		Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/Rotation	Lecture (L)	Tutorial (T)	Practical (P)	Clinical Posing/Rotation	Total hrs.
	Sem VII (Internship)	-	-	-	720	-	-	-	720	**720**
	Sem VIII (Internship)				720				720	**720**
Total		**0**	**0**	**0**	**1440**	**0**	**0**	**0**	**1440**	**1440**

B.Sc. Allied Health Sciences

DIRECTOR'S DESK

In 2007 the school of Biomedical Sciences was established with a mission of building up well qualified Allied Health Care professionals. The faculty set out to design an ideal biomedical graduate program which met the demands and expectations of the education system of our country. The college has been amending its perspective plan, which means extensive preparations for taking over the construction of the academic system including designing of courses, adopting the semester system over the existing pattern of annual system, continuous internal assessmentand active industrial visits/Hospital Visits as the part of curriculum and implementing Credit base choice system to all the courses offered.

The School offers 7 UG Courses viz; B.Sc. Operation Theatre and Anaesthesia technology, Dialysis Technology, Medical Radiology &Imaging Technology, Medical Laboratory Technology, Perfusion Technology, Cardiac Care Technology and Optometry.

The college adopts the national qualification frame work for the degree programs in terms of duration and levels of studies. The curricula is updated to make our education comparable to and compatible and in accordance with those of others and also to facilitate the mobility of our graduates for further studies and for employment both within and outside the country. The programs designed are the perfect embodiment of the vision, mission and core values of the college and are designed in such a way that students are commensurate to face the global employment opportunities.

ABOUT MGM SCHOOL OF BIOMEDICAL SCIENCES

Mission

To improve the quality of life, both at individual and community levels by imparting quality medical education to tomorrow's doctors and medical scientists and by advancing knowledge in all fields of health sciences though meaningful and ethical research.

Vision

By the year 2020, MGM Institute of Health Sciences aims to be top-ranking Centre of Excellence in Medical Education and Research. Students graduating from the Institute will have the required skills to deliver quality health care to all sections of the society with compassion and benevolence, without prejudice or discrimination, at an affordable cost. As a research Centre, it shall focus on finding better, safer and affordable ways of diagnosing, treating and preventing diseases. In doing so, it will maintain the highest ethical standards.

About – School of Biomedical Sciences

MGM School of Biomedical Sciences is formed under the aegis of MGM IHS with the vision of offering basic Allied Science and Medical courses for students who aspire to pursue their career in the Allied Health Sciences, teaching as well as research.

School of Biomedical Sciences is dedicated to the providing the highest quality education in basic medical sciences by offering a dynamic study environment with well equipped labs. The school encompasses 21 courses each with its own distinct, specialized body of knowledge and skill. This includes 7 UG courses and 14 PG courses. The college at its growing years started with mere 100 students has recorded exponential growth and is now a full-fledged educational and research institution with the student strength reaching approximately 581 at present.

Our consistent theme throughout is to encourage students to become engaged, be active learners and to promote medical research so that ultimately they acquire knowledge, skills, and understanding so as to provide well qualified and trained professionals in Allied Health Sciences to improve the quality of life.

As there is increased need to deliver high quality, timely and easily accessible patient care system the collaborative efforts among physicians, nurses and allied health providers become ever more essential for an effective patient care. Thus the role of allied health professionals in ever-evolving medical system is very important in providing high-quality patient care.

Last but by no means least, School of Biomedical Sciences envisions to continuously grow and reform. Reformations are essential to any growing institution as it fulfills our bold aspirations of providing the best for the students, for us to serve long into the future and to get ourselves updated to changing and evolving trends in the health care systems.

Name of the Degree: B.Sc. Cardiac Technology

Duration of Study:

The duration of the study for B.Sc. Cardiac Technology will be of 4 years (3 years Academics +1 year Internship).

Program pattern:

- First Semester: July
- Second Semester: January
- Third Semester: July
- Fourth Semester: January
- Fifth Semester-July
- Sixth Semester-January

Eligibility Criteria:

- He/she has passed the Higher Secondary (10+2) with Science (PCB) or equivalent examination recognized by any Indian University or a duly constituted Board with pass marks in Physics, Chemistry, and Biology.
- Minimum percentage of marks: 45% aggregate.

Medium of Instruction:

English shall be the Medium of Instruction for all the Subjects of study and for examinations.

For any query visit the website: www.mgmsbsnm.edu.in

Preamble

India is one of the rising countries in providing medical and para medical facilities for the patients. There are all most more than 200 medical colleges and equivalent paramedical institutions which have potential to provide skill training to millions of youth through their own facilities and/or by establishing extension centres in collaboration with government medical colleges (AIIMS, NIMHANS etc.,) and Research Centres (ICMR, DBT,BARC, NIRRH, etc.,) or Vocational Skill Knowledge providers, NGOs. The high quality of medical care we enjoy today is built upon years of effort by Physicians, Nurses, Physiotherapist, Research Scholars and other medical professionals investigating the causes of and potential treatments for disease. The tireless effort of countless medical professionals has made many life-threatening diseases and conditions a faded memory**.**

India faces an acute shortage of over 64 lakh skilled human resource in the health sector.Although occupational classifications vary across the globe, little has been done in India to estimate the need and to measure the competency of health care providers beyond the doctors and nurses. As Indian government aims for Universal Health Coverage, the lack of skilled human resource may prove to be the biggest impediment in its path to achieve targeted goals. The benefits of having AHPs in the healthcare system are still unexplored in India.

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

This prompted the Ministry of Health and Family Welfare to envisage the creation of national guidelines for education and career pathways of allied and healthcare professionals, with a structured curriculum based on skills and competencies which is competence enough to face the challenges. The curriculum represents a conscious and systematic selection of knowledge, skills and values: a selection that shapes the way teaching, learning and assessment processes are organized.

MGM School Of Bio-Medical Sciences (Declared Under Section 3 Of The UGC Act, 1956) Accredited By NAAC with "A" Grade, Kamothe, Navi Mumbai, MGM University Regulations on "Choice Based Credit System - 2017"

Our MGMSBS institute is established with the goal to achieve the same and to initiate the patient's care at the hospital for a high level of health and medical services, which are unusually complex, scientifically advanced, and costly in nature, to meet his special needs. Allied health professionals are very crucial part of evolving health care system as they support diagnosis, recovery, and quality of life. The scope of allied health professionals is profound as they provide direct patient care in virtually at every step. They provide critical care support in intensive care units, deliver scientific support in clinical laboratories, offer numerous rehabilitation services, manage and provide data critical to seamless patient care and diagnosis, operate sophisticated diagnostic equipment and contribute to broader public health outcomes.

In addition, the practice of the faculty is important to the community as teaching students are in the forefront of the knowledge of medical sciences and at MGMSBS.

MGMSBS is at par with any other MCI recognised medical colleges with the following available resources:

- Well equipped with physical facilities such as spacious and well furnished class rooms ,laboratories ,Skill centres ,Library and Hostels for enriching knowledge and to serve rural community and slums dwellers through this knowledge.
- We have qualified and trained faculty who can foster research in different discipline and well versed to scientifically formulate, implement and monitor community oriented programs and projects especially where the level of involvement in adoption of innovative and appropriate technologies involved.

Students of MGMSBS will be of tremendous help in making meaningful contribution to community and rural development. The involvement of allied health in implementing the Scheme of Community Development through Paramedics is need of the time.

The Chairman, University Grants Commission (UGC) has in his letter D.O.No.F.1- 1/2015 (CM) dated 8th January, 2015 has communicated the decision of the Ministry of Human Resources Development to

implement Choice Based Credit System (CBCS) from the academic session 2015-2016 in all Indian Universities to enhance academic standards and quality in higher education through innovation and improvements in curriculum, teaching learning process, examination and evaluation systems. UGC, subsequently, in its notification No.F.1-1/2015 (Sec.) dated 10/4/15 has provided a set of, Model curricula and syllabi for CBCS programmes under the Faculties of Arts, Humanities and Sciences providing the academic flexibility for Universities.

MGMSBS has taken the proactive lead in bringing about the academic reform of introducing CBCS for semester wise pattern for the B.Sc. Allied Health Science courses and MS.c Courses

CBCS – Definition and benefits: Choice Based Credit System is a flexible system of learning. The distinguishing features of CBCS are the following:

- It permits students to learn at their own pace.
- The electives are selected from a wide range of elective courses offered by the other University Departments.
- Undergo additional courses and acquire more than the required number of credits.
- Adopt an inter-disciplinary and intra-disciplinary approach in learning.
- Make best use of the available expertise of the faculty across the departments or disciplines
- Has an inbuilt evaluation system to assess the analytical and creativity skills of students in addition to the conventional domain knowledge assessment pattern.

Definitions of Key Words:

i. **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.Choice Based Credit System (CBCS).

ii. The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses).

iii. **Course**: Usually referred to, as “papers” is a component of a programme. All courses need not carry the same weight. The courses should define learning objectives and learning outcomes. A course may be designed to comprise lectures/ tutorials/ laboratory work/ outreach activities/

project work/ viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these.

iv. **Credit Based Semester System (CBSS):** Under the CBSS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.

v. **Credit:** A unit by which the course work is interpreted. It functions the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week.

vi. **Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the sum total of the credit points obtained by the student in various courses in all semesters and the sum of the total credits of all courses in all the semesters.

vii. **Grade Point:** It is a numerical marking allotted to each letter grade on a 10-point scale.

viii. **Letter Grade:** It is an appreciated point of the student's performance in a selected course. Grades are denoted by letters O, A+, A, B, C and RA x. Programme: An educational programme leading to award of a Degree certificate.

ix. **Semester Grade Point Average (SGPA):** It is index of performance of all performance of work in a semester. Its total credit points obtained by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

x. **Semester:** Each semester will consist of minimum of 180 working days. The odd semester may be scheduled from June/ July to December and even semester from December/ January to June.

Semester System and Choice Based Credit System:

The semester system initiates the teaching-learning process and screws longitudinal and latitudinal mobility of students in learning. The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a sun shone" type approach in which the students can take choice of courses, learn and adopt an interdisciplinary approach of learning.

Semesters:

An academic year consists of two semesters:

	UG	PG
Odd Semester 1st semester	July – December	July – December
Odd Semester 3rd, 5thsemesters	June – October/ November	
Even Semester 2nd, 4th, 6thsemesters	December –April	December - June

Credits:

Credit defines the coefficient of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, normally in each of the courses, credits will be assigned on the basis of the number of lectures/ tutorial laboratory work and other forms of learning required, to complete the course contents in a 15-20 week schedule:

a. ***1 credit*** = 1 hour of lecture per week
b. ***3 credits*** = 3 hours of instruction per week
   - ✓ Credits will be assigned on the basis of the lectures (L) / tutorials (T) / Clinical Training (CR) / laboratory work (P) / Research Project (RP) and other forms of learning in a 15-20 week schedule L - One credit for one hour lecture per week
c. **P/T -** One credit for every two hours of laboratory or practical
d. **CR -** One credit for every three hours of Clinical training/Clinical rotation/posting
e. **RP** - One credit for every two hours of Research Project per week – Max Credit 20- 25

	Lecture - L	**Tutorial - T**	**Practical - P**	**Clinical Training/ Rotation– CT/CR**	**Research Project– RP***
1 Credit	1 Hour	2 Hours	2 Hours	3 Hours	2 Hours
RP*	Maximum Credit 20 – 25 / Semester				

Types of Courses: Courses in a programme may be of three kinds:

- **Core Course**
- **Elective Course**

Core Course: A course, which should compulsorily be studied by a candidate as a basic requirement is termed as a Core course. There may be a Core Course in every semester. This is the course which is to be compulsorily studied by a student as a basic requirement to complete programme of respective study.

Elective Course: A course which can be chosen from a very specific or advanced the subject of study or which provides an extended scope or which enables an exposure to some other domain or expertise the candidates ability is called an Elective Course.

Discipline Specific Elective (DSE) Course: Elective courses offered by the main subject of study are referred to as Discipline Specific Elective. The University / Institute may also offer discipline related Elective courses of interdisciplinary nature. An elective may be "Discipline Specific Electives (DSE)" gazing on those courses which add intellectual efficiency to the students.

Dissertation / Project: An Elective/Core course designed to acquire special / advanced knowledge, such as supplement study / support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher / faculty member is called dissertation / project.

Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective. P.S.: A core course offered in a discipline / subject may be treated as an elective by other discipline / subject and vice versa and such electives may also be referred to as Generic Elective.

Assigning Credit Hours per Course: While there is flexibility for the departments in allocation of credits to various courses offered, the general formula would be:

All core course should be restricted to a maximum of 4 credits.

- All electives should be restricted to a maximum of 3 credits.
- All ability enhancement course should be restricted to a maximum of 2 credits.
- Projects should be restricted to a maximum of 20-25 credits.

Programme Outcome:

• Students will be trained to apply specialized occupational theory, skills and concepts to work independently as qualified cardiovascular technologist and becomes an integral member of the cardiac catheterization and electrophysiology laboratory teams.
• The CVT's primary role is to perform, at the direction of a qualified physician, technical procedures for the diagnosis and treatment of cardiovascular injury and disease.

Programme Specific Outcome:

• This programme is designed to cover all aspects of cardiovascular disease management and care.
• It involves learning of complex diagnostic and therapeutic procedures that involve use of various catheterization equipment, computer hardware, tools, machines and pharmacological agents.
• This program enables students to acquire skills for management of various cardiac disorders.

