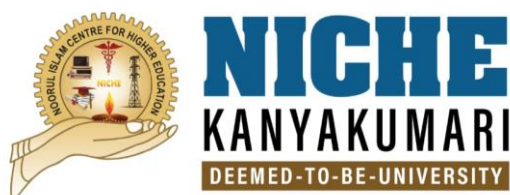


NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

(Deemed to be University Under Section 3 of the UGC Act, 1956)
Kumaracoil, Thuckalay

DEPARTMENT OF ALLIED HEALTH SCIENCE



B.Sc. CARDIAC CARE TECHNOLOGY **CURRICULUM AND SYLLABI**

REGULATION 2021



NOORUL ISLAM CENTRE FOR HIGHER EDUCATION

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DEPARTMENT OF ALLIED HEALTH SCIENCES

BSc Cardiac Care Technology

Regulation: 2021

Curriculum and Syllabi

Vision of the University

To be recognized by the Government and society at large as an institution able to deliver excellence with relevance in the field of higher education and research focusing on the needs of the nation in tune with the technological revolution to cope with the knowledge explosion and global competence.

Mission of the University

To develop the institution as a Centre of Excellence, keeping pace with the advances in the field, so as to provide quality higher education to the students and instill in them high standards of discipline and ethics so that they become enlightened individuals in the service of humanity and to carry out focused research in the frontier areas of science and technology.

Faculty of Allied Health Sciences

Department of Allied Health Sciences

Vision Statement:

Empower and elevate students to understand the conditions conducive to harmonious healthy society by building up youth towards achieving it when it is practiced effectively.

Mission Statement:

The mission of the department of Allied Health Sciences at NICHE is to build up new chorum of youth towards application and practice of knowledge. Recent techniques provide accessible innovative care service and ways to improve outcomes through science and advanced research.

Description of the programme

Cardiac Care Technology offers; under graduate as of now. The course highlights diverse subjects related to Cardiac Care Technology. The course also provides in-depth knowledge about heart and circulatory system. After doing this course students tend to know about invasive procedures during case of emergency and technical knowledge about the cardiovascular system

Programme Educational Objectives - PEO	
PEO-01	This program enables candidates to evolve into a full trained qualified cardiovascular technologist working independently.
PEO-02	Candidates become well versed in techniques such as cardiac catheterization.
PEO-03	To engage in professional development or education and work independently as a skilled cardiovascular technician
PEO-04	To enable graduates to expertise in procedures like echocardiography and ultrasound instrumentation
PEO-05	Graduate will be able to provide health care solution in the field of cardiovascular technology for the benefit of the society

Graduate Attributes-GA	
GA-1	Foundational Scientific Knowledge Acquire a deep understanding of fundamental principles across core scientific disciplines, including physics, chemistry, biology, and mathematics, providing a strong foundation for further learning and research.
GA-2	Practical Skills and Laboratory Competence Develop hands-on laboratory skills and the ability to conduct experiments, analyze data, and apply scientific methods to real-world problems in various scientific domains
GA-3	Research and Analytical Thinking Foster research capabilities and critical thinking skills, enabling the design and execution of scientific investigations, interpretation of experimental results, and formulation of evidence-based conclusions.
GA-4	Data Analysis and Statistical Techniques Utilize modern data analysis techniques and statistical tools to interpret experimental data, draw meaningful conclusions, and solve complex scientific and mathematical problems.
GA-5	Interdisciplinary Knowledge and Applications Integrate knowledge from multiple scientific disciplines to approach problems holistically, understanding how different scientific fields contribute to innovation and real-world applications.
GA-6	Environmental Awareness and Sustainability Demonstrate an understanding of environmental issues and the impact of scientific practices on the environment, promoting sustainability and responsible use of natural resources in all scientific endeavors.
GA-7	Ethical Conduct and Scientific Integrity Uphold ethical standards and integrity in scientific research and practice, ensuring honesty, accuracy, and responsibility in data handling, experimentation, and reporting.
GA-8	Communication and Presentation Skills Develop effective communication skills to articulate scientific concepts, research findings, and technical information clearly and concisely to both scientific and non-scientific audiences.
GA-9	Technology Integration and Innovation Apply cutting-edge technologies and tools in scientific experimentation and research, leveraging innovation to drive progress and stay at the forefront of scientific discovery.
GA-10	Lifelong Learning and Adaptability Cultivate a mindset of continuous learning, staying informed about scientific advancements and adapting to new tools, methods, and technologies to remain competitive in a rapidly evolving scientific landscape.

Programme Outcome - PO	
PO-A	Students are familiar with basic subjects of cardiac care technology.
PO-B	Knowledge on the interdisciplinary subjects make them excel in the programme
PO-C	Performs the health care procedures based on their theoretical knowledge.
PO-D	Based on the theoretical knowledge obtained students will be able to identify the signs and symptoms of diseases and new solutions can be formulated.
PO-E	Knowledge on cardiac care technology will help them to diagnose the critical complications and identify solutions to them.
PO-F	Provide health education to the society in mitigating health problems through healthy lifestyle.
PO-G	Giving awareness to the society regarding the prevention of health issues and the existing technologies to identify the cardiac problems.
PO-H	Group assignments and projects will make them to understand and co operate with co-workers.
PO-I	Students will be able to develop skills of effective communication and principles of team work.
PO-J	Clinical experience enables them to understand their roles and responsibilities as professionals.
PO-K	Designing new methods in care of patients through research in concern with the social ethics.
PO-L	Innovating cost effective technology which can be affordable for all sectors of the society.
PO-M	Motivating the students to ensure health care services to society by upgrading their knowledge.