FIRST YEAR

B.Sc. Cardiac Care Technology

SEMESTER-I

Code No.	Core Subjects
Theory	
BCCT 101L	Human Anatomy Part I
BCCT 102 L	Human Physiology Part I
BCCT103 L	General Biochemistry& Nutrition
BCCT 104 L	Introduction to National HealthCare System (Multidisciplinary/ Interdisciplinary)
Practical	
BCCT 101 P	Human Anatomy Part I
BCCT 102 P	Human Physiology Part I
BCCT103 P	General Biochemistry
BCCT 105 P	Community Orientation & Clinical Visit (Including related practical to the parent course)
Ability Enhancement Elective Course	
AEC 001L	English & Communication Skills
AEC 002L	Environmental Sciences

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Human Anatomy- Part I
Course Code	BCCT 101 L

Teaching Objective	• To introduce the students to the concepts related to General anatomy, Muscular, Respiratory, Circulatory, Digestive and Excretory system
Learning Outcomes	• Comprehend the normal disposition, interrelationships, gross, functional and applied anatomy of various structures in the human body. • Demonstrate and understand the basic anatomy of Respiratory and Circulatory system • Demonstrate and understand the basic anatomy of Digestive and Excretory system

Sr.No.	Topics	No. of Hrs.
1	**Introduction to Anatomy , Terminology, Cell and Cell division, Tissues of body, Skin**	5
2	**Skeletal System** - Classification of bones, Parts of developing long bone and its blood supply, JointsI- Classification of joints, Joints II- Synovial Joint, Appendicular skeleton I- Bones of upper Limb, Appendicular skeleton II- Bones of lower limb, Axial skeleton-I , Axial skeleton-II	8
3	**Muscular System** - Muscle I-Types, Muscle II- Muscle groups and movements, Muscles of Upper limb, Muscles of lower limb, Muscles of Neck, Muscles of back , Muscles of abdomen	7
4	**Joints** – Shoulder, Hip , Knee , Movements and muscle groups producing movements at other joints	4
5	**Respiratory System** - Introduction to Respiratory system, Larynx, Thoracic cage and diaphragm, Lung & Pleura , Trachea &Bronchopulmonary segments , Mediastinum	6
6	**Circulatory System** - Types of blood vessels, Heart& Pericardium, Coronary Circulation, Overview of mediastenum , Blood vessels of Thorax	5
7	**Digestive System** - GIT I- Pharynx, Oesophagus, GIT II-Stomach, GIT III- Small and Large Intestine, GIT IV-Liver &Gall Bladder, GIT V- Spleen, GIT VI-Pancreas , Salivary glands	7
8	**Excretory System** - Kidney, Ureter, Bladder, Urethra, Pelvis dynamic	3
	Total	**45hrs**

BCCT 101 P - Human Anatomy Part I- (Demonstration)

Sr.No.	Topics	No of Hrs
1	**Introduction to Anatomy, Terminology, Cell and Cell division, Tissues of body, Skin**	60
2	**Skeletal System** - Classification of bones, Parts of developing long bone and its blood supply, JointsI- Classification of joints, Joints II- Synovial Joint, Appendicular skeleton I- Bones of upper Limb, Appendicular skeleton II- Bones of lower limb, Axial skeleton-I , Axial skeleton-II	
3	**Muscular System** - Muscle I-Types, Muscle II- Muscle groups and movements, Muscles of Upper limb, Muscles of lower limb, Muscles of Neck, Muscles of back , Muscles of abdomen	
4	**Joints** – Shoulder, Hip ,Knee , Movements and muscle groups producing , movements at other joints	
5	**Respiratory System** - Introduction to Respiratory system, Larynx, Thoracic cage and diaphragm, Lung & Pleura , Trachea &Bronchopulmonary segments , Mediastinum	
6	**Circulatory System** - Types of blood vessels, Heart& Pericardium, Coronary Circulation, Overview of mediastenum , Blood vessels of Thorax	
7	**Digestive System** - GIT I- Pharynx, Oesophagus, GIT II-Stomach, GIT III- Small and Large Intestine, GIT IV-Liver &Gall Bladder, GIT V- Spleen, GIT VI-Pancreas , Salivary glands	
8	**Excretory System** - Kidney, Ureter, Bladder, Urethra, Pelvis dynamic	
	Total	**60 hrs**

TextBooks :

1. Manipal Manual of Anatomy for Allied Health Sciences courses:Madhyastha S.
2. G.J. Tortora& N.P Anagnostakos: Principles of Anatomy and Physiology
3. B.D. Chaurasia: Handbook of General Anatomy

Reference books:

1. B.D. Chaurasia : Volume I-Upper limb & Thorax,
   Volume II- Lower limb, Abdomen & Pelvis
   Volume III- Head, Neck, Face
   Volume IV- Brain-Neuroanatomy
2. Vishram Singh: Textbook of Anatomy Upper limb & Thorax
   Textbook of Anatomy Abdomen & Lower limb
   Textbook of Head neck and Brain
3. Peter L. Williams And Roger Warwick:- Gray's Anatomy - Descriptive and Applied, 36th Ed; Churchill Livingstone.
4. T.S. Ranganathan : Text book of Human Anatomy
5. Inderbirsingh, G P Pal : Human Embryology
6. Textbook of Histology, A practical guide:- J.P Gunasegaran

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Human Physiology Part I
Course Code	BCCT 102 L

Teaching objective	• To teach basic physiological concepts related to General physiology, Haematology, Nerve-Muscle physiology, Cardiovascular ,Digestive & Respiratory physiology
Learning outcomes	• To understand the basic physiological concepts of General physiology • To understand the basic physiological concepts of Hematology • To understand the basic physiological concepts of Nerve-Muscle physiology • To understand the basic physiological concepts of Respiratory physiology • To understand the basic physiological concepts of Cardiovascular physiology

Sr.No.	Topics	No. of Hrs.
1	**General Physiology-** Introduction to physiology, Homeostasis, Transport Across cell membrane	3
2	**Blood - Composition, properties and functions of Blood,** Haemopoesis , Haemogram (RBC, WBC, Platelet count, Hb Concentrations), Blood Groups - ABO and RH grouping, Coagulations & Anticoagulants, Anaemias: Causes, effects & treatment, Body Fluid: Compartments, Composition, Immunity – Lymphoid tissue	10
3	**Cardio vascular system -** Introduction, general organization, functions & importance of CVS , Structure of heart, properties of cardiac muscle, Junctional tissues of heart & their functions, Origin & spread of Cardiac Impulse, cardiac pacemaker, Cardiac cycle & E C G, Heart Rate & its regulation, Cardiac output,Blood Pressure definition & normal values, Physiological needs & variation, regulation of BP	10
4	**Digestive system -** General Introduction, organization, innervations & blood supply of Digestive system, Composition and functions of all Digestive juices,Movements of Digestive System (Intestine), Digestion & Absorption of Carbohydrate, Proteins & Fats	6
5	**Respiratory System -**Physiologic anatomy, functions of respiratory system, non respiratory functions of lung, Mechanism of respiration, Lung Volumes & capacities, Transport of Respiratory GasesO_2, Transport of Respiratory Gases CO_2, Regulation of Respiration.	10
6	**Muscle nerve physiology -** Structure of neuron & types, Structure of skeletal Muscle, sarcomere, Neuromuscular junction& Transmission. Excitation & contraction coupling (Mechanism of muscle contraction)	6
	Total	**45 hrs**

BCCT 102 P - Human Physiology Part I (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Study of Microscope and its use, Collection of Blood and study of Haemocytometer	60
2	Haemoglobinometry	
3	White Blood Cell count	
4	Red Blood Cell count	
5	Determination of Blood Groups	
6	Leishman's staining and Differential WBC Count	
7	Determination of Bleeding Time, Determination of Clotting Time	
8	Pulse & Blood Pressure Recording, Auscultation for Heart Sounds	
9	Artificial Respiration –Demonstration, Spirometry-Demonstration	
Total		**60hrs**

Textbooks

1. Basics of medical Physiology –D Venkatesh and H.H Sudhakar, 3rd edition.
2. Principles of Physiology – DevasisPramanik, 5th edition.
3. Human Physiology for BDS –Dr A.K. Jain, 5th edition.
4. Textbook of human Physiology for dental students-Indukhurana 2nd edition.
5. Essentials of medical Physiology for dental students –Sembulingum.

Reference books

1. Textbook of Medical Physiology, Guyton , 2nd South Asia Edition.
2. Textbook of Physiology Volume I & II (for MBBS) – Dr. A. K. Jain.
3. Comprehensive textbook of Medical Physiology Volume I & II – Dr. G. K. Pal.

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	General Biochemistry & Nutrition
Course Code	BCCT 103 L

Teaching Objective	At the end of the course, the student demonstrates his knowledge and understanding on: • Structure, function and interrelationship of biomolecules and consequences of deviation from normal. • Integration of the various aspects of metabolism, and their regulatory pathways. • Principles of various conventional and specialized laboratory investigations and instrumentation, analysis and interpretation of a given data. • to diagnose various nutritional deficiencies • Identify condition and plan for diet • Provide health education base on the client deficiencies
Learning Outcomes	• Define "biochemistry." • Identify the five classes of polymeric biomolecules and their monomeric building blocks. • Explain the specificity of enzymes (biochemical catalysts), and the chemistry involved in enzyme action. • Explain how the metabolism of glucose leads ultimately to the generation of large quantities of ATP. • Describe how fats and amino acids are metabolized, and explain how they can be used for fuel. • Describe the structure of DNA, and explain how it carries genetic information in its base sequence. • Describe DNA replication. • Describe RNA and protein synthesis. • Explain how protein synthesis can be controlled at the level of transcription and translation. • Summarize what is currently known about the biochemical basis of cancer.

Sr. No.	Topics	No. of Hrs.
1	Introduction and scope of biochemistry	1
2	**Chemistry of carbohydrates, proteins, lipids and nucleic acid–** **Chemistry of Carbohydrates**: Definition, Functions, Properties, Outline of classification with eg.(Definition of Monosaccharides, Disaccharides, Polysaccharides and their examples). **Chemistry of Proteins:**Amino acids (total number of amino acids, essential and non essential amino acids) .Definition, Classification of Proteins Structural orgnisation of protein, Denaturation of Proteins. **Chemistry of Lipids:** Definition, functions, Classification (Simple Lipids, Compound Lipids, Derived Lipids.) Essential Fatty Acids. **Chemistry of Nucleic acid**:Nucleosides and Nucleotides, Watson and Crick model of DNA, **RNA-** it's type along with functions	12
3	**Eementary knowledge of enzymes -** Classification, mechanism of enzyme action, Factors affecting activity of enzymes, enzyme specificity, Enzyme inhibition, Isoenzymes and their diagnostic importance.	8
4	**Biological oxidation** - Brief concept of biological oxidation: Definition of Oxidative phospoylation Electron transport chain. Inhibitors and Uncouplersbriefly	5
5	**Metabolism of Carbohydrate**:Glycolysis, TCA cycle, Definition and significance of glycogenesis and glycogenolysis. Definition and significance of HMP shunt, definition and significance of gluconeogenesis. Regulation of blood Glucose level, Diabetes Mellitus, Glycosuria.Glucose Tolerance Test. **Metabolism of Proteins**: Transamination, Transmethylation reactions. Urea cycle, Functions of glycine, tyrosine, phenylalanine, tryptophan and Sulphur containing aminoacids. **Metabolism of Lipid:**Outline of beta oxidation with energetic, Ketone bodies (Enumerate) and its importance. Functions of cholesterol and its biomedical significance. Lipid profile and its diagnostic importance. Fatty liver, lipotropic factor, atherosclerosis. **Metabolism of Nucleic acid**:Purinecatabolism (Formation of uric acid), Gout	14
6	**Vitamins and Minerals-** RDA, Sources, functions and deficiency manifestations of Fat soluble vitamins. RDA, sources, functions and deficiency manifestations of Water soluble vitamins. RDA, Sources, functions and deficiency manifestations of Calcium, Phosphorous, Iron, Iodine	5
7	**Principle and applications of :**Colorimeters, pH Meter	5
8	**Pre examination Skills -** Collection and preservation of samples (Anticoagulants), transportation & separation of biological specimens, Sample rejection criteria, Disposal of biological Waste materials.	5
9	**Nutrition:** History of Nutrition, Nutrition as a science, Food groups, RDA, Balanced diet, diet planning, Assessment of nutritional status, **Energy:** Units of energy, Measurements of energy and value of food, Energy expenditure, Total energy/calorie requirement for different age groups and diseases, Satiety value, Energy imbalance- obesity, starvation, Limitations of the daily food guide, Role of essential nutrients in the balanced diet	5
Total		**60hrs**

BCCT 103 P – General Biochemistry (Demonstration)

Sr. No.	Topics	No. of Hrs
1	Introduction to Personnel protective equipments used in laboratory and their importance (LCD)	60
2	Handling of colorimeters – operation and maintenance (LCD)	
3	Serum electrolytes measurement (only demo)	
4	Demonstration of semi automated / fully automated blood analyser	
5	Demonstration of tests for carbohydrates (Monosacchrides, disaccharides and polysaccharides)	
6	Precipitation Reactions of protein (only demonstration)	
7	Test on bile salts (only demonstration)	
8	Tests on Normal constituents of Urin (only demo)	
9	Tests on Abnormal constituents of Urin (only demo)	
Total		**60 hrs**

Textbooks:

1. Textbook of Medical Laboratory Technology, Volume 1, 3rd Edition by PrafulGhodkar
2. Textbook of Medical Laboratory Technology, Volume 2, 3rd Edition by PrafulGhodkar
3. Medical Laboratory Technology (Volume 1): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
4.Medical Laboratory Technology (Volume 2): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
5.Medical Laboratory Technology (Volume 3): Procedure Manual for Routine Diagnostic, Kanai Mukharjee
6. Essentials of Biochemistry, Second Edition, Dr.(Prof) Satyanarayana
7. Essentials of Biochemistry, 2nd Edition, Dr. PankajaNaik
8. Principles and Techniques of Biochemistry and Molecular Biology, 5Th Edition, Wilson &Walker

Reference books:

1. An Introduction to Chemistry, 8th Edition by Mark Bishop
2. Clinical Chemistry made easy, 1stEidtion by Hughes
3. Tietz Fundamentals of Clinical Chemistry , 7th Edition by Carl Burtis

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Introduction to National Health Care System (Multidisciplinary/Interdisciplinary)
Course Code	BCCT 104 L

Teaching Objective	• To teach the measures of the health services and high-quality health care • To understand whether the health care delivery system is providing high-quality health care and whether quality is changing over time. • To provide to National Health Programme- Background objectives, action plan, targets, operations,in various National Heath Programme. • To introduce the AYUSH System of medicines.
Learning Outcomes	• The course provides the students a basic insight into the main features of Indian health care delivery system and how it compares with the other systems of the world.

Sr. No.	Topics	No. of Hrs.
1	**Introduction to healthcare delivery system** - Healthcare delivery system in India at primary, secondary and tertiary car; Community participation in healthcare delivery system; Health system in developed countries; Private / Govt Sector; National Health Mission; National Health Policy; Issues in Health Care Delivery System in India	10
2	**National Health Programme-** Background objectives, action plan, targets, operations, achievements and constraints in various National Heath Programme.	8
3	**Introduction to AYUSH system of medicine -** Introduction to Ayurveda; Yoga and Naturopathy; Unani; Siddha; Homeopathy; Need for integration of various system of medicine	8
4	**Health scenario of India-** past, present and future	4
5	**Demography & Vital Statistics-** Demography – its concept; Census & its impact on health policy	5
6	**Epidemiology -** Principles of Epidemiology; Natural History of disease; Methods of Epidemiological studies; Epidemiology of communicable & non-communicable diseases, disease, transmission, host defense immunizing agents, cold chain, immunization, disease, monitoring and surveillance.	10
Total		**45 hrs**

Books:

1. National Health Programs Of India National Policies and Legislations Related to Health: 1 J. Kishore (Author)
2. A Dictionary of Public Health Paperback by J Kishor
3. Health System in India: Crisis & Alternatives , National Coordination Committee, Jan SwasthyaAbhiyan
4. In search In Search of the Perfect Health System
5. Central Bureau of Health Intelligence (1998). Health Information of India, Ministry of Health and Family Welfare, New Delhi.
6. Goyal R. C. (1993). Handbook of Hospital Personal Management, Prentice Hall of India, New Delhi, 17–41. Ministry of Health and Family Welfare (1984). National Health Policy, Annual Report (1983–4), Government of India, New Delhi
7. Historical Development of Health Care in India, Dr. Syed Amin Tabish,
8. cultural Competence in Health Care by Wen-Shing Tseng (Author), Jon Streltzer (Author)
9. Do We Care: India's Health System by K. Sujatha Rao (Author)

BCCT 105 P - Community Orientation & Clinical Visit (including related practical's to the parent course) (Total -120 hrs.)