Mapping of Graduate Attributes and Programme Outcome

GA PEOs	GA-01	GA-02	GA-03	GA-04	GA-05	GA-06	GA-07	GA-08	GA-09	GA-10
PEO-A	H	H	A	H	A	H	H	H	H	A
PEO-B	H	H	H	H	A	H	H	A	A	H
PEO-C	H	H	A	H	A	H	H	H	A	H
PEO-D	H	H	H	H	H	H	H	A	A	H
PEO-E	H	H	H	H	A	H	H	H	H	H

H- Highly Associated

A- Associated

N – Not Associated

Mapping of Programme Educational Objective (PEOs) and Programme Outcomes (POs)

PEO PO	PEO-01	PEO-02	PEO-03	PEO-04	PEO-05
PO-A	H	A	A	H	H
PO-B	H	H	H	H	A
PO-C	H	H	H	H	H
PO-D	H	H	H	H	H
PO-E	H	H	H	A	H
PO-F	H	A	H	H	H
PO-G	H	H	H	H	H
PO-H	H	H	H	A	H
PO-I	H	H	A	A	A
PO-J	H	H	H	H	H
PO-K	A	H	H	A	H
PO-L	H	H	H	H	H

H- Highly Associated

A- Associated

Not – Not Associated

Duration of the programme: 4 Years/ 6 Semesters+1 year
internship **Total credit: 138**

**CURRICULUM
SEMESTER I**

SL. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	EG3603	English	3	1	0	4
2.	BS3601	Anatomy	3	1	0	4
3.	BS3602	Physiology	3	1	0	4
4.	BS3603	Basic Biochemistry	3	1	0	4
5.	BS3604	Environmental Science	2	0	0	2
PRACTICAL						
6.	BS3671	Anatomy Laboratory	0	0	2	2
7.	BS3672	Physiology Laboratory	0	0	2	2
8.	BS3673	Basic Biochemistry Laboratory	0	0	2	2
TOTAL			14	4	6	24

SEMESTER II

SL. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	BS3605	General Pathology	3	1	0	4
2.	BS3606	Microbiology	3	1	0	4
3.	BS3607	Pharmacology	3	1	0	4
4.	BS3608	Psychology	2	0	0	2
5.	BS3609	Introduction to Computer	2	0	0	2
PRACTICAL						
6.	BS3674	Pathology Laboratory	0	0	2	2
7.	BS3675	Microbiology Laboratory	0	0	2	2
8.	BS3676	Pharmacology Laboratory	0	0	2	2
TOTAL			13	3	6	22

SEMESTER III

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	BS36S1	Applied Pathology	3	1	0	4
2	BS36S2	Applied Microbiology	3	1	0	4
3	CT3601	Basic Cardiac Care Technology	3	1	0	4
4	BS36S3	Introduction Biomedical Instrumentation	2	0	0	2
5	BS36S4	Health care	3	0	0	3
CLINICAL POSTING & PRACTICAL						
6	BS3677	Applied Pathology Laboratory	0	0	2	2
7	BS3678	Applied Microbiology Laboratory	0	0	2	2
8	CT3671	Basic Cardiac Care Technology Laboratory	0	0	2	2
TOTAL			14	3	6	23

SEMESTER IV

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	BS36S5	Patient care and Basic Nursing	3	1	0	4
2	CT3602	Basics Cardiac evaluation and therapies	3	1	0	4
3	BS36S8	Basics of Medical Disorders	3	1	0	4
4	BS36S6	Biostatistics and Research Methodology	2	0	0	2
5	BS36S7	Constitution of India	3	0	0	3
CLINICAL POSTING & PRACTICAL						
6	BS3679	Patient care and Basic Nursing Laboratory	0	0	2	2
7	CT3672	Basics Cardiac evaluation and therapies Laboratory	0	0	2	2
8	BS3680	Basics of Medical Disorders Laboratory	0	0	2	2
TOTAL			14	3	6	23

SEMESTER V

SL. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	CT3603	Cardiac Evaluation and Therapies-I	3	1	0	4
2.	CT3604	Cardiac Evaluation and Therapies-II	3	1	0	4
3.	CT3605	Cardiac Evaluation and Therapies-III	3	1	0	4
4.	CT3606	Biomedical Engineering Devices for Cardiac Care Technology	3	0	0	3
5.	BS36S9	Medical Ethics	2	0	0	2
CLINICAL POSTING & PRACTICAL						
6.	CT3673	Cardiac Evaluation and Therapies Laboratory-I	0	0	2	2
7.	CT3674	Cardiac Evaluation and Therapies Laboratory-II	0	0	2	2
8.	CT3675	Cardiac Evaluation and Therapies Laboratory-III	0	0	2	2
TOTAL			14	3	6	23

SEMESTER VI

SL. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	CT3607	Advanced Cardiac Care Technology-I	3	1	0	4
2.	CT3608	Advanced Cardiac Care Technology-II	3	1	0	4
3.	CT3609	Applied Coronary Angiography and Echocardiography	3	1	0	4
4.	CT3610	Basic Intensive Care	3	0	0	3
5.	BS36S0	Hospital Management	2	0	0	2
CLINICAL POSTING & PRACTICAL						
6.	CT3676	Advanced Cardiac Care Technology Laboratory-I	0	0	2	2
7.	CT3677	Advanced Cardiac Care Technology Laboratory-II	0	0	2	2
8.	CT3678	Applied Coronary Angiography and Echo cardiography Laboratory	0	0	2	2
TOTAL			14	3	6	23

IV Year - Internship

One year internship finally prepares and trains the student who will be able to meticulously assist the doctors for providing quality patient care in selected areas of clinical speciality.