ABILITY ENHANCEMENT ELECTIVE COURSE

Name of the Programme	**B.Sc. Cardiac Care Technology**
Name of the Course	**English and Communication Skills**
Course Code	**AEC 001L**

Teaching Objective	• This course deals with essential functional English aspects of the of communication skills essential for the health care professionals. • To train the students in oral presentations, expository writing, logical organization and Structural support.
Learning Outcomes	• Able to express better. • Grow personally and professionally and Developconfidence in every field

Sr. No.	Topics	No. of Hrs.
1	**Basics of Grammar** - Vocabulary, Synonyms, Antonyms, Prefix and Suffix, Homonyms, Analogies and Portmanteau words	6
2	**Basics of Grammar – Part II** - Active, Passive, Direct and Indirect speech, Prepositions, Conjunctions and Euphemisms	6
3	**Writing Skills** - Letter Writing, Email, Essay, Articles, Memos, one word substitutes, note making and Comprehension	3
4	Writing and Reading, Summary writing, Creative writing, news paper reading	3
5	Practical Exercise, Formal speech, Phonetics, semantics and pronunciation	5
6	**Introduction** to communication skills - Communication process, Elements of communication, Barriers of communication and how to overcome them, Nuances for communicating with patients and their attenders in hospitals	6
7	**Speaking** - Importance of speaking efficiently, Voice culture, Preparation of speech. Secrets of good delivery, Audience psychology, handling , Presentation skills, Individual feedback for each student, Conference/Interview technique	4
8	**Listening** - Importance of listening , Self assessment, Action plan execution, Barriers in listening, Good and persuasive listening	4
9	**Reading** - What is efficient and fast reading , Awareness of existing reading habits, Tested techniques for improving speed, Improving concentration and comprehension through systematic study	4
10	**Non Verbal Communication** - Basics of non-verbal communication, Rapport building skills using neuro- linguistic programming (NLP), Communication in Optometry practice	4
	Total	**45 hrs**

Text books:

1. Graham Lock, Functional English Grammar: Introduction to second Language Teachers.Cambridge University Press, New York, 1996.
2. Gwen Van Servellen. Communication for Health care professionals: Concepts,practice and evidence,
   Jones & Bartlett Publications, USA, 2009

Name of the Programme	**B.Sc. Cardiac Care Technology**
Name of the Course	**Environmental Sciences**
Course Code	**AEC 002L**

Teaching Objective	• To understand and define terminology commonly used in environmental science • To teach students to list common and adverse human impacts on biotic communities, soil, water, and air Quality. • To understand the processes that govern the interactions of organisms with the biotic and abiotic. • Understand the relationship between people and the environment; Differentiate between key ecological terms and concepts
Learning Outcomes	• Current environmental issues and highlight the importance of adopting an interdisciplinary approach. • Sample an ecosystem to determine population density and distribution. • Create food webs and analyse possible disruption of feeding relationships.

Sr. No.	Topics	No. of Hrs.
1	**Components of Environment** – Hydrosphere, lithosphere, atmosphere and biosphere – definitions with examples; Interaction of man and environment;	4
2	**Ecosystem** : Basic concepts, components of ecosystem, Tropic levels, food chains and food webs, Ecological pyramids, ecosystem functions, Energy flow in ecological systems, Characteristics of terrestrial fresh water and marine ecosystems,	5
3	**Global Environmental Problems** – Green House Effect, Acid rain, El Nino, Ozone depletion, deforestation, desertification, salination, biodiversity loss; chemical and radiation hazards.	4
4	**Environmental pollution and degradation** – Pollution of air, water and land with reference to their causes, nature of pollutions, impact and control strategies; perspectives of pollution in urban, industrial and rural areas. Habitat Pollution by Chlorinated Hydrocarbons (DDT, PCBs, Dioxin etc, Endocrine disrupting chemicals, Nutrient pollution.	8
5	**Environmental Management** – Concept of health and sanitation, environmental diseases – infectious (water and air borne) and pollution related, spread and control of these diseases, health hazards due to pesticide and metal pollution, waste treatment, solid waste management, environmental standards and quality monitoring.	6
6	**Environmental Protection Act** – Environmental Laws, national movements, environmental ethics – holistic approach of environmental protection and conservation, IUCN – role in environmental protection. Concept with reference to UN – declaration, aim and objectives of human right policies with reference to India, recent north-south debate on the priorities of implementation, Environmental Protection Agency (EPA)	10
7	**Bioremediation** – Oil spills, Wastewater treatment, chemical degradation, heavy Metals.	8
	Total	**45 hrs**

Books:

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., &Guha, R. 1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P. H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J., Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
7. McCully, P. 1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.
8. McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, H.T. & Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. &Brusseau, M.L. 2011. Environmental and Pollution Science. Academic Press.
11. Rao, M.N. &Datta, A.K. 1987. Waste Water Treatment. Oxford and IBH Publishing Co. Pvt. Ltd.
12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.
13. Rosencranz, A., Divan, S., & Noble, M. L. 2001. Environmental law and policy in India. Tripathi 1992.
14. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.
15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.
16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.
17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.
18. Warren, C. E. 1971. Biology and Water Pollution Control. WB Saunders.
19. Wilson, E. O. 2006. The Creation: An appeal to save life on earth. New York: Norton.
20. World Commission on Environment and Development. 1987. Our Common Future. Oxford University Press

FIRST YEAR

B. Sc. Cardiac Care Technology

SEMESTER- II

Code No.	Core Subjects
Theory	
BCCT 106 L	Human Anatomy Part II
BCCT 107 L	Human Physiology Part II
BCCT 108 L	General Microbiology
BCCT 109 L	Basic Pathology & Hematology
BCCT 110 L	Introduction to Quality and Patient safety (Multidisciplinary/Interdisciplinary)
Practical	
BCCT 106 P	Human Anatomy Part II
BCCT 107 P	Human Physiology Part II
BCCT 108 P	General Microbiology
BCCT 109 P	Basic Pathology & Hematology
BCCT 111 P	Community Orientation & Clinical Visit (Including related practical's to the parent course)
Skill Enhancement Elective Course	
SEC 001 L	Medical Bioethics & IPR
SEC 002 L	Human Rights & Professional Values

Name of the Programme	**B.Sc. Cardiac Care Technology**
Name of the Course	**Human Anatomy- Part II**
Course Code	**BCCT 106 L**

Teaching Objective	• To teach the students the basic anatomy of Reproductive , Lymphatic Endocrine ,Nervous system and Special senses
Learning Outcomes	• Demonstrate and understand the basic anatomy of Reproductive and Lymphatic system. • Demonstrate and understand the basic anatomy of Endocrine ,Nervous system • Demonstrate and understand the basic anatomy of Special senses

Sr. No.	**Topics**	**No. of Hrs.**
1	**Reproductive system -** Male- Testis, Spermatic Cord, Female- Ovaries & Fallopian tube, Uterus	6
2	**Lymphatic system -** Lymphoid Organs, Lymph node groups- Cervical, Axillary, Inguinal	5
3	**Endocrine system -** Thyroid, Parathyroid, Adrenal, Pitutary	4
4	**Nervous system -** Introduction to nervous system(Neuron, ANS, PNS) Meninges, Cerebrum I, Cerebrum II, Cerebellum, Blood supply of Brain, Brain stem, Spinal cord, Cranial and peripheral nerves, CSF & Ventricles	12
5	**Sensory system -** Eye (Gross anatomy), Ear	3
Total		**30hrs**

BCCT 106 P - Human Anatomy Part II (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	**Reproductive system -** Male- Testis, Spermatic Cord, Female- Ovaries & Fallopian tube, Uterus	60
2	**Lymphatic system -** Lymphoid Organs, Lymph node groups- Cervical, Axillary, Inguinal	
3	**Endocrine system -** Thyroid, Parathyroid, Adrenal, Pitutary	
4	**Nervous system -** Introduction to nervous system(Neuron, ANS, PNS) Meninges, Cerebrum I, Cerebrum II, Cerebellum, Blood supply of Brain ,Brain stem, Spinal cord, Cranial and peripheral nerves, CSF & Ventricles	
5	**Sensory system -** Eye (Gross anatomy), Ear	
Total		**60 hrs**

Textbooks:

1. Manipal Manual of Anatomy for Allied Health Sciences courses:Madhyastha S.
2. G.J. Tortora& N.P Anagnostakos: Principles of Anatomy and Physiology
3. B.D. Chaurasia: Handbook of General Anatomy

Reference books:

1. B.D. Chaurasia : Volume I-Upper limb & Thorax,
   Volume II- Lower limb, Abdomen & Pelvis
   Volume III- Head, Neck, Face
   Volume IV- Brain-Neuroanatomy
2. Vishram Singh: Textbook of Anatomy Upper limb & Thorax
   Textbook of Anatomy Abdomen & Lower limb
   Textbook of Head neck and Brain
3. Peter L. Williams And Roger Warwick:- Gray's Anatomy - Descriptive and Applied, 36th Ed; Churchill Livingstone.
4. T.S. Ranganathan : Text book of Human Anatomy
5. Inderbirsingh, G P Pal : Human Embryology
6. Textbook of Histology, A practical guide:- J.P Gunasegaran

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Human Physiology Part II
Course Code	BCCT 107 L

Teaching Objective	• To teach basic physiological concepts related to Renal physiology, Endocrinology& Reproductive physiology, CNS, Special senses
Learning Outcomes	• To understand the basic physiological concepts of Renal physiology • To understand the basic physiological concepts of Endocrinology & Reproductive physiology • To understand the basic physiological concepts of CNS, Special senses,

Sr. No.	Topics	No. of Hrs.
1	**Nervous system** -Functions of Nervous system , Neuron – Conduction of Impulses, factors affecting, Synapse- transmission, Receptors, Reflexes Ascending tracts, Descending tracts, Functions of various parts of the Brain.Cerebro-Spinal Fluid (CSF): Composition, functions & Circulation, Lumbar Puncture, Autonomic Nervous System (ANS): Functions.	10
2	**Special senses-** Vision: Structure of Eye, functions of different parts, Refractive errors of Eye and correction, Visual Pathway, Colour vision & tests for colour Blindness, Hearing: Structure and function of ear, Mechanism of Hearing, Tests for Hearing (Deafness)	6
3	**Skin -** Structure and function, Body temperature,Regulation of Temperature & fever.	4
4	**Endocrine System -** Short description of various endocrine glands and their functions	2
5	**Reproductive systems -** Structure & Functions of Reproductive system, Male Reproductive System: spermatogenesis, Testosterone, Female reproductive system: Ovulation, Menstrual cycle, Oogenesis, Tests for Ovulation, Oestrogen&Progesterone , Pregnancy test, Parturition. Contraceptives, Lactation: Composition of Milk, advantages of breast Feeding.	4
6	**Excretory System** General Introduction, structure & functions of kidney, Renal circulation, Glomerular filtration & tubular reabsorption, Nephron, Juxta Glomerular Apparatus,Mechanism of Urine formation, Micturition, Cystomatrogram.Diuretics, Artificial Kidney.	4
Total		**30hrs**

BCCT 107 P - Human Physiology Part II –(Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Recording of body temperature	30
2	Examination of sensory system	
3	Examination of motor system	
4	Examination of Eye	
5	Examination of ear	
Total		**30 hrs**

Textbooks:

1. Basics of medical Physiology –D Venkatesh and H.H Sudhakar, 3rd edition.
2. Principles of Physiology – DevasisPramanik, 5th edition.
3. Human Physiology for BDS –Dr A.K. Jain, 5th edition.
4. Textbook of human Physiology for dental students-Indukhurana 2nd edition.
5. Essentials of medical Physiology for dental students –Sembulingum.

Reference books:

1. Textbook of Medical Physiology, Guyton , 2nd South Asia Edition.
2. Textbook of Physiology Volume I & II (for MBBS) – Dr. A. K. Jain.
3. Comprehensive textbook of Medical Physiology Volume I & II – Dr. G. K. Pal.

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	General Microbiology
Course Code	BCCT 108 L

Teaching Objective	• To introduce basic principles and then applies clinical relevance in four segments of the academic preparation for paramedical: immunology, bacteriology, mycology, and virology. This rigorous course includes many etiological agents responsible for global infectious diseases.
Learning Outcomes	• Upon completion, students should be able to demonstrate knowledge of microorganisms and the disease process as well as aseptic and sterile techniques. • Perform microbiological laboratory procedures according to appropriate safety standards

Sr. No.	Topics	No. of Hrs.
1	**Concepts and Principles of Microbiology -** Historical Perspective, Koch's Postulates, Importance of Microbiology, Microscopy, Classification of Microbes.	4
2	**General Characters of Microbes -** Morphology, staining methods, Bacterial growth & nutrition, Culture media and culture methods +ABS, Collection of specimen, transport and processing, Antimicrobial mechanism and action, Drug Resistance minimization.	6
3	**Sterilization and Disinfection -** Concept of sterilization, Disinfection asepsis,Physical methods of Sterilization, Chemical methods (Disinfection), OT Sterlization, Biological waste and Biosafety & Biohazard.	5
4	**Infection and Infection Control -** Infection, Sources, portal of entry and exit, Standard (Universal) safety Precautions & hand hygiene, Hospital acquired infections & Hospital Infection Control	3
5	**Immunity -** Types Classification, Antigen, Antibody – Definition and types, Ag-Ab reactions – Types and examples, Procedure of Investigation & Confidentiality, Immunoprophylaris – Types of vaccines, cold chain, Immunization Schedule.	6
6	**Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory tests) –** Introduction, Gram Positive Cocci & Gram Negative Cocci, Enterobacteraecea& Gram negative bacilli, Mycobacteria, Anaerobic bacteria &Spirochaetes, Zoonotic diseases, Common Bacterial infections of eye.	7
7	**Mycology -** Introduction, Classification, outline of lab diagnosis, List of Fungi causing:Common fungal infections of eyes, Superficial Mycoses, Deep mycoses & opportunistic , Fungi.	3
8	**Virology -** Common Viral infection of eye, Introduction, General Properties, outline of lab diagnosis& Classification, HIV Virus, Hepatitis -B Virus.	4
9	**Parasitology** – Morphology, Life Cycle & Outline of Lab Diagnosis & Classification, Common parasite infection of eye, Protozoa- E, histolytica,Malarial Parasite, General properties, classification, list of diseases caused by:Cestodes and Trematodes, Intestinal Nematodes& Tissue Nematodes, Vectors.	7
Total		**45 hrs**

BCCT 108 P - General Microbiology (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Concepts and Principles of Microbiology	60
2	General Characters of Microbes	
3	Sterilization and Disinfection	
4	Infection and Infection Control	
5	Immunity	
6	Systemic Bacteriology (Morphology, diseases caused, specimen collection & lists of laboratory test)	
7	Mycology	
8	Virology	
9	Parasitology	
Total		**60 hrs**

Text Book:

1. Text Book of Microbiology for Nursing Students, AnantNarayanPanikar
2. Text Book of Ophthalmology, Khurana

Reference Book:

1. Text Book of Microbiology, Baveja.

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Basic Pathology & Hematology
Course Code	BCCT 109 L

Teaching Objective	• Understand the importance of clinical information in supporting a timely, accurate pathological diagnosis. • Describe normal and disordered hematopoiesis • Develop implement and monitor a personal continuing education strategy and critically appraise sources of pathology related medical information. • Describe mechanisms of oncogenesis&demonstrate an understanding of genetics and cytogenetics pertaining to hematology
Learning Outcomes	• The student should submit the appropriate tissue sections per protocol to demonstrate the lesion and other clinically-relevant information needed for the final pathologic report • To aid hematology in the reference ranges for hemoglobin, hematocrit, erythrocytes, and leukocytes in infants, children and adult.