SEMESTER I

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	EG3603	English	3	1	0	4
2.	BS3601	Anatomy	3	1	0	4
3.	BS3602	Physiology	3	1	0	4
4.	BS3603	Basic Biochemistry	3	1	0	4
5.	BS3604	Environmental Science	2	0	0	2
PRACTICAL						
6.	BS3671	Anatomy Laboratory	0	0	2	2
7.	BS3672	Physiology Laboratory	0	0	2	2
8.	BS3673	Basic Biochemistry Laboratory	0	0	2	2
Total			14	4	6	24

EG3603	ENGLISH	L	T	P	C
		3	1	0	4

OBJECTIVE

This subject deals with English language, grammar and reading comprehension.

Course Outcome – COs		Cognitive Skill
At the end of the course, the students will able to		
CO-01	Understand reading comprehension	U, A
CO-02	Learn to use applied grammar.	A
CO-03	Understand summary and bibliography.	A, U
CO-04	Understand and apply grammar and vocabulary.	U, A
CO-05	Do group discussions	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	N	M	M	L	S	M	L	S	N	S	M	N	M
CO-02	M	S	L	S	N	M	S	L	N	M	M	N	S
CO-03	S	M	L	L	N	M	S	L	M	N	L	S	S

CO-04	S	S	M	S	S	M	N	S	L	N	S	L	S
CO-05	S	M	L	L	M	M	S	N	S	L	S	S	N

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I: Introduction

12

a) Study Techniques - Reading Comprehension

Exercises on reading passages and answering questions based on the passage.

b) Organization of Effective Note Taking Why good note-taking is important

Effective note-taking is an important practice to master at university. You have a lot of new knowledge and you need to develop reliable mechanisms for recording and retrieving it when necessary. But note-taking is also a learning process in itself, helping you to process and understand the information you receive.

c) Use of the Dictionary

Tips on how to use the dictionary

1. Choose the right dictionary.
2. Read the introduction.
3. Learn the abbreviations.
4. Learn the guide to pronunciation.
5. Looking Up a Word
 - a) Find the section of the dictionary with first letter of your word.
 - b) Read the guide words.
 - c) Scan down the page for your word.
 - d) Read the definition.
6. Online dictionaries
7. Research various facts.
8. Thesaurus

It is a dictionary of synonyms and antonyms, such as the online Thesaurus.com.

Enlargement of Vocabulary

Roots: A to G

Effective Diction

Foreign Expressions - meaning and pronunciation

Unit II: Applied Grammar

12

a) Correct Usage

The Eight Parts of Speech

1. Noun
2. Pronoun
3. Adjective
4. Verb
5. Adverb
6. Preposition
7. Conjunction
8. Interjection

b) The Structure of Sentences

What is a sentence? What are clauses? What are phrases?

1. Simple sentences
2. Compound sentences
3. Complex sentences

c) The Structure of Paragraphs

1. What is a Paragraph?

Paragraphs are comprised of sentences, but not random sentences. A paragraph is a group of sentences organized around a central topic.

2. The Secrets to Good Paragraph Writing:

Four Essential Elements

The four elements essential to good paragraph writing are: unity, order, coherence, and completeness.

A paragraph consists of 3 main structures:

- 1.Claim
- 2.Evidence
- 3.Analysis

Unit III: Written Composition

12

a) Precise writing and Summarizing

1. Definition of precise:

A precise or summary is an encapsulation of someone's writing or ideas. Technically it should be one - third the length of the actual passage given.

2. Definition of summary:

Summaries may not always follow a direct line through what they're summarizing - if you want to summarize someone else's ideas in a few sentences, it might make more sense if you begin with their conclusion, and work back to the arguments they use to develop that conclusion.

Guidelines to follow while writing a summary are:

- 1) Divide and conquer.
- 2) Read.
- 3) Reread.
- 4) One sentence at a time.
- 5) Write a thesis statement.
- 6) Check for accuracy.
- 7) Revise.

b) Writing of a Bibliography

I. What is a bibliography?

A bibliography is an alphabetical list of all materials consulted in the preparation of your assignment.

II. What is an annotated bibliography?

An annotated bibliography is an alphabetical list of books or articles for which you have added explanatory or critical notes.

III. Why you must do a bibliography?

- a) To acknowledge and give credit to sources of words, ideas, diagrams, illustrations and quotations borrowed, or any materials summarized or paraphrased.
- b) To show that you are respectfully borrowing other people's ideas, not stealing them, i.e. to prove that you are not plagiarizing.

IV. What must be included in a bibliography?

- Author
- Title
- Place of publication
- Publisher
- Date of publication
- Page number(s) (for articles from magazines, journals, periodicals, newspapers, encyclopaedias, or in anthologies).

V. Writing a bibliography in MLA style

1. Standard Format for a Book:

Author. Title: Subtitle. City or Town: Publisher, Year of Publication.

If a book has no author or editor stated, begin with the title. If the city or town is not commonly known, add the abbreviation for the State or Province.

2. Standard Format for a Magazine, Periodical, Journal, or Newspaper

Article: Author. "Title: Subtitle of Article." Title of Magazine, Journal, or Newspaper Day, Month, Year of Publication: Page Number(s).

c) *Enlargement of Vocabulary Roots - N to S*

Unit IV: Reading and Comprehension

12

- a) Review of selected materials and express oneself in one's words
Seminar for students on power point presentation and book review.
- b) Enlargement of Vocabulary
Roots - T to Z

Unit V- The study of various forms of Composition

12

a) *Paragraph*

Exercises for students on short paragraph topics.

b) *Essay*

How to Write an Essay

The writing of an essay has three stages:

- 1. Essay writing
- 2. Close reading
- 3. Research

c) Letter

Mechanics of writing formal and business letters. Exercises on writing letters for students.

d) Summary

Writing reports: project report, magazine article and reporting in newspapers on sporting events.

e) Practice In Writing

Exercises and assignments on report writing for students.

Verbal Communication

a) Discussions And Summarization Tips on taking minutes of a meeting Why Meeting Minutes Matter

Meeting minutes are important. They capture the essential information of a meeting - decisions and assigned actions. The following instructions will help you take useful and concise meeting minutes.

Before the Meeting

If you are recording the minutes, make sure you aren't a major participant in the meeting. You can't perform both tasks well.

Create a template for recording your meeting minutes and make sure you leave some blank space to record your notes.

Decide how you want to record your notes. If you aren't comfortable relying on your pen and notepad, try using a tape recorder or, if you're a fast typist, take a laptop to the meeting.

During the Meeting

As people enter the room, check off their names on your attendee list. Ask the meeting lead to introduce you to meeting attendees you aren't familiar with. This will be helpful later when you are recording assigned tasks or decisions.

After the Meeting

Review the notes and add additional comments, or clarify what you didn't understand right after the meeting.

a) Debates

Group Discussions:

1. Do's in a group discussion:

- Be Confident. Introduce yourself with warm smile and get into topic soon.
- Have eye contact with all group members
- Learn to listen.
- Be polite.

Be a good team player. Move with all group members and help them when needed.

2. Don'ts in a group discussion:

- Don't be harsh when you are interrupted.
- Don't interrupt the other person
- Don't try to push your ideas on others.
- Don't argue. Everyone is free to express their ideas.

c) Oral Reports

An oral report is a presentation, usually done for a student's teacher and classmates, though it can also be done for a larger segment of the school community, for parents, or for a more open group, depending on the circumstances. For example, at a science fair, a student might present a report on his or her project periodically for the class, for other visitors who pass by, and for judges.

d) Use in Teaching Writing of dialogues

Originating from dialogues, the Greek word for conversation, the term dialogue refers to a verbal conversation between two or more people.

When writing dialogues, it is important to adhere to specific grammar rules. The following points need to be remembered while writing dialogues for role play.

1. Quotation Marks
2. Periods
3. Question Marks
4. Commas
5. Capitalization and Paragraphs
6. How Dialogue Enhances Writing

Dialogue reveals information about the speaker(s) within a written work. Dialogue also enhances the story line and plot.

a) Exposes Character Traits

Through indirect characterization, dialogue reveals details about a character by what they say, how they say it, and perhaps what they choose not to say.

b) Unveils Mood/Emotions

A character's word choice, description of tone, and choice of language reveal the inner state of the character without directly "telling" the audience.

Showing instead of telling creates a deeper understanding of the character through the eyes of the reader or audience.

c) Reveals Motivation/Influences

Dialogue can illuminate a character's internal motivation or desires.

d) Establishes Relationships

Seeing how a character addresses and responds to other characters shows the type of relationships that they form and where their relationships currently stand. Dialogue can demonstrate how relationships change throughout the course of the story. It can show how a character changes or responds to various situations.

Exercises for students on preparing a dialogue exchange between two people

- * On the street (with a vegetable vendor)
- * At college with a lecturer (regarding admissions)
- * In a bank with the manager (for opening a bank account)
- * Telephone conversation with a hotel receptionist (make room reservations)
- * Telephone conversation (taking an appointment with the dentist/doctor)

TOTAL:60 HOURS

REFERENCE BOOKS

1. "English Grammar in Use" by Raymond Murphy
2. "Practical English Usage" by Michael Swan
3. "Word Power Made Easy" by Norman Lewis

BS3601	ANATOMY	L	T	P	C
		3	1	0	4

OBJECTIVE

To deals with the concept of structure and functions of human body

Course Outcome – COs At the end of the course,the students will able to		Cognitive Skill
CO-01	Understand the organization of the Human Body	R
CO-02	Understand the locomotion and Support	U
CO-03	Understand the maintenance of the Human Body	A
CO-04	Understand the urinary system and Reproductive system	R
CO-05	Understand the control Systems of the Body	U

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	M	L	S	S	M	S	M	M	S	S	M	S	S
CO-02	S	M	M	L	S	S	M	S	S	L	M	M	S
CO-03	M	M	S	S	S	M	S	M	S	S	M	M	S
CO-04	S	S	M	M	S	M	M	S	M	M	S	S	M
CO-05	S	M	S	M	S	S	S	M	S	M	M	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I: Organization of the Human Body

12

Introduction to the human body, Definition and subdivisions of anatomy, Anatomical position and terminology. Cell - Definition of a cell, shapes and sizes of cells, Parts of a cell - cell membranes, cytoplasm, sub cellular organelles. Cell Division - Definition and main events in different stages of mitosis and meiosis. Tissues - Tissues of the body, Definition and types of tissues, Characteristics, functions and locations of different types of tissues, Epithelial tissue - definition, classification with examples. Glands- classification with examples.