Sr. No.	Topics	No. of Hrs.
1	Introduction to Pathology	1
2	Working and maintenance of instruments	2
3	General principles of Haematologytechniques, blood collection, anticoagulants, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report), platelet counts, cell counter working	10
4	Generalprinciplesof Histopathologytechniques collection, fixation, processing & routine staining	3
5	General principles of Cytopathology techniques collection, fixation, processing & routine staining	5
6	General principles of Clinical Pathology techniques samplecollection, processingforroutine test, normal urine & urine examination, urine strip, introductions to body fluids (Distinguish between Transudate and exudate)	10
7	Generalprinciplesof Blood Bank techniques antigen, antibody, ABO & Rh system	5
8	General principles of Autopsy & Museum	4
9	**GeneralPathologyincludingintroductionto :** I)Cell Injury (Reversible, Irreversible cell injury) II)Inflammation(Acute inflammation, cells, Chronic inflammation, granuloma and examples III)Circulatorydisturbances(Thrombosis, Embolism ,Edema- ascetic, pleural, pericardial- effusions, Shock, Allergy, Anaphylaxis-Definition, Morphological features,	8

	And distinguishing features) IV)Neoplasia (Definition of Anaplasia, dysplasia, metaplasia and metastasis and difference between benign and malignant lesions)	
10	**Systemicpathologybasis andmorphologyof common disorders like** I)Anemia(types-Iron deficiency, megaloblastic, Aplastic-Etiology, Pathogenesis Investigation)- II)Leukemia (Acute and chronic, Peripheral smear), AIDS(Definition, Pathogenesis, Mode of transmission, Two Confirmatory test Tridot, Western blot), Hepatitis (Types, Etiology, Mode of spread) III)Malaria-(Mode of spread IV)Tuberculosis-(Primary and secondary tb, Granuloma formation, Mode of transmission, Organs involved	8
11	Maintenance and medicolegal importance of records and specimens, Lab information system(LIMS)	3
12	Biomedical Waste, Universal Safety Precaution(Protocol to be followed after -Needle injury, chemical injury	1
Total		**60hrs**

BCCT 109 P – Basic Pathology & Hematology (Demonstration)

Sr. No.	Topics	No. of Hrs.
1	Working and maintenance of instruments,	60
2	General principles of Haematologytechniques, blood collection, anticoagulants, fixation, processing, routine staining, Haemoglobin, TLC, DLC, Peripheral smear (CBC report), platelet counts, cell counter working	
3	Generalprinciplesof Histopathologytechniques collection, fixation, processing & routine staining	
4	General principles of Cytopathology techniques collection, fixation, processing & routine staining	
5	General principles of Clinical Pathology techniques samplecollection, processingforroutinetest, normal urine & urine examination, urine strip, introductions to body fluids (Distinguish between Transudate and exudate)	
6	GeneralprinciplesofBloodBanktechniquesantigen, antibody, ABO & Rh system	
7	General principles of Autopsy & Museum	
Total		**60hrs**

Reference Books:

1. A *Handbook of Medical* Laboratory (Lab) Technology: *Editor*) *Second Edition*. *V.H. Talib* (Ed.).
2. Comprehensive Textbook Of Pathology For Nursing: Pathology Clinical Pathology Genetics. Ak Mandal Shramana Choudhury, Published by Avichal Publishing Compnay | Language English
3. Textbook of Medical Laboratory Technology- PrafulB. Godkar, Darshan P. Godkar
4. Medical Laboratory Technology. Methods and Interpretations – RamnikSood (volume 1&2)
5. Medical Laboratory technology a procedure manual for routine diagnostic test – vol – I, II, III. Kanai L. Mukharjee Tata Mc graw hill pub. New Delhi.
6. Practical Pathology P. Chakraborty Gargi Chakraborty New Central Book Agency, Kolkata.
7. Theory & Practice of Histological Techniques John D. Bancroft et.al. Churchill Livingstone Printed in China.
8. Histochemistry in Pathology M.I. Filipe et.al. Churchill Livingstone, London
9. Hand Book of Histopathological & Histochemical Techniques C.F.A. Culling Butterworths Company Ltd. London.
10. A Handbook of Medical Laboratory (Lab) Technology. By V.H Talib.

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Introduction to Quality and Patient safety
Course Code	BCCT 110 L

Teaching Objective	• The objective of the course is to help students understand the basic concepts of quality in health Care and develop skills to implement sustainable quality assurance program in the health system. • To understand the basics of emergency care and life support skills. • To Manage an emergency including moving a patient • To help prevent harm to workers, property, the environment and the general public. • To provide a broad understanding of the core subject areas of infection prevention and control. • To provide knowledge on the principles of on-site disaster management
Learning Outcomes	• Upon completion, Students should be able to apply healthcare quality improvement and patient safety principles, concepts, and methods at the micro-, meso-, and macro-system levels.

Sr. No.	Topics	No. of Hrs.
1	**Quality assurance and management** – Concepts of Quality of Care, Quality Improvement Approaches, Standards and Norms, Introduction to NABH guidelines	7
2	**Basics of emergency care and life support skills** - Basic life support (BLS), Vital signs and primary assessment, Basic emergency care – first aid and triage, Ventilations including use of bag-valve-masks (BVMs), Choking, rescue breathing methods, One- and Two-rescuer CPR	7
3	**Bio medical waste management and environment safety** -Definition of Biomedical Waste, Waste minimization, BMW – Segregation, collection, transportation, treatment and disposal (including color coding), Liquid BMW, Radioactive waste, Metals / Chemicals / Drug waste, BMW Management & methods of disinfection, Modern technology for handling BMW, Use of Personal protective equipment (PPE), Monitoring & controlling of cross infection (Protective devices)	8
4	**Infection prevention and control** - Evidence-based infection control principles and practices [such as sterilization, disinfection, effective hand hygiene and use of Personal protective equipment (PPE)],Prevention & control of common healthcare associated infections, Components of an effective infection control program, Guidelines (NABH and JCI) for Hospital Infection Control	8
5	**Antibiotic Resistance** - History of Antibiotics, How Resistance Happens and Spreads, Types of resistance- Intrinsic, Acquired, Passive, Trends in Drug Resistance, Actions to Fight Resistance, Bacterial persistence, Antibiotic sensitivity, Consequences of antibiotic resistance	8
6	**Disaster preparedness and management** - Fundamentals of emergency management, Psychological impact management, Resource management, Preparedness and risk reduction, information management, incident command and institutional mechanisms.	7
Total		**45 hrs**

Reference Books:

1. Washington Manual of Patient Safety and Quality Improvement Paperback – 2016 by Fondahn (Author)
2. Understanding Patient Safety, Second Edition by Robert Wachter (Author)
3. Handbook of Healthcare Quality & Patient Safety Author : Girdhar J Gyani, Alexander Thomas
4. Researching Patient Safety and Quality in Healthcare: A Nordic Perspective Karina Aase, LeneSchibevaag
5. Old) Handbook Of Healthcare Quality & Patient Safety by GyaniGirdhar J (Author)
6. Handbook of Healthcare Quality & Patient Safety by .Gyani G J/Thomas A
7. Quality Management in Hospitals by S. K. Jos

BCCT 111 P - Community orientation & clinical visit (including related practicals to the parent course)(Total -120 hrs)

SKILL ENHANCEMENT ELECTIVE COURSE

Name of the Programme	**B.Sc. Cardiac Care Technology**
Name of the Course	**Medical Bioethics & IPR**
Course Code	**SEC 001 L**

Teaching Objective	• To introduce the wide range of ethical issues in health care. • To provide basic skills in: A) Approaching ethical issues. B) Analysis and statement of issues. C) Understanding the relevant ethical principles invoked. • Imparting knowledge and skills that will enable students to develop ethical answers to these issues • To acquire acquire specialized knowledge of law and IPR. • The main objective of the IPR is to make the students aware of their rights for the protection of their invention done in their project work.
Learning Outcomes	• Upon successful completion of the course, students will be able to: Recognize what constitutes an ethical concern in health care • Understanding ethical issues in Health care. • Understand better the complexity and multi-dimensionality of medical ethical concerns and uniqueness of each problem. • Capacity to rationally justify your decision • Develop the ability to reason through difficult medical/clinical ethical issues both orally, in the context of a group of their peers, and through written • The students get awareness of acquiring the patent and copyright for their innovative works. • They also get the knowledge of plagiarism in their innovations which can be questioned legally.

Sr. No.	Topics	No. of Hrs.
1	**Introduction to Bioethics** Bioethical issues related to Healthcare &Medicine	5
2	**Anatomy -** Cadaver ethics, Human dignity, PNDT, Disposal of cadaver, Genetic Counseling	7
3	**Physiology -** Animal ethics, Health policy privacy	7
4	**Biochemistry & Pathology -** Prudence of investigation confidentiality, Patients bill of rights, Disposal of investigative material, Integrity, Blood transfusion	5
5	**Pharmacology -** Rational drug prescribing, Clinical trials, Risk minimization, Animal ethics	5
6	**Microbiology -** Hand wash, Drug resistance minimization, Prudence of investigation confidentiality, Sterilization procedure, Biosafety and bio hazard	5
7	**Medicolegal aspects of medical records**	3
8	**Introduction to Intellectual Property**: Concept of Intellectual Property Kinds of Intellectual Property Patents, CopyrightsDesigns, Trademarks,Geographical Indication, Infringement of IPR, Its protection and Remedies Licensing and its types	8
Total		**45hrs**

Reference Books:

1. Contemporary issues in bioethics – Beauchamp &walters (B&W) 4th edition.
2. Classic philosophical questions by Gloud (8th Edition)
3. Case book series and booklets by UNESCO Bioethics Core curriculum 2008
4. Encyclopedia of Bioethics 5 vol set, (2003) ISBN-10: 0028657748
5. Intellectual property rights- Ganguli-Tat McGrawhill. (2001) ISBN-10: 0074638602,
6. Intellectual Property Right- Wattal- Oxford Publicatiopn House.(1997) ISBN:0195905024.

Name of the Programme	**B.Sc. Cardiac Care Technology**
Name of the Course	**Human Rights &Professional Values**
Course Code	**SEC 002 L**

Teaching Objective	• To understand interaction between society and educational institutions. • To sensitize the citizens so that the norms and values of human rights and duties of education programme are realized. • To encourage research activities. • To encourage research studies concerning the relationship between Human Rights and Duties Education.
Learning Outcomes	•This course will aim at making the learners acquire conceptual clarity and develop respect for norms and values of freedom, equality, fraternity and justice. • It will include awareness of civil society organizations and movements promoting human rights. • This will make the students realize the difference between the values of human rights and their duties

Sr. No.	Topics	No. of Hrs.
1	**Background -** Introduction, Meaning, Nature and Scope, Development of Human Rights, Theories of Rights, Types of Rights	6
2	**Human rights at various level-** Human Rights at Global Level UNO, **Instruments**: U.N. Commission for Human Rights,European Convention on Human Rights.	6
3	**Human rights in India -** Development of Human Rights in India, Human Rights and the Constitution of India, Protection of Human Rights Act 1993- National Human Rights Commission, State Human Rights Commission, Composition Powers and Functions, National Commission for Minorities, SC/ST and Woman	7
4	**Human Rights Violations -**Human Rights Violations against Women, Children, Violations against Minorities SC/ST and Trans-genders, Preventive Measures.	6
5	**Professional values-** Integrity, Objectivity, Professional competence and due care, Confidentiality	6
6	**Personal values-** ethical or moral values, Attitude and behavior- professional behavior, treating people equally	6
7	**Code of conduct-** professional accountability and responsibility, misconduct, Cultural issues in the healthcare environment	8
Total		**45hrs**

Reference Books:

1. JagannathMohanty Teaching of Human sRights New Trends and Innovations Deep & Deep Publications Pvt. Ltd. New Delhi2009
2. Ram Ahuja: Violence Against Women Rawat Publications Jewahar Nager Jaipur.1998.
3. SivagamiParmasivam Human Rights Salem 2008
4. Hingorani R.C.: Human Rights in India: Oxford and IBA New Delhi.

SECOND YEAR

(B.Sc. Cardiac Care Technology)

SEMESTER-III

Code No.	Core Subjects
Theory	
BCCT 112 L	Applied Anatomy,Physiology,Pharmacology in Cardiac Care
BCCT 113 L	Basic Electrocardiography
BCCT 114 L	Basic Echocardiography
BCCT 115 CP	CCT Directed Clinical Education-I
Practical	
BCCT 113 P	Basic Electrocardiography
BCCT 114 P	Basic Echocardiography
Generic Elective Course	
GEC 001 L	Pursuit of Inner Self Excellence (POIS)
GEC 002 L	Organizational Behavior

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Applied Anatomy, Physiology, Pharmacology in Cardiac care
Course Code	BCCT 112 L

Teaching Objective	•Describe the structure and function of the heart including the electrical activity involved in the normal and abnormal cardiac cycle. •Describe the structure and function of the myocytes & function of the peripheral and coronary circulatory systems at rest and during physical activity •Discuss Anatomy of Coronaries of Heart •Discuss the factors which impact the cardiac output and identify those factors impacted by physical activity and environmental factors •To understand Indication and Contraindications, Uses and Adverse effects of drugs, Mechanism of Action
Learning Outcomes	•To understand Coronary Anatomy •To enable students, differentiate between normal heart sounds and murmurs. •To enable students, a preliminary understanding of the circulatory system from a physiological and functional perspective, as well as related terminologies. •Students will be proficient in Pharmacology with proficient knowledge about the different drugs / medicines to be given in various cardiovascular diseases, dose calculation and mode of administration. •Also recent advances in pharmacology will play a key role in research aspect of the students.