Unit II: Locomotion and Support**12**

Cartilage - Types with examples. Skeleton - Definition, axial and appendicular skeleton with names and number of bones, Types of bones. Marking of bones. Functions of bones. Development (types and ossification) and growth of bone. Name, location and general features of the bones of the body. Joints - Definition and types of joints with examples. Axes and kind of movements possible. Name, location, type, bones forming, ligaments, movements possible and the muscles producing such movements of the joints of the body. Muscular system- Parts of the skeletal muscle. Definition of origin and insertion. Classification of muscular tissue. Compartment muscles of upper limb, lower limb, sternocleidomastoid

Unit III: Maintenance of the Human Body**12**

Cardio-vascular system - Types and general structure of blood vessels. Structure and types of arteries and veins. Structure of capillaries. Shape, size, location, coverings, external and internal features of heart. Structure of heart wall. Conducting system and blood supply of the heart. The systemic arteries and veins. Name, location, branches and main-distribution of major arteries and veins. Lymphatic system- Lymph, lymphatic vessels, name, location and features of the lymphoid organs. Respiratory system-Names of organs of respiration, Location and features of nose, pharynx, larynx, trachea, bronchi, lungs and pleura. Digestive system - Names of organs of digestion. Location and features of mouth, pharynx, esophagus, stomach, small and large intestines. Location and features of salivary glands, pancreas, liver and gall bladder

Unit IV: Urinary system and Reproductive system**12**

Names of urinary organs, location and features of kidney, ureter, urinary bladder and urethra. Names of male and female organs of reproduction. Location and features of scrotum, testis, epididymis, vas deferens, seminal vesicle, ejaculatory duct, prostate gland, penis and spermatic cord. Location and features of uterus & its supports, uterine tube, ovary & mammary gland. Development - Gametes, period of gestation, gametogenesis, structure of sperm and ovum, growth of ovarian follicles, events of 1st, 2nd and 3rd weeks of development, folding of embryo. Derivatives of germ layers, placenta.

Unit V: Control Systems of the Body**12**

Nervous system - Sub-divisions of the nervous system. Brain - Sub-divisions, location external features and internal structure of medulla oblongata, pons, mid-brain, cerebellum and cerebrum. Spinal cord - Location, extent, spinal segments, external features and internal structure. Location and features of thalamus and hypothalamus. Locations and subdivisions of basal ganglia. Meninges and spaces around them. Name and location of ventricles of brain and circulation of cerebrospinal fluid. Blood supply of the brain and spinal cord. Cranial nerves. Sense organs - Location and features of the nose, tongue, eye, ear and skin. Endocrine system - Names of the endocrine glands. Location and features of pituitary, thyroid, parathyroid, suprarenal, pancreas, ovaries and testes. Names of hormones produced by each gland.

TOTAL: 60 HOURS

TEXT BOOKS

1. Ross and Wilson: Anatomy and Physiology in Health and illness
2. Understanding Human Anatomy and Physiology, William Davis (p) MC Graw Hill
3. Essentials of Human Embryology. Bhatnagar, Orient Blackswan Pvt. Ltd.
4. Anatomy for B.Sc Nursing by Renu Chauhan. Arichal publishing company 2012
5. Hand book of Anatomy BD Chaurasia
6. Basics in Human Anatomy for B.Sc. Paramedical Courses 1st edition 2008 Jaypee Publishers

REFERENCE BOOKS

1. B D Chaurasia: Regional Anatomy. Vol I, II, III 6th edition

BS3602	PHYSIOLOGY	L	T	P	C
		3	1	0	4

OBJECTIVE

Students will acquire knowledge in different vital systems of the body and their functions

Course Outcome – COs At the end of the course, the students will be able to,		Cognitive Skill
CO-01	Study about various systems of human body	U
CO-02	Understand functioning of various organ systems	U
CO-03	Analyze and report on experiments and observations in physiology	An
CO-04	Recognize and identify principal tissue structures	R
CO-05	Understand how these organ systems are interrelated to apply a holistic approach to human health	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	L	S	M	M	S	S	M	S	S	M	S	M
CO-02	S	S	M	L	M	S	M	S	S	L	S	M	S
CO-03	M	S	S	S	S	M	S	M	S	S	M	M	S
CO-04	S	S	M	M	S	S	M	S	M	M	S	M	M
CO-05	S	M	S	M	S	M	S	M	S	S	M	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I: General physiology and Blood

12

General Physiology - Organization of the cell and its function, homeostasis, transport across cell membrane, Membrane Potentials - Resting Membrane Potential & Action Potential, Body Fluid Compartments - Normal Values. Blood - Introduction: composition and function of blood, Red blood cells: erythropoiesis, stages of differentiation, function, count, physiological variation. Structure, function, concentration, physiological variation, methods of estimation of haemoglobin. White blood cells: production, function, count. Platelets: origin, normal count, morphology & functions. Plasma proteins: types, functions.