Sr. No.	Topics	No. of Hrs.
1.	**ANATOMY OF CARDIOVASCULAR SYSTEM:** Anatomy of Arteries and arterioles, Anatomy of Aorta, Capillaries and sinusoids, Anastomoses, Veins and venules, Anatomy of Coronary arteries: Left and Right	6
2.	**PHYSIOLOGY OF CARDIOVASCULAR SYSTEM:** Physiology of Aorta, Physiology of Carotid Bifurcation, Systemic, Pulmonary, Coronary and Portal circulation, Nerve supply of the heart, Major Arteries and Veins supplying Head, Neck and Thorax, Major Arteries and Veins of Upper limb, Major Arteries and Veins of Pelvis and Lower Limb.	6
3.	**ANATOMY OF HEART:** Surface anatomy of heart, Structure of the heart, Surface and Borders, Pericardium, Myocardium and Endocardium, Chambers: Right Atrium (Venous Area, Septum, Atrial Appendage), Right ventricle: (Inflow, Atrial Sinus, Outflow), Left Atrium (Venous, Ventricular Septum, Appendage, MV), Left Ventricle (Inflow, Body, Outflow), Anatomy of SA node and AV node, Anatomy of Cardiac Valves: Eustachian, Thebesian, A-V Valves, Semilunar Valves, Valve Apparatus	8

4.	**BLOOD VESSELS AND HEMODYNAMICS:** Regulation of Blood pressure: Hormonal and Neural regulation, Pulse and sites for pulse assessment, Shock and Homeostasis,	4
5.	**CLINICAL PATHOLOGIES IN PHYSIOLOGY OF CVS:** Coronary Artery Disease (CAD), Congestive Heart Failure (CHF), and Atherosclerosis, Shock and Hemorrhage, Syncope, Hypertension.	8
6.	**GENERAL PHARMACOLOGY:** Sources of drugs, Route of drug administration, Pharmacokinetics, Pharmacodynamics, First pass metabolism, Adverse drug reactions	8
7.	**DRUGS USED IN CARDIOVASCULAR SYSTEM (with its MOA, ADRs, Indications and complications):** Anti-Hypertensives, Anti- Anginal Agents, Anti-Failure Agents, Anti-Arrhythmic Agents, Antithrombotic Agents	8
8.	**DRUGS USED IN NERVOUS SYSTEM (with its MOA, ADRs, Indications and complications):** Anticholinergics & Adrenergic, Narcotics, Sedatives & Hypnotics	6
9.	**MISCELLANEOUS:** IV Fluids, Neuromuscular blockers, Electrolyte supplements, Antihistamines, Protamine, Emergency drugs- Atropine, Adrenaline, Steroids, Sodium bicarbonate	6
Total		**60 hrs**

Recommended Learning Resources:

Text Books:

1. Textbook of Anatomy (Vol.1,2,3): B.D. Chaurasia
2. Ross and Wilson Anatomy & Physiology in Health and Illness, 12th Edition by Anne Waugh and Allison Grant
3. Principles of Anatomy & Physiology ,12th Edition by Gerard J. Tortora& Bryan Derrickson
4. Textbook of Physiology (Vol.1,2): Dr. A.K. Jain
5. Essentials of Medical Physiology, Sixth Edition by K Sembulingam and PremaSembulingam
6. Physical Examination of the Heart and Circulation, Fourth Edition by Joseph K. Perloff
7. Pharmacology for Physiotherapy by PadmajaUdaykumar.
8. Drugs for the Heart, South Asia edition by Lionel H. Opie and Bernard J. Gersh
9. R. S. Satoskar, S.D. Bhandarkar, S. S. Ainapure, Pharmacology and Pharmacotherapeutics, 18th Edition
10. K.D. Tripathi, Essentials of Medical Pharmacology, V. Edition, M/s. Jaypee Brothers, Post Box, 7193, G-16, EMCA House, 23/23, Bansari Road, Daryaganj, New Delhi

Reference books or related websites:www.osmosis.org

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Basic Electrocardiography
Course Code	BCCT 113 L

Teaching Objective	•To enable students, understand the correct placement of all electrodes •To demonstrate patient positioning and preparation •To teach students about maintenance of the ECG machine, wires and electrodes.
Learning Outcomes	•To develop understanding regarding Electrocardiography and its procedure. •Describe the proper hook-up procedure for a 12-Lead ECG •Identify basic normal ECG waveform morphology and common interpretation. •Enumerate the measures to be taken before, after and during ECG procedure.

Sr. No.	Topics	No. of Hrs.
1	**BASIC ELECTROPHYSIOLOGY:** Heart: An electrical field, Electrical and Mechanical properties of the heart, Cardiac electrical field generation during activation, Cardiac wave fronts - Action potential: Repolarization and Depolarization, Cardiac electrical field generation during ventricular recovery, Conduction system of the heart: In detail	6
2	**BASICS OF ELECTRODE PLACEMENT AND LEAD SELECTION AND AXIS DEVIATION:** Basics of Electrodes and Leads, ECG deflections: Isoelectric, Upright, Negative and Biphasic, Types of ECG leads- Standard limb leads, Precordial leads and the Wisdom central, Augmented limb leads, Unipolar V/S Bipolar leads, Placement of leads with universal color code, Hexa-axial reference frame and Electrical axis, X axis – time presentation, Y axis – voltage presentation, Right & Left axis in normal ECG, Einthoven's Triangle, Deviation of Axis.	6
3	**BASICS OF STRESS TEST:** Protocols, lead placement, instruction to the patient, rhythm analysis.	5
4	**ECG COMPONENTS-WAVES AND INTERVALS:** ECG waveforms: Rate, Rhythm and Normal time intervals-The Normal Electrocardiogram, The Normal P wave & Atrial repolarization, Atrioventricular node conduction and the PR segment, Ventricular activation and the QRS complex, Genesis of QRS complex, Ventricular recovery and ST-T wave, Normal variants and Rotation of the heart, ECG PAPER,Rate measurement: Six second method, Large box method, Small box method	6
5	**SINUS RHYTHMS & ATRIOVENTRICULAR BLOCKS (Description, Possible causes, ECG criteria, Plan of assessment, Potential treatments):** Normal Sinus Rhythm, Sinus Bradycardia, Sinus Tachycardia, 1st Degree AV block, 2nd Degree AV	8

	block: Type-I or Mobitz-I, 2nd Degree AV block: Type-II or Mobitz-II, 3rd Degree AV block/ CHB	
6	**BASICS OF ECG INTERPRETATION:** Basic steps for interpretation- Rate, Rhythm, P-wave examination, P to R interval, QRS width, Rhythm interpretation	6
7	**ATRIAL & VENTRICULAR ARRHYTHMIAS (Description, Possible causes, ECG criteria, Plan of assessment, Potential treatments):** Premature Atrial Contractions (PACs), Atrial Flutter (AF), Atrial Fibrillation (A. Fib), Paroxysmal Atrial Tachycardia, Premature Ventricular Contractions (PVCs), Ventricular Tachycardia (V. Tach), Supraventricular Tachycardia (SVT), Ventricular Fibrillation (V. Fib), Asystole	8
Total		**45hrs**

BCCT 113 P – Basic Electrocardiography

Sr. No.	Topics	No. of Hrs.
1	Steps to perform an ECG	5
2	Patient positioning according to various conditions.	5
3	Proper communication with patient to find out the history	5
4	ECG machine operating and maintenance	5
5	Maintain ECG catalogue for self-assessment	5
6	Common errors in ECG recording	5
Total		**30 hrs**

Recommended Learning Resources:

Text Books:

1. ECG Made Easy –AtulLuthra
2. Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test
3. An Introduction to Electrocardiography:Schamroth Colin
4. Clinical Electrocardiography: Goldberger. A

Reference books or related websites:www.osmosis.org

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Basic Echocardiography
Course Code	BCCT 114 L

Teaching Objective	•To provide a brief introduction to Echocardiography, its techniques and types of Echocardiography. •To provide practically and clinically useful application of Echocardiography. •To explain echo techniques xavailable and to put echo into a clinical perspective.
Learning Outcomes	•To develop an understanding regarding Echocardiography. •To train students to perform Echocardiography examinations by explaining the position of transducers. •To make students aware of recent advances in Echocardiography. •To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing individually.

Sr. No.	Topics	No. of Hrs.
1	**INTRODUCTION TO ECHOCARDIOGRAPHY:** Basics Of Ultrasound Waves, Characteristics Of: Sound Wave, Frequency And Attenuation, Basic Principle Of Echocardiography, Indications Of Echocardiography, Types Of Echocardiography, Importance Of Gel In Echocardiography	2
2	**MURMURS:** Types Of Murmurs Heard In Echocardiography- Systolic And Diastolic Murmurs, Possible Causes Of Murmurs, Conditions Associated With Murmurs, Features Of Murmurs Suggesting Echocardiography	2
3	**ECHOCARDIOGRAPHY TECHNIQUES: BASIC PRINCIPLES, INDICATIONS AND USES OF:** 2D Transthoracic Echocardiography, M-Mode, Echo Windows And Views Used In Transthoracic Echocardiography, Doppler Echocardiography In Detail: Pulsed, Continuous Wave And Color Flow Mapping	2
4	**KNOBOLOGY AND INSTRUMENTATION:** Transducer: Basic Principle And Working, Types Of Transducers, Piezoelectric Crystals And Its Effect, Various Knobs Used On Echo Machine With Its Description And Application	2
5	**CARDIAC ASSESSMENT:** Measurement Of Cardiac Dimensions, Basics Of:EvaluationOf Systolic And Diastolic Left Ventricular Function, Ejection Fraction, Fractional Shortening,RegionalWall Motion Abnormalities: Classification**,** Stroke Volume And Cardiac Output Assessment**,** TransvalvularGradients And Orifice Area	3
6	**DOPPLER EFFECT:** Basics Of Doppler, Applications Of Doppler, Types Of Doppler, Continuity Equation	2
7	**ECHOCARDIOGRAPHY ASSESSMENT IN VALVULAR HEART DISEASE:** Role Of Echo In Assessment Of ValvularHeart Diseases, 2D Findings, Doppler Calculations, M-Mode Findings And Views Seen In: Mitral Regurgitation, Mitral Stenosis With Different Types Of M-Mode Pattern, Mitral Valve Prolapse, Aortic Regurgitation, Aortic Stenosis: Types Of AS, Infective Endocarditis, Tricuspid Regurgitation, Tricuspid Stenosis, Pulmonary Regurgitation,	4

	Pulmonary Stenosis	
8	**BASICS OF TOE, STRESS ECHO &CONTRAST ECHO:**Advantages&Disadvantages, Applications, Indications &Contraindications, Complications, Patient Positioning And Medications Used	3
9	**ECHO IN SPECIAL HOSPITAL SETTINGS:** Clinical Uses Of Echocardiography In: Preoperative Cases, Intraoperative Cases, Intensive Care Unit (ICU), Coronary Care Unit (CCU), Cardiac Catheterization Laboratory (CCL), Accident &Emergency (A&E) Department, Portable (Hand-Held) Echo.	2
10	**ECHO ASSESSMENT IN CAD:** Assessment Of Ischemia, Assessment Of Myocardial Infarction, Complications Of MI Detection By Echo, Myocardial Hibernation	2
11	**ARTIFICIAL (PROSTHETIC) VALVES:** Basics Of Artificial Valves, Types Of Artificial Valves, Echo Examination Of Prosthetic Valve, Basics Of Prosthetic Valve Malfunction, Echo Assessment Of: Endocarditis, Thrombus, Dehiscence, Regurgitation, Variance, Degeneration	2
12	**HYPERTENSION AND LVH:** Indications For Echo In Hypertension, Echo Findings In Hypertension, Left Ventricular Hypertrophy: Echo Findings	2
13	**SCREENING AND FOLLOW-UP ECHO:** Good Indications For Screening Echo, Less Clear-Cut Indications For Screening Echo, Follow-Up Echo	2
Total		**30 hrs**

BCCT 114 P Basic Echocardiography

Sr. No.	Topics	No. of Hrs.
1	Learn about Probe and Scanner settings.	**15**
2	Learn about Structural and Functional assessment of the heart.	**15**
3	Learn about various windows and views used in Echocardiography.	**15**
4	Learn about qualitative reporting system along with various software's associated with Echo reporting.	**15**
Total		**60 hrs**

Recommended Text Books:

1. Echo Made Easy: Sam Kaddoura
2. Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
3. Feigen Baum's Echocardiography
4. Tajik Jamil for Echocardiography.

Reference books or related websites:www.123sonography.com

Course code- BCCT 115 CP: CCT Directed Clinical Education – I

Students will gain additional skills in clinical procedures, interaction with patients and professional personnel. Students will apply knowledge from clinical learning experience under the supervision of a Cardiologist or senior technologist Students are tested on intermediate clinical cardiac care skills.
(Total- 405 hrs)

GENERIC ELECTIVE COURSE

Name of the Programme	**B.Sc. Cardiac Care Technology**
Name of the Course	**Pursuit of Inner Self Excellence (POIS)**
Course Code	**GEC 001 L**

Teaching Objective	• To inculcate moral values in students – Self-Discipline , Time Management, Develop attitude of Service with humility, Empathy, Compassion, brotherhood, Respect for teachers, colleagues & society members. • Develop Effective means of communication & presentation skills in students • To develop wisdom in students for deciding their career based on their areas of interest and inner skills. • Introduce techniques for Relaxation, Meditation & Connecting with innerself. • Rejuvenation Techniques which can be used by students to distress themselves •To improve performance of students during various assignments, projects, elocutions, events, quiz, interviews.
Learning Outcomes	• Students will become self dependent, more decisive and develop intuitive ability for their study and career related matter. • Student's ability to present their ideas will be developed. •Enhanced communication skills, public speaking & improved Presentation ability. • Students will be able to explore their inner potential and inner ability to become a successful researcher or technician & hence become more focused. • Students will observe significant reduction in stress level. • With the development of personal attributes like Empathy, Compassion, Service, Love & brotherhood, students will serve the society and industry in better way with teamwork and thus grow professionally.