Haemostasis: definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting. Blood groups: ABO system, Rh system. Blood grouping & typing, cross matching. Rh system: Rh factor, Rh incompatibility. Blood transfusion: indication, transfusion reactions. Anticoagulants: classification, examples and uses. Anaemias: morphological and etiological classification, -Blood indices: CI, MCH, MCV, MCHC. Erythrocyte sedimentation rate (ESR) and packed cell volume, normal values.

Unit II: Digestive system & Respiratory system

12

Digestive System-Physiological anatomy of gastro intestinal tract, functions of digestive system. Salivary glands: structure and functions, deglutition: stages and regulation. Stomach: structure and functions. Gastric secretion: composition function regulation of gastric juice secretion. Pancreas: structure, function, composition of pancreatic juice. Functions of liver. Bile secretion, composition, function. Jaundice: types, Functions of gall bladder. Small intestine: functions, digestion, absorption, movements. Large intestine: functions, movements defecation. Respiratory system - Functions of respiratory system, physiological anatomy of respiratory system, respiratory tract, respiratory muscles. Mechanism of normal and rigorous respiration, forces opposing and favoring expansion of the lungs. Intra pulmonary & intrapleural pressure. Surface tension, recoil tendency of the thoracic cage and lungs. Transport of respiratory gases: transport of oxygen & carbon dioxide, oxy haemoglobin dissociation curve, factors affecting it. Lung volumes and capacities - normal values Regulation of respiration: mechanisms of regulation, nervous and chemical regulation, respiratory centre. Applied physiology: hypoxia, cyanosis, dyspnoea, apnoea.

Unit III: Cardiovascular and Endocrine system

12

Cardiovascular system - Heart: Physiological Anatomy, Nerve supply. Properties of cardiac muscle, cardiac cycle. Conducting System of Heart, Origin and Spread of Cardiac Impulse. Electrocardiogram (ECG) waves and normal duration. Recording. Cardiac Cycle: Phases and Volume Changes. Normal heart sounds, areas of auscultation. Pulse: jugular, radial pulse. Cardiac output: definitions of stroke volume, cardiac index, factors Affecting It. measurement of Cardiac output. General principles of circulation. Blood pressure: definition, normal value, clinical measurement of blood pressure, hypotension, hypertension. Factors affecting it and regulation. Physiological variations & regulation of heart rate. Coronary circulation. Shock. Endocrine System - Classification of endocrine glands & Definition of hormone. Pituitary hormones: anterior and posterior pituitary hormones, secretion, functions. Thyroid gland: physiological anatomy, hormone secreted, physiological function, regulation, secretion,

disorders (hypo and hyper secretion of hormone). Adrenal cortex: physiological anatomy. cortical hormones, functions and regulation. Adrenal medulla: hormones, regulation and secretion. Functions of adrenaline and nor adrenaline. Hormones of pancreas. Insulin: secretion, regulation, function and action. Diabetes mellitus: regulation of blood glucose level. Parathyroid gland: function, action, regulation of secretion of parathyroid hormone. Calcitonin.

Unit IV: Excretory system and Reproductive system 12

Excretory System - Functional anatomy of kidney. Juxta glomerular apparatus: structure and function. Glomerular filtration. Tubular function (reabsorption and secretion). Micturition, innervation of bladder, cystometrogram. Artificial kidney, renal function tests skin and body temperature. Reproductive system – Male reproductive system: functions of testes, spermatogenesis: Endocrine functions of testes -Female reproductive system: oestrogen, progesterone, menstrual cycle: ovulation, physiological changes during pregnancy, pregnancy tests. Lactation: composition of milk, factors controlling lactation.

Unit V: Muscle nerve physiology, Nervous system and Special senses 12

Muscle nerve physiology - Classification and properties of neuron and neuroglia. Classification of nerve fibers. Classification of muscle, structure of skeletal muscle, neuromuscular junction. Transmission across nmj. Excitation contraction coupling. Muscle tone, fatigue, rigor mortis. Nervous system - Organisation of nervous system. Synapse: structure, types, properties. Receptors: definition, classification, properties. Sensations-pain. Organization Spinal cord. Ascending tracts, descending tracts. Reflex: definition reflex arc, clinical classification of reflexes: Babinski's sign. Hypothalamus- functions. Cerebral cortex lobes – functions. Cerebellum- functions. Basal ganglia functions. Cerebro Spinal Fluid (CSF): formation, circulation & reabsorption, composition and functions. Lumbar puncture. Autonomic Nervous System: Sympathetic and parasympathetic distribution. Special senses - Vision: structure of eye, function of different parts. Structure of retina. Visual pathway, errors of refraction. Hearing: structure and functions of ear. Taste: taste buds and taste pathway. Olfaction : receptors, pathway.

TOTAL: 60 HOURS

TEXT BOOKS

1. A.K.Jain, Human Physiology and Biochemistry for Physical Therapy and Occupational Therapy, 1st Ed. Arya Publication.
2. Dr.Venkatesh.D and Dr.SudhakarH.S.Basic of Medical Physiology, 2nd Ed., Wolter-Kluwer Publication.
3. Chaudhari (Sujith K) Concise Medical Physiology 6th Ed. New Central Book.

REFERENCE BOOKS

1. A.K.Jain, Text book of Physiology for Medical Students, 4th Ed. Arya Publication.
2. Guyton (Arthur) Text Book of Physiology.11th Ed. Prism Publishers.
3. Ganong (William F) Review of Medical Physiology. 23rd Ed . Appleton.