Sr. No.	Topics	No. of Hrs.
1	**Spiritual Values for human excellence :** The value of human integration; Compassion, universal love and brotherhood (Universal Prayer) ; Heart based living ; Silence and its values, Peace and non-violence in thought, word and deed ; Ancient treasure of values - Shatsampatti , Patanjali'sAshtanga Yoga ,Vedic education - The	10

	role of the Acharya , values drawn from various cultures and religious practices - Ubuntu, Buddism, etc.; Why spirituality? Concept – significance ; Thought culture	
2	**Ways and Means :** Correlation between the values and the subjects ;Different teaching techniques to impart value education; Introduction to Brighter Minds initiative; Principles of Communication; Inspiration from the lives of Masters for spiritual values - Role of the living Master	15
3	**Integrating spiritual values and life:** Relevance of VBSE (Value Based Spiritual Education) in contemporary life ; Significant spiritual values ; Spiritual destiny ; Principles of Self-management; Designing destiny	10
4	**Experiencing through the heart for self-transformation (Heartfulness Meditation):** Who am I? ; Introduction to Relaxation; Why, what and how HFN Meditation?; Journal writing for Self-Observation ; Why, what and how HFN Rejuvenation (Cleaning)? ; Why, what and how HFN connect to Self (Prayer)?; Pursuit of inner self excellence ; Collective Consciousness-concept of *egregore effect;*	10
Total		**45 hrs**

Books:

- The Art of Learning: **A Journey in the Pursuit of Excellence,** Josh Waitzkin, Simon and Schuster, 2007
- Reality at Dawn. By Shri Ram Chandra, Published by ISRC

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Organizational Behavior
Course Code	GEC 002 L

Teaching Objective	• To understand the initial insights into underlying principles and fundamental theories of organizational behaviour. • The Student should develop a sense of what falls under the domain of organizationalbehaviour. • He should develop an understanding of academic views on the behaviour and motivations of people in organizations and the purposes of organizations. • This course clearly takes an academic and scientific lens with the aim of understanding human behaviour in organizations.
Learning Outcomes	• Describe and apply motivation theories to team and organizational scenarios in order achieve a team's or an organization's goals and objectives. • Explain the effect of personality, attitudes, perceptions and attributions on their own and other's behaviours in team and organizational settings. • Explain types of teams and apply team development, team effectiveness, and group decision making models and techniques. Analyse and apply leadership theories and better understand their own leadership style.

Sr. No.	Topics	No. of Hrs.
1	Organizational Behavior - Definition - Importance - Historical Background - Fundamental concepts of OB - 21st Century corporate - Different models of OB i.e. autocratic, custodial, supportive	6
2	**Organization Structure and Design** - Authority and Responsibility Relationships - Delegation of Authority and Decentralization - Interdepartmental Coordination - Emerging Trends in Corporate Structure, Strategy and Culture - Impact of Technology on Organizational design - Mechanistic vs Adoptive Structures – Formal and Informal Organization	8
3	Perception Process - Nature & Importance - Perceptual Selectivity - Perceptual Organization - Social Perception - Impression Management	6
4	Learning - Process of Learning - Principles of Learning - Organizational Reward Systems - BehavioralManagement	6
5	Motivation - Motives - Characteristics - Classification of motives - Primary Motives - Secondary motives - Morale - Definition and relationship with productivity - MoraleIndicators	6
6	Leadership - Definition - Importance - Leadership Styles - Models and Theories of LeadershipStyles	7

7	Conflict Management - Traditional vis-a-vis Modern view of conflict - Constructive and Destructive conflict - Conflict Process - Strategies for encouraging constructive conflict - Strategies for resolving destructiveconflict	6
Total		**45 hrs**

Books:

1. Organizational Behavior, 9th Ed. - Stephen Robbins
2. Human Behaviour at work - Davis and Newstorm
3. Organizational Behaviour - Uma Sekaran
4. Organizational Behaviour - Fred Luthans
5. Organizational Behaviour - K.Aswathappa
6. Human Behaviour at Work - Keith Davis
7. Organizational Behaviour - Jit S.Chandran
8. Human Relations & Organizational Behaviour - R.S.Dwivedi
9. Organizational Behaviour - McShane

SECOND YEAR

B.Sc. Cardiac Care Technology

SEMESTER-IV

Code No.	Core Subjects
Theory	
BCCT 116 L	Development of Cardiovascular system: Fetal & Neonatal
BCCT 117 L	Cardiovascular diseases pertinent to Cardiac care technology
BCCT 118 L	Medical Instrumentation relevant to Cardiac care
BCCT 119 CP	CCT Directed Clinical Education-II
Practical	
BCCT 118 P	Medical Instrumentation relevant to Cardiac care
Ability Enhancement Elective Course	
AEC 003 L	Computer and Applications
AEC 004 L	Biostatistics and Research Methodology

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Development of Cardiovascular system: Fetal & Neonatal
Course Code	BCCT 116 L

Teaching Objective	•To understand the description of fate of certain fetal structures once postnatal circulation is established. •To provide an outline of Cardiovascular Anatomy to improve the student's understanding of the technical and diagnostic procedures used with special emphasis on applied aspects in Cardiology
Learning Outcomes	•This course will provide overall information of the structural development of the cardiovascular system. •To encourage student to apply this knowledge to understand developmental anomalies in Cardiovascular System.

Sr. No.	Topics	No. of Hrs.
1	**EARLY DEVELOPMENT OF EMBRYO:** Early development of embryo, Early blood vessel formation, Intra-embryonic blood vessel, Extra-embryonic blood vessel	8
2	**DEVELOPMENT OF THE HEART:** Formation and position of the heart tube, Formation and position of the heart loop, Mechanism of cardiac looping, Formation of the embryonic ventricle, Development of the sinus venosus, Formation of the cardiac septa, Atrial septation, The atrio-ventricular canal, The muscular interventricular septum, The septum in truncus arteriosus and the cordis conus	10
3	**FORMATION OF THE CARDIAC VALVES:** Formation of the cardiac valves, The atrioventricular valve, The semilunar valve.	4
4	**FORMATION OF THE GREAT SYSTEMIC VEINS:** The cardiac veins, The vitelline veins, The umbilical veins, The vena cava	4
5	**FETAL & NEONATAL CIRCULATION:** Blood flow pattern, oxygenation &venous return to the heart, Cardiac output and its distribution, Intra - cardiac vascular pressure, Myocardial function & its energy metabolism	6
6	**CHARACTERISTICS OF FETAL CIRCULATION AND CHANGES OCCUR AT BIRTH:** Postnatal circulation in detail	4
7	**ETIOLOGY OF CARDIOVASCULAR MALFORMATION:** Congenital anomalies in detail	6
8	**ADULT CIRCULATION:** Systemic Circulation, Pulmonary Circulation	3
	Total	**45hrs**

Recommended Learning Resources:

Text Books:

1. Ross and Wilson Anatomy & Physiology in Health and Illness, 12th Edition by Anne Waugh and Allison Grant
2. Principles of Anatomy & Physiology ,12th Edition by Gerard J. Tortora& Bryan Derrickson
3. Human Embryology; Inderbir Singh

Reference books or related websites:www.osmosis.org , www.khanacademy.org

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Cardiovascular Diseases Pertinent to Cardiac Care Technology
Course Code	BCCT 117 L

Teaching Objective	•To know the Definition and Pathophysiology of Cardiovascular diseases Classification, Etiology, Clinical features, Diagnosis & Management of Diseases
Learning Outcomes	•This course will cover common Cardiovascular Diseases, their related pathology and microbiology. •Along with outline of clinical presentation and management of these conditions it also includes Medical and Surgical interventions.

Sr. No.	Topics	No. of Hrs.
1	**VALVULAR HEART DISEASE:** Acquired Valvular heart disease, **Rheumatic fever and Rheumatic heart disease:** Aortic stenosis, Aortic regurgitation, Mitral valve disease, Mitral stenosis, Mitral regulation, Combined valvular heart disease, Tricuspid valve disease, Infective endocarditis	6
2	**CORONARY ARTERY DISEASE:** Pathophysiology and clinical recognitionof Angina Pectoris, Pathophysiology of Coronary Artery Disease**,** Myocardial Infarction, Treatment for Coronary Artery Disease	5
3	**HYPERTENSION:** Etiology of Hypertension, Systemic hypertension, Essential and secondary hypertension, Treatment for hypertension, DASH diet, Pulmonary Hypertension, Pulmonary thrombo-embolism	4
4	**HEART FAILURE: Types of Heart failure-** Left, Right, Biventricular, Acute Decompensated Heart Failure, Pathophysiology of Heart failure, Causes, Signs and symptoms, Medical management, Surgical treatment	6
5	**MYOCARDIAL DISEASES:** Dilated cardiomyopathy, Hypertrophic cardiomyopathy, Restrictive cardiomyopathy**,** Myocarditis	4
6	**CONGENITAL HEART DISEASES: Acyanotic heart disease -**Atrial septal defect (ASD), Ventricular septal defect (VSD), Patent ductus arteriosus (PDA), Coarctation of Aorta (CoA), **Cyanotic congenital heart disease -** Tetralogy of Fallot (TOF), Double Outlet Right Ventricle (DORV), Pulmonary Atresia, Transposition of Great Arteries (TGA)**,** Total Anomalous Pulmonary Venous Connection (TAPVC)	8
7	**PERICARDIAL DISEASES:** Pericardial effusion, Constrictive pericarditis**,** Cardiac tamponade, Pericardiocentesis	4
8	**PERIPHERAL VASCULAR DISEASE:** Atherosclerotic peripheral vascular disease, Aortic aneurysms, Aortic dissection, Takayasus arteritis	4
9	**CARDIAC ARREST:** Classification, 6 H's and 6 T's, Signs and Symptoms, Diagnosis, Treatment	2
10.	**COPD:** Causes,Stages of COPD (Stage 1-4),Signs and Symptoms, Diagnosis, Treatment: Medication, Dietary changes, Lifestyle changes	2
	Total	**45hrs**

Recommended Learning Resources:

Text Books:

1. Ross and Wilson Anatomy & Physiology in Health and Illness, 12th Edition by Anne Waugh and Allison Grant
2. Principles of Anatomy & Physiology ,12th Edition by Gerard J. Tortora& Bryan Derrickson
3. Essentials of Medical Physiology, Sixth Edition by K Sembulingam and PremaSembulingam
4. Physical Examination of the Heart and Circulation, Fourth Edition by Joseph K. Perloff

Reference books or related websites:www.osmosis.org

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Medical Instrumentation relevant to Cardiac Care
Course Code	BCCT 118 L

Teaching Objective	• To introduce Biomedical applications of different transducers used. • To introduce the student to the various sensing and measurement devices of electrical origin. • To provide awareness of electrical safety of medical equipment. • To provide the latest ideas on devices of non-electrical devices. • To bring out the important and modern methods of imaging techniques. • To provide latest knowledge of medical assistance / techniques and therapeutic equipment.
Learning Outcomes	• The course is designed to make the student acquire an adequate knowledge of the physiological systems of the human body and relate them to the parameters that have clinical importance. • The fundamental principles of equipment that are actually in use at the present day are introduced. • To train the student in various recording techniques of the machines which will increase their efficiency in the healthcare industry or they will be the best helping hand for biomedical engineers.

Sr. No.	Topics	No. of Hrs.
1.	**INTRODUCTION TO MEDICAL PHYSICS:** Basics, Indications, Outcome, Machines related to Medical Physics.	4
2.	**ELECTRO – PHYSIOLOGICAL MEASUREMENTS:** Electrodes – Limb electrodes, floating electrodes, pregelled disposable electrodes, Microneedle and surface electrodes, ECG: Lead systems and recording methods, Typical waveforms, Electrical safety in medical environment: shock hazards, leakage current, Instruments for checking safety parameters of biomedical equipment, Transducers:selection criteria, Piezo electric ultrasonic transducers.	8
3.	**NON-ELECTRICAL PARAMETER MEASUREMENTS:** Measurement of blood pressure, Cardiac output, Stethoscope: Heart rate, Heart sound, ACT, Pulmonary function measurements – Spirometer, Photo Plethysmography, Body Plethysmography, Blood Gas analyzers: pH of blood, measurement of blood pCO2, pO2, finger-tip oximeter - ESR, GSR measurements.	8
4.	**ASSISTING AND THERAPEUTIC EQUIPMENTS:** Types of Pacemakers, Types of Defibrillators, Ventilators- Types of Ventilators	4
5.	**MEDICAL IMAGING:** C-Arm, Coronary Computer tomography & MRI, TLD, Radiographic and fluoroscopic techniques: Echocardiography: TTE, TEE, Stress Echo, Coronary Angiography, PTCA	6
	Total	**30 hrs**

BCCT 118 P Medical Instrumentation relevant to Cardiac care

Sr. No.	Topics	No. of Hrs.
1	ECG Machine	6
2	Stress Test Machine	6
3	Patient monitor	6
4	Central Monitoring System	6
5	Sphygmomanometer	6
6	Pulse Oximeter	6
7	Stethoscope	6
8	Defibrillators	6
9	Pressure transducers	6
10	Techniques of monitoring radiation exposure	6
Total		**60 hrs**

Recommended Learning Resources:

Text Books:

1. R. S. Khandpur, 'Hand Book of Bio-Medical instrumentation', Tata McGraw Hill Publishing Co Ltd.,2003.
2. Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, 'Bio-Medical Instrumentation and Measurements', II edition, Pearson Education, 2002 / PHI

Reference books or related websites:

1. M. Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.
2. L.A. Geddes and L.E. Baker, 'Principles of Applied Bio-Medical Instrumentation', John Wiley & Sons, 1975.
3. J. Webster, 'Medical Instrumentation', John Wiley & Sons, 1995.
4. C. Rajarao and S.K. Guha, 'Principles of Medical Electronics and Bio-medical Instrumentation', Universities press (India) Ltd, Orient Longman ltd, 2000.