BS3604	BASIC BIOCHEMISTRY	L	T	P	C
		3	1	0	4

OBJECTIVE

Study about the biomolecules involved in clinical laboratory.

Course Outcome – COs At the end of the course, the students will be able to,		Cognitive Skill
CO-01	Chemistry of Cell & Chemistry of Carbohydrates, Proteins, Lipids & Nucleotides	R
CO-02	The Enzymes & Acid base balance	U
CO-03	The Vitamins & Minerals	U
CO-04	The Nutrition, Blood chemistry & Urine Chemistry	R,A
CO-05	Know about Clinical Biochemistry	U,E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	N	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	L	S	N	M	M	M	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	N	S	M	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I : Chemistry of Cell & Chemistry of Biomolecules

12

Cell- Structure & Function of Cell Membrane, Subcellular Organelles and their Functions. Carbohydrates- Definition, Classification & Biological importance of carbohydrates, Proteins- Definition & Classification of amino acids & Proteins, Biologically important peptides, Plasma proteins, Immunoglobulins. Lipids- Definition, Classification & Biological importance and Functions of Lipids. Nucleotides- Structure and Functions of DNA & RNA. Biologically important nucleotides.

Unit II: Enzymes & Acid Base Balance

12

Enzymes- Definition and Classification. Factors affecting enzyme activity. Coenzymes and Cofactors. Enzyme inhibition & Regulation of enzyme activity. Acid Base balance- Acids, Bases & Body Buffers, Regulation of pH, Acid base disorders.

Unit III : Vitamins& Minerals**12**

Vitamins-Classification, Sources, RDA, Functions (in brief), deficiency manifestations and hypervitaminosis. Minerals- Classification, Sources, RDA, Functions (in Brief), deficiency manifestations of the following: calcium, phosphorous, iron, copper, iodine, zinc, fluoride,sodium, potassium and chloride.

Unit IV : Blood chemistry & Urine Chemistry**12**

Blood chemistry- Biochemical components –Plasma, Red blood cells, white blood cells, latelets, Complete blood count. Reference ranges in normal- Blood, Serum, Plasma, CSF and Hematologic. Diseased states- Diabetes, Anemia, Jaundice. Benedict's method, glucose tolerance test, renal threshold for glucose, glycogen storage diseases, lactosuria, ketonemia and ketonuria. Urine chemistry- Biochemical components – Reference ranges in normal - Diseased state- Proteinuria, oliguria, Polyuria, Glycosuria, Hematuria.

Unit V : Clinical Biochemistry**12**

Specimen Collection- Blood, Urine and Body fluids.Preanalytical, analytical and postanalytical errors. Clinical Biochemistry- Parameters to diagnose Diabetes & Cardiovascular diseases. Diagnostic enzymology, Assessment of arterial Blood gas status and electrolyte balance, Point of Care Testing. Renal Function tests (in brief), Liver function tests(in brief).

TOTAL: 60HOURS**TEXT BOOKS**

1. Textbook of Biochemistry –NaikPankaja- Published by Jaypee brothers medical, 2 nd edition (1 January 2017)
2. Biochemistry –Voet D and Voet J GPublishedby Wiley, 4th edition (27 April 2012)
3. Clinical Biochemistry-R LuxtonPublishedby Hodder Arnold,3rd edition (2 july 1999)
4. Textbook of Medical Biochemistry-Chatterjea and ShindePublishedby JPB publisher, 8th edition (1 January. 2012)
5. Textbook of Clinical Chemistry-TerronForrePublishedby Random experts, 2nd Edition (1 January 2013)

REFERENCE BOOKS

1. Harpers Biochemistry By Murray R KPublishedby Tata Mc Graw hill, 31st edition 2021)
2. Clinical Biochemistry-S S HaquePublishedby New Delhi publishers 1st edition (31 August 2021)
3. Textbook of Biochemistry-Rafi M.DPublishedbyThe Orient Black swan, 3rd edition (1sr January 2017)
4. Reference guide to blood chemistry analysis- Dicken, RichardPublishedby Bear mountain, 1st edition (5 September 2014)
5. Practical Clinical Biochemistry-Harold VarleyPublishedby CBS publisher, 4th edition (1st January 2005).

BS3604	Environmental Science	L	T	P	C
		2	0	0	2

OBJECTIVE

To know various Environmental factors of Health

Course Outcome – COs At the end of the course, the students will be able to,		Cognitive Skill
CO-01	Apprehends the concepts of EVS, its relationship and impacts with health and studies about the importance of safe and pure water, pollution and purification method	U
CO-02	Understands the properties, sources, biological effects and the monitoring, prevention & control of air, light, noise and radiation	R & U
CO-03	Learns the various methods of disposing solid and excreta wastes and the modern sewage systems to improvise proper sanitation and health of public	R
CO-04	Acquire knowledge about the importance of good standard housing as it influence health greatly and the medical entomology	R & U
CO-05	Know about the types, mechanism of action, dosage and application of insecticides to control insects and rodents which impacts health ultimately	R

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	L	S	M	L	L	S	S	S	L	L	M	M	S
CO-02	L	S	M	L	L	S	S	S	L	L	M	M	S
CO-03	L	S	M	L	L	S	S	S	L	L	M	M	S
CO-04	L	S	M	L	L	S	S	S	L	L	M	L	S
CO-05	L	S	M	L	L	S	S	S	L	L	M	L	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I: Environment, Health and Water

6

Introduction to Environment and Health and Water- Ecological definition of Health, Population perspective of relations, Health & environment perspective of relations, Environmental factors, Environmental Sanitation, Need to study environmental health, Predominant reasons for ill-health in India. Water - Safe and wholesome water, requirements, uses, sources; sanitary well; Hand pump; water Pollution; Purification of water; large scale & small scale; slow sand filters; rapid sand filters; Purification of Water on a small scale; Household purification, Disinfection of wells; water quality criteria & standards.