Course code- BCCT 119 CP: CCT Directed Clinical Education – II

Students will gain additional skills in medical equipment and radiation safety techniques. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate technical skills.
(Total-405 hrs)

ABILITY ENHANCEMENT ELECTIVE COURSE

Name of the Programme	**B.Sc. Cardiac Care Technology**
Name of the Course	**Computer and Applications**
Course Code	**AEC 003 L**

Teaching Objective	• Learn IT applications in medicine and allied health care field. • Introduction to health informatics. • Understand the theories and practices adopted in Hospital Information Systems in the light of medical standards, medical data formats and recent trends in Hospital Information Systems.
Learning Outcomes	• Discuss about health informatics and different IT applications in allied health care. • Explain the function of Hospital Information Systems • Analyze medical standards

Sr. No.	Topics	No. of Hrs.
1	Introduction to computer: Introduction, characteristics of computer, block diagram of computer, generations of computer, computer languages.	1
2	Input output devices: Input devices(keyboard, point and draw devices, data scanning devices, digitizer, electronic card reader, voice recognition devices, vision-input devices), output devices(monitors, pointers, plotters, screen image projector, voice response systems).	3
3	Processor and memory: The Central Processing Unit (CPU), main memory.	4
4	Storage Devices: Sequential and direct access devices, magnetic tape, magnetic disk, optical disk, mass storage devices.	3
5	Introduction of windows: History, features, desktop, taskbar, icons on the desktop, operation with folder, creating shortcuts, operation with windows (opening, closing, moving, resizing, minimizing and maximizing, etc.).	5
6	Introduction to MS-Word: introduction, components of a word window, creating, opening and inserting files, editing a document file, page setting and formatting the text, saving the document, spell checking, printing the document file, creating and editing of table, mail merge.	5
7	Introduction to Excel: introduction, about worksheet, entering information, saving workbooks and formatting, printing the worksheet, creating graphs.	5
8	Introduction to power-point: introduction, creating and manipulating presentation, views, formatting and enhancing text, slide with graphs.	5
9	Introduction of Operating System: introduction, operating system concepts, types of operating system.	4

10	Computer networks: introduction, types of network (LAN, MAN, WAN, Internet, Intranet), network topologies (star, ring, bus, mesh, tree, hybrid), components of network.	5
11	Internet and its Applications: definition, brief history, basic services (E-Mail, File Transfer Protocol, telnet, the World Wide Web (WWW)), www browsers, use of the internet.	4
12	Application of Computers in clinical settings.	1
Total		**45 hrs**

Text books:

(1) Mausner&bahn : Epidemiology-An Introductory text, 2nd Ed.,W.B.Saunders Co.
(2) Richard f. Morton & j. Richard hebd : A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.
(3) Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Biostatistics and Research Methodology
Course Code	AEC 004 L

Teaching Objective	• To enable students to present, analyze and interpret data. • To enable students to use concepts of probability in business situations. • To enable students to make inferences from samples drawn from large datasets. • To enable students to apply univariate and multivariate statistical techniques.
Learning Outcomes	• To understand the importance & Methodology for research • To learn in detail about sampling, probability and sampling distribution, significance tests correlation and regression, sample size determination, study design and multivariate analysis.

Sr. No.	Topics	No. of Hrs.
1	Introduction to research methods	5
2	Identifying research problem	5
3	Ethical issues in research	5
4	Research design	5
5	Basic Concepts of Biostatistics	5
6	Types of Data	5
7	Research tools and Data collection methods	5
8	Sampling methods	5
9	Developing a research proposal	5
Total		**45 hrs**

Text books:

(1) Mausner&bahn : Epidemiology-An Introductory text, 2nd Ed.,W.B.Saunders Co.
(2) Richard f. Morton & j. Richard hebd : A study guide to Epidemiology and Biostatistics, 2nd Ed., University Park Press, Baltimore.
(3) Sylvia W Smoller, J Smoller, Biostatistics & Epidemiology A Primer for health and Biomedical professionals, 4th edition, Springs, 2015

THIRD YEAR

(B.Sc. Cardiac Care Technology)

SEMESTER-V

Code No.	Core Subjects
Theory	
BCCT 120 L	Advanced Electrocardiography
BCCT 121 L	Advanced Echocardiography
BCCT 122 L	Invasive Cardiology
BCCT 123 CP	CCT Directed Clinical Education-III
Practical	
BCCT 120 P	Advanced Electrocardiography
BCCT 121 P	Advanced Echocardiography
Core Elective Course	
CEC 005 L	Basics of Clinical Skills Learning
CEC 006 L	Hospital Operation Management

Name of the Programme	**B.Sc. Cardiac Care Technology**
Name of the Course	**Advanced Electrocardiography**
Course Code	**BCCT 120 L**

Teaching Objective	•To enable students, understand about various arrhythmias. •To demonstrate patient positioning and preparation. •To teach students about maintenance of the ECG machine, wires and electrodes.
Learning Outcomes	•To develop an understanding regarding Echocardiography. •To train students to perform Echocardiography examinations by explaining the position of transducers. •To make students aware of recent advances in Echocardiography. •To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing individually.

Sr. No.	Topics	No. of Hrs.
1	**ANATOMY OF THE CONDUCTION SYSTEM &BASICS OF ELECTROPHYSIOLOGY:**SA node, AV node, Internodal and Inter-atrial conduction, Bundle branches, History, Equipment used, Procedure, Resting interval measurements, Management of Arrhythmias by EP study	6
2	**GENESIS OF CARDIAC ARRHYTHMIAS AND MANAGEMENT:** Various Mechanisms of Arrhythmogenesis&disorders of impulse formation**:** Artifacts, Electrical interference, Somatic tremor, Wandering baseline, Antiarrhythmic agents class I, class II, class III, class IV, Implantable electric devices for treatment of cardiac arrhythmias, Ablation theory for cardiac arrhythmias: Basic	6
3	**ECG IN ISCHEMIC HEART DIESEASE:** Coronary events and ECG, ECG changes in IHD and Myocardial Infarction, Investigations: Stress test- Indications, Contraindications, Pre-test probability, Exercise Protocols, Interpretation of reports	6
4	**DISORDERS OF IMPULSE CONDUCTION:** Reentry mechanism, Tachycardia's caused by reentry, Electrical remodeling of atria, Sinus reentry, Atrial reentry, AV node reentry, Pre-excitation syndrome, Ventricular tachycardia caused by reentry,PACEMAKERS:Types of Pacemakers, Components of Pacemaker, Single and Double Timing cycles, Pacemaker Troubleshooting	6
5	**CARDIAC PACING & RADIOFREQUENCY ABLATION THERAPY:** Indications, Temporary and Permanent Pacing, NBG codes, Types of Pacing, Complications, Common sites of Ablation, Management of A. Flutter, V. Tach, A. Fib, AVNRT	6
Total		**30hrs**

BCCT 120 P Advanced Electrocardiography

Sr. No.	Topics	No. of Hrs.
1	Learn about 12-lead ECG	20
2	Learn about various software's associated with ECG.	20
3	Learn various conditions indicated for Electrocardiography	20
Total		**60hrs**

Recommended Text Books:

1. ECG Made Easy –AtulLuthra
2. Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
3. Hampton J. 2003, The ECG made Easy (6th ed.) Churchill Livingstone, Edinburgh
4. An Introduction to Electrocardiography: Schamroth Colin
5. Clinical Electrocardiography: Goldberger. A
6. Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.

Reference books or related websites:www.osmosis.org

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Advanced Echocardiography
Course Code	BCCT 121 L

Teaching Objective	•To provide a brief introduction to Echocardiography, its techniques and types of Echocardiography. •To provide practically and clinically useful application of Echocardiography. •To explain echo techniques available and to put echo into a clinical perspective.
Learning Outcomes	•To develop an understanding regarding Echocardiography. •To train students to perform Echocardiography examinations by explaining the position of transducers. •To make students aware of recent advances in Echocardiography. •To understand the role of Cardiac Care technician while assisting the Cardiologist as well as when performing individually.

Sr. No.	Topics	No. of Hrs.
1	**HEART FAILURE, MYOCARDIUM AND PERICARDIUM:** Heart failure, Assessment of LV systolic function, Coronary Artery Disease, Cardiomyopathies and Myocarditis, Diastolic function, Right heart and lungs, Long-axis function, Pericardial disease, Device therapy for heart failure – Cardiac Resynchronization Therapy	8
2	**TRANSESOPHAGEAL ECHOCARDIOGRAPHY:** Standard views used in TOE, Indications for TOE, Advantages and Disadvantages of TOE, Patient preparation and care during TOE, Uses of TOE, Contraindications to TOE, Complications of TOE,	4
3	**CARDIAC MASSES, INFECTION AND CONGENITAL ABNORMALITIES:** Cardiac masses - Tumors (primary or secondary), Thrombus, Infected material (vegetation or abscess), Congenital Abnormalities- Shunts: ASD, VSD, PFO, Coarctation of the aorta, Congenital valvular abnormalities- Ebstein's Anomaly, Pulmonary Stenosis, Bicuspid Aortic valve.	4
4	**SPECIAL SITUATIONS AND CONDITIONS:** Pregnancy, Rhythm disturbances: A. Fib, V. Fib, Syncope, Palpitations, LVH, Stroke, TIA and Thromboembolism, Breathlessness and Peripheral edema	4
5	**ECHO ABNORMALITIES IN SOME SYSTEMIC DISEASES AND CONDITIONS:** HIV infection and AIDS, Chagas' disease, Lyme disease, Rheumatic heart disease, Obesity	6
6	**RECENT ADVANCES IN ECHOCARDIOGRAPHY:** 3D Echo, 4D Echo, Tissue Doppler Imaging	4
	Total	**30 hrs**

BCCT 121 P Advanced Echocardiography

Sr. No.	Topics	No. of Hrs.
1	Learn about advance Echo settings.	20
2	Learn about qualitative reporting system along with various software's associated with Echo reporting.	20
3	Learn various conditions indicated for Echocardiography	20
Total		**60hrs**

Recommended Text Books:

1. Echo Made Easy: Sam Kaddoura
2. Reference by PGDCC – IGNOU Handbooks for ECG, ECHO and Stress Test.
3. Feigen Baum's Echocardiography
4. Tajik Jamil for Echocardiography.

Reference books or related websites:www.123sonography.com

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Invasive Cardiology
Course Code	BCCT 122 L

Teaching Objective	•To enable students, understand new techniques for procedures in and around the heart emerge that again need expert knowledge and manual dexterity. •To understand such interventions which include diagnostic and therapeutic electrophysiology; implantation or exchange of complex pacemaker systems or percutaneous cardioverter-defibrillator-pacers; percutaneous valve repairs or replacements etc
Learning Outcomes	•To enable students to not only be a helping hand to those just starting out in the specialty but also to serve as a reference for those who have been working in Invasive field for some time

Sr. No.	Topics	No. of Hrs.
1	**CONTRAST MEDIA:** Basics, Definition of Hydrophilicity, Osmolarity, and Viscosity, Contrast Agents used in the CCL, Uses, Complications, Contrast medium reactions: Mild, Moderate, Severe, Allergies: Anaphylactic and Anaphylactoid Reaction, Contrast-Induced Nephropathy (CIN)	8
2	**HEMODYNAMICS:**Introduction to Hemodynamics, Pressure Measurement System, Sources of Error and Artifacts: Fluid Artifacts, Electronic and Electrical Artifacts, Human Error: Leveling and Balancing, Slope calibration, Hemodynamic waveforms, Gradient, Valve Area Calculations, Cardiac output formulas- Fick, Ejection fraction	8
3	**IVUS:** History, Angiography vs. IVUS, IVUS systems, Diagnostic Applications of IVUS, Complications of IVUS, Optical Coherence Tomography (OCT)	4
4	**FUNCTIONAL ASSESSMENT OF CORONARY DISEASE:**Intravascular Pressure Measurement: Coronary Pressures and Fractional Flow Reserve	4
5	**PTCA:** History, Indications, Materials used, Types of Angioplasty balloons (OTW, SOE, Fixed-wire balloons, Perfusion balloons, Compliant and Non-Compliant balloons, Stent Implantation, Contraindications, Complications	4
6	**IC HARDWARES:** Stents: Composition, Types, Guidewires: Composition, Types, Catheters: Diagnostic and Guiding	4
7	**IABP AND OTHER CARDIAC ASSIST DEVICES:** IABP- Physiologic Principles of Counter pulsation, Indications, Contraindications, Insertion, Timing: Timing errors, Troubleshooting,Weaning and Balloon Removal, Complications, Basics of Percutaneous ventricular assist devices: Tandem Heart, Impella, Percutaneous Coronary Bypass	4
8	**PERIPHERAL CAROTID ANGIOGRAPHY:**Introduction, Cerebrovascular Anatomy and pathology, Diagnosis and patient selection, Patient preparation,	3

	Diagnostic procedure, Post procedure Care	
9	**CARDIAC PHARMACOLOGY:**Local Anesthetics, Analgesics And Sedatives: Opioids, Morphine, Fentanyl, Diazepam, Midazolam, Lorazepam, Vasodilators: Nitroglycerine, Sodium Nitroprusside, Beta receptor blockers: Metoprolol, Propranolol, Esmolol, Labetalol, Calcium Channel Blockers: Diltiazem, Verapamil, Nicardipine, Anticoagulation Agents: Platelet Aggregation Inhibitors, Aspirin, Clopidogrel, Glycoprotein IIb/IIIa Inhibitors, Tirofiban, Heparin, Warfarin, Thrombolytics: Streptokinase, Urokinase, Anistreplase, rTPA, Reteplase, Tenecteplase	4
10	**RECENT ADVANCES IN INVASIVE CARDIOLOGY**	2
Total		**45 hrs**

Recommended Text Books:

1. Invasive Cardiology, 3rd Edition by Sandy Watson.

Reference books or related websites:

1. The Interventional Cardiac Catheterization Handbook, 3rd Edition By Mortonj. Kern

Course code- BCCT 123 CP: CCT Directed Clinical Education – III

Students will gain additional skills in interventional procedures, cardiac pharmacology and recent advancements. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate pharmacological and invasive techniques.

(Total- 360 hrs)

CORE ELECTIVE COURSES

Name of the Programme	**B.Sc. Cardiac Care Technology**
Name of the Course	**Basics of Clinical Skill Learning**
Course Code	**CEC 005 L**

Teaching Objective	•To Understand the basic ideas on how to check for Vital Signs of the Patient • This course the Student will learn how to handle the patients and their positioning •They will also learn on the Basics of Nasal-Gastric Tube •The Students will learn on Administration of IV, IV and Medication •Also they will know about Cleanliness in the Asepsis
Learning Outcomes	•After successful accomplishment of the course, the students would be able to Measure Vital Signs, do basic physical Examination of the patients, NG tube basics, Administration of Medicines •The students will learn about Asepsis, and the Cleanliness related to asepsis and on mobility of the patients

Sr. No.	Topics	No. of Hrs.
1	**MEASURING VITAL SIGNS:** Temperature: Axillaries Temperature, Pulse: Sites of pulse, Measurement, Respiratory, Blood Pressure, Pain: Pain Scale	5
2	**PHYSICAL EXAMINATION:**Observation, Auscultation(Chest), Palpation, Percussion, History Taking	10
3	**FEEDING: ENTRAL FEEDING, NG TUBE:**Measurement, Procedure, Care, Removal of Nasal-Gastric Tube, Nasal-Gastric Tube Feeding, and Parentral Nutrition.	10
4	**ADMINISTRATIONS:**Oral, Intravenous, Intramuscular, Subcutaneous, Recapping of Syringe, Loading of Drugs, Calculation of Drugs, Venipuncture, IV Infusion, Cannula, Attachment of IV infusion Set, Fluid Collection, Heparin Lock, Maintenance of IV set, Performing Nebulizer Therapy, Inhaler, Oxygen Therapy (Nasal, prongs, nasal Catheter,Venturi Mask, face mask)	10
5	**ASEPSIS:**Hand wash Techniques,(Medical, Surgical) Universal Precaution, Protecting Equipments: Using Sterile Gloves, Opening a Sterile package and Establishing a Sterile Field, Sterile Dressing Changes, Surgical Attire ,Wound Dressing, Suture Removal, Cleaning and Application of Sterile Dressing, Wearing and Removal of personal protective Equipment	5
6	**MOBILITY AND SUPPORT:**Moving and Positioning, range of Motion exercises (Active & Passive) Assisting for Transfer, Application of Restraints	5
Total		**45 hrs**

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Hospital Operation Management
Course Code	CEC 006 L

Teaching Objective	•To promote scientific management of hospital and advancement of health care systems so as to make it rational, responsive and cost efficient •To promote the development of high quality of hospital care in the community and the country. •It has to provide a satisfactory environment to the patient and also to the doctors for clinical research.
Learning Outcomes	•Understand and apply resource management concepts (personnel, finance, and material resources) and the processes and strategies needed in specific hospital sectors •Communicate effectively and develop their leadership and teambuilding abilities •Apply modern change management and innovation management concepts to optimize structures •Analyze existing hospital service policies and enhance their alignment within the local and national context

Sr. No.	Topics	No. of Hrs.
1	**MEDICO-LEGAL CASES:** Introduction,Laws associated with Medico-Legal Cases, Three Core Contents in Medico-legal cases w.r.t Doctors, Patient & Profession,	5
2	**CONSIDERATIONS OF ETHICS:** Consent, Confidentiality, Mental Health, End of life and Organ Transportation, Research & Clinical Trials	10
3	**HOSPITAL INFORMATION SYSTEM(HIS):** Hospital Information System Management, software applications in registration, billing, investigations, reporting, medical records management, Security and ethical challenges	10
4	**EQUIPMENT OPERATIONS MANAGEMENT:** Hospital equipment repair and maintenance, types of maintenance, job orders, equipment maintenance log books, AMCS	10
5	**ROLE OF MEDICAL RECORDS IN HEALTH CARE MANAGEMENT:** Computers for Medical records, Developments of computerized medical record information processingsystem(EMR's), Computer stored (Vs) Manual hand written record, Advantages of EMR (Vs) Manual	10
	Total	**45hrs**

THIRD YEAR

(B.Sc. Cardiac Care Technology)

SEMESTER-VI

Code No.	Core Subjects
Theory	
BCCT124L	Cardiac Catheterization
BCCT 125L	Pediatric Interventions
BCCT 126CP	CCT Directed Clinical Education-IV
Practical	
BCCT 124P	Cardiac Catheterization
BCCT 125P	Pediatric Interventions

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Cardiac Catheterization
Course Code	BCCT 124 L

Teaching Objective	•To provide the critical information to students when beginning with interventional cardiology. •To provide an extension of techniques and methods described for diagnostic catheterization and specially related techniques.
Learning Outcomes	•The students will gain knowledge about chances of a successful procedure. •To enable students, understand about benefit/risk to the patient if the procedure is successful/ unsuccessful •The occurrence and management of various complications.

Sr. No.	Topics	No. of Hrs.
1	**ASEPSIS IN THE CARDIOVASCULAR CATHETERIZATION LABORATORY**	6
2	**DIAGNOSTIC CATHETERIZATION**	6
3	**ATHERECTOMY AND THROMBECTOMY:** Atherectomy devices- Directional Coronary Atherectomy, Rotational Atherectomy, Components, Procedure, Complications, Thrombectomy devices- Angio Jet, Manual Aspiration devices	6
4	**RENAL ARTERY INTERVENTION**	4
5	**FOREIGN BODY RETRIEVAL:** Various Instruments- Amplatz Goose Neck Snare, Curry Intravascular Retriever, Dotter Intravascular Retriever, Vascular Retrieval Forceps, Welter Retrieval Loop, Biopsy Forceps	4
6	**EMERGENCIES IN THE CARDIAC CATHETERIZATION LABORATORY:** Complications encountered in CCL, ACLS and BLS algorithm	4
	Total	**30hrs**

BCCT 124 P Cardiac Catheterization

Sr. No.	Topics	No. of Hrs.
1	Sterilization techniques	20
2	Hardwares used in Cardiac Catheterization	20
3	Procedures involved in Cardiac Catheterization	20
Total		**60hrs**

Recommended Text Books Invasive Cardiology, 3rd Edition by Sandy Watson.
Reference books or related websites:

1. THE INTERVENTIONAL CARDIAC CATHETERIZATION HANDBOOK, 3rd Edition by MortonJ. Kern

Name of the Programme	B.Sc. Cardiac Care Technology
Name of the Course	Pediatric Interventions
Course Code	BCCT 125 L

Teaching Objective	•To provide the critical information to students when beginning with Pediatric cardiology interventions. •To approach the diagnostic problem presented by an infant or child with a cardiac finding.
Learning Outcomes	•The students will gain knowledge through proper assessment and integration of the history, physical examination, electrocardiogram, and chest X-ray, the type of problem can be diagnosed correctly in many patients, and the severity and hemodynamics correctly estimated. •The occurrence and management of various complications in Pediatric cardiology interventions

Sr. No.	Topics	No. of Hrs.
1	**TOOLS TO DIAGNOSE CARDIAC CONDITIONS IN CHILDREN:** History- General principles of the cardiovascular history, Chief complaint and/or presenting sign, Physical examination- Vital signs, Cardiac examination, Laboratory examinations	6
2	**CARDIAC DEFECT CLOSURE DEVICE:** Device closure procedures in Patent Foramen Ovale (PFO), Atrial Septal Defect (ASD), Ventricular Septal Defect (VSD), Patent Ductus Arteriosus (PDA), Left Atrial Appendage (LAA)	6
3	**PERCUTANEOUS VALVE COMMISSUROTOMY, REPAIR, AND REPLACEMENT:** Cardiac Valves from the left to the right: Mitral, Aortic, Pulmonic & Tricuspid valves, their pathologies: MS, MR, AS, PS, TS and treatment.	6
4	**PEDIATRIC INTERVENTIONAL CARDIOLOGY:** Introduction, General Anesthesia Versus Sedation and Analgesia, Diagnostic procedures, Interventional Procedures, Device Placement.	6
5	**CHAMBER LOCALIZATION & CARDIAC MALPOSITION**	4
6	**RECENT ADVANCES IN PEDIATRIC INTERVENTIONS**	2
	Total	**30hrs**

BCCT 125 P Pediatric Interventions

Sr. No.	Topics	No. of Hrs.
1	Diagnosis of Cardiac conditions in children	15
2	Cardiac Defect Closure Devices	15
3	Valve repair and replacement procedures	15
4	Drugs used in Pediatric Interventions	15
Total		**60hrs**

Recommended Text Books:

1. Invasive Cardiology, 3rd Edition by Sandy Watson.
2. Pediatric Cardiology, The Essential Pocket Guide, 3rd Edition by Walter H. Johnson, Jr., MD

Reference books or related websites:

1. THE INTERVENTIONAL CARDIAC CATHETERIZATION HANDBOOK, 3rd Edition by MortonJ. Kern

Course code- BCCT 126 CP: CCT Directed Clinical Education – IV

Students will gain additional skills in diagnosis in pediatric cases and pediatric interventional procedures. Students apply knowledge from previous clinical learning experience under the supervision of a senior technologist. Students are tested on intermediate clinical diagnostic and therapeutic skills. **(Total – 450 hrs)**

INTERNSHIP

Guidelines:
1. The internship shall commence after the student has completed and passed all subjects up to VI semesters.
2. The internship is compulsory.
3. The duration of the internship shall be one year.
4. The degree of Bachelor in Allied Health Sciences shall be awarded after the satisfactory completion of the internship.

Evaluation of Internees:

Formative Evaluation:
Day to day assessment of the internees during their internship postings should be done by the Head of the Department/Faculty assigned. The objective is that all the interns must acquire necessary minimum skills required for carrying out day to day professional work competently. This can be achieved by maintaining Records /Log Book by all internees. This will not only provide a demonstrable evidence of the processes of training but more importantly of the internee's own acquisition of competence as related to performance.

Summative Evaluation:
It shall be based on the observation of the Sr. Technical staff / Faculty of the department concerned and Record / Log book maintained by the interns. Based on these two evaluations, the Head of the Department shall issue certificate of satisfactory completion of training, following which the university shall award the degree or declare him/her eligible for it.
To implement the project work uniformly for all the specialties in view of the curriculum and training to be acceptable internationally and the students to get opportunity for higher studies and employment.

Internship Programme:

05 days for orientation programme
300 days in Cardiology Department
30 days in Cardiac ICU/General ICUs
15 days for Record Keeping/CSSD deparment
15 days for Casualty/Visit to other hospitals

Checklist - I

Continuous Evaluation of Directed Clinical Education (Clinical Posting) by Faculty in charge

Name of the student: _____ Date:_____

Semester: _____ Name of the faculty/Observer:_____

Core Competencies	Grade
Students will begin to develop critical thinking abilities utilizing the allied health personnel roles of communicator and caregiver. Students will learn principles of professional allied health personnel practice and provide direct care to individuals within a medical surgical setting while recognizing the diverse uniqueness of individuals with health alterations.	Write a grade 1-4 in the boxes below
I. Clinical Teaching	
a. Demonstrate beginning competency in technical skills.	
II. Independent Work by Student guided by faculty	
a. Develop effective communication skills (verbally and through charting) with patients, team members, and family	
b. Identify relevant data for communication in pre and post conferences	
c. Identify intra and inter-professional team member roles and scopes of practice. Establish appropriate relationships with team members.	
d. Identify need for help when appropriate to situation. Delegates level specific skills to appropriate team member.	
III. Hands on practical work by students	
a. Navigate and document clear and concise responses to care in the electronic health record for patient, where appropriate for clinical setting	
b. Protect confidentiality of electronic health records data, information, and knowledge of technology in an ethical manner	
IV. Independent work by student	
a. Maintain a positive attitude and interact with inter-professional team members, faculty, and fellow students in a positive, professional manner. Accept constructive feedback and develop plan of action for improvement.	
b. Demonstrate expected behaviours and complete tasks in a timely manner. Arrive to clinical experiences at assigned times. Maintain professional behaviour and appearance.	
c. Accept individual responsibility and accountability for nursing interventions, outcomes, and other actions. Engage in self evaluation & assumes responsibility for learning.	

***Clinical evaluation tool guidelines for full descriptions of grades 1-4.**

4-exceeds expectations (range of marks –40-50 marks)

3-meets expectations (range of marks –30-40 marks)

2-below expectations (range of marks –25-30 marks)

1-does not meet expectations (range of marks –no marks)

Resolution No. 4.5.1 of BOM-53/2018:

It was accepted to keep 50% as the passing marks for all the elective and core subjects for UG courses under School of Biomedical Sciences.

Resolution No. 4.13 of BOM-55/2018: Resolved as follows:-

(i) Slow learners must be re-designated as potential learners.

(ii) Students scoring less than 35% marks in a particular subjects/course in the 1st formative exam are to be listed as potential learners. These learners must be constantly encouraged to perform better with the help of various remedial measures.

(iii) Students scoring more than 75% marks in a particular subjects/course in the 1st formative exam are to be listed as advanced learners. These learners must be constantly encouraged to participate in various scholarly activities.

Resolution No. 3.1.4.2 of BOM-57/2019:

i. Resolved to include "Gender Sensitization" into UG (from new batch 2019-2020) and PG (from existing batches) curricula. **[Annexure-21]**

ii. Resolved to align the module of "Gender Sensitization" with MCI CBME pattern for MBBS students.

iii. Resolved that Dr. Swati Shiradkar, Prof., Dept. of OBGY., MGM Medical College, Aurangabad will coordinate this activity at both campuses.

Annexure - 21

Gender sensitization for UG (2nd , 3rd , 8th semesters) and PG (3 hours)

INCLUSION OF " GENDER SENSATIZATION" IN CURRICULUM

Introduction :

The health care provider should have a healthy gender attitude, so that discrimination, stigmatization, bias while providing health care will be avoided. The health care provider should also be aware of certain medico legal issues related with sex & gender.

Society particularly youth & adolescents need medically accurate, culturally & agewise appropriate knowledge about sex, gender & sexuality. So we can train the trainers for the same. It is need of the hour to prevent sexual harassment & abuse .

To fulfill these objectives, some suggestions are there for approval of BOS.

Outline

1)For undergraduates :- Three sessions of two hours each, one in 2nd term, one in 3rd term & one in 8th term.

2)For Faculties and postgraduates :- One session of two hrs .

3)For those want to be trainers or interested for their ownself, value added course, which is optional about sex, gender, sexuality & related issues.

Responsibility

ICC of MGM, MCHA , with necessary support from IQAC & respective departments.

Details of undergraduate sessions

1)First session in 2nd term

Aim – To make Students aware about the concept of sexuality & gender**.**

To check accuracy of knowledge they have,

To make them comfortable with their own gender identify & related issues.

To make them aware about ICC & it is functioning.

Mode – Brain storming , Interactive power point presentation experience sharing.

Duration – Around two hours

Evaluation – Feedback from participants.

2)Second session in 3rd / 4th term

Aim – To ensure healthy gender attitude in these students as now they start interacting with patients.

To ensure that the maintain dignity privacy while interacting with patients and relatives, particularly gender related.

To make them aware about importance of confidentiality related with gender issues.

To encourage them to note gender related issues affecting health care & seek solutions.

Mode – focused group discussions on case studies, Role plays & discussion.

Duration – Around two hours.

Evaluation – Feedback from participants.

Third session in 8th term.

Aim – To understand effect of gender attitudes on health care in various subjects.

To develop healthy gender attitude while dealing with these issues.

Mode – Suggested PBL by departments individually. (In collaboration with ICC till faculty sensitization is complete)

Evaluation – Feedback

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FOR POSTGRADUATES

Session of 2-3 hrs preferably in induction program.

Aim – To introduce medically accurate concept of gender, sex, gender role & sex role.

To ensure healthy gender attitude at workplace.

To understand gender associated concepts on health related issues & avoid such bias wile providing health care.

To make them aware about ICC & it's functioning.

Mode – Interactive PPT

Role plays & discussion

Duration – 2 to 3 hrs

Evaluation – Feedback.

FOR FACULTIES

Session of 2 hours may be during combined activities.

Aim – To ensure clarity of concept abut gender & sex.

To discuss effect of these concept on health related issues.

To identify such gender & sex related issues in indivual subject specialties.

To discuss methodology like PBL for under graduate students when whey are in 7th-8th semester.

Mode – Role play

Focused group discussion

Case studies

Evaluation – Feed back.

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Sdp-Pimple/joshi-obgy