Unit II: Air, Light, Noise, Radiation**6**

Air- Composition, Indices of Thermal Comfort, Air pollutants, Air Pollution - Health Effects, Environmental Effects, Green-house effect, Social & Economic Effects, Monitoring, Prevention & Control. Light, Noise, Radiation. Natural and Artificial light; Properties, sources, noise pollution and its control, types, sources, biological effects and protection.

Unit III: Waste and Excreta Disposal**6**

Disposal of Wastes - Solid Wastes, Health hazards, Methods of Disposal; Dumping, Controlled tipping/ sanitary landfill, Incineration, Composting. Excreta Disposal - Public health importance, Health hazards, sanitation barrier, Methods of excreta disposal, unsewered areas and sewerage areas, sewage, Modern Sewage Treatment.

Unit IV: Housing and Health and Medical**6**

Housing and Health - Human Settlement, Social goals of housing, Criteria for Healthful Housing by Expert Committee of the WHO, Housing standards- Environmental Hygiene Committee, Rural Housing Standards, Overcrowding, Indicators of Housing. Medical Entomology - Classification of Arthropods, Routes of Disease transmission, Control measures.

Unit V : Insecticides and Rodents**6**

Insecticides - Types, mechanism of action, dosage and application for control of insects. Rodents - Rodents and its importance in disease, along with anti-rodent measures.

TOTAL: 30 HOURS**REFERENCE BOOKS**

- 1) Park K. Park's Textbook of Preventive and Social Medicine. 23rd ed. Jabalpur: BanarsidasBhanot Publishers; 2015. p.135-141
- 2) Suryakantha. Textbook of Community Medicine with recent advances. 4th edition.
- 3) Bhalwar R. Textbook of Public Health and Community Medicine. 2nd edition. Pune: Department of Community Medicine AFMC, 2012
- 4) Essentials of Community Medicine for Allied Health Sciences, JSS University Publications, 2015.

BS3671	ANATOMY LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE

It deals with various anatomical studies about various systems in the body.

Course Outcome – COs		Cognitive Skill
At the of the course,the students will able to,		
CO-01	Understand the parts of microscope and its uses, skeleton and joint	R
CO-02	Demonstrate the deltoid and gluteus maximus, Cubital fossa	U

CO-03	Demonstrate the heart and its blood supply, demonstration of major arteries of upper limb and lower limb, histology of cardiac muscle and histology of vessels	A
CO-04	Demonstrate the location and features of kidney, ureter, urinary bladder and urethra. Histology of urinary system except urethra	R
CO-05	Determine the histology of cornea and retina	U

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO -I	PO- J	PO- k	PO -L	PO- M
CO-01	S	M	S	S	M	S	S	M	S	S	M	S	S
CO-02	S	S	M	L	M	S	M	S	S	L	S	M	S
CO-03	M	S	S	S	S	M	S	M	S	S	M	M	S
CO-04	S	S	M	M	S	S	M	S	M	M	S	M	M
CO-05	S	S	S	M	S	M	S	M	S	S	L	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Practicals

- 1) Demonstration of parts of microscope and its uses
- 2) Demonstration of skeleton and joint
- 3) Demonstration of deltoid and gluteus maximus, Cubital fossa
- 4) Demonstration of heart and its blood supply, demonstration of major arteries of upper limb and lower limb, histology of cardiac muscle and histology of vessels
- 5) Demonstration of location and parts of lungs, histology of trachea and lungs
- 6) Demonstration of location of stomach, small and large intestines. Location and features of pancreas, liver and gall bladder
- 7) Demonstration of location and features of kidney, ureter, urinary bladder and urethra. Histology of urinary system except urethra
- 8) Demonstration of location of male and female reproductive organs
- 9) Demonstration of brain and spinal cord
- 10) Histology of cornea and retina

TOTAL: 30HOURS

BS3672	PHYSIOLOGY LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE

To study about physiological systems of body

Course Outcome – COs At the end of the course,the students will able to,		Cognitive Skill
CO-01	Understand and perform estimation of haemoglobin	U
CO-02	Analyze the blood groups	An
CO-03	Determination of bleeding time and clotting time	U
CO-04	Evaluate the principles of haemocytometer	E
CO-05	Learn various blood pressure recording methods	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Practicals

- 1) Haemoglobinometry.
- 2) Haemocytometry
- 3) Total leucocyte count.
- 4) Total Red blood cell count.
- 5) Determination of blood groups.
- 6) Differential WBC count.
- 7) Determination of clotting time, bleeding time.
- 8) Erythrocyte sedimentation rate (ESR). Determination of packed cell Volume, Calculation of Blood indices: CI, MCH, MCV, MCHC.
- 9) Blood pressure recording.
- 10) Spirometry, Artificial Respiration

TOTAL: 30 HOURS

BS3673	BIOCHEMISTRY LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE

To study about the laboratorial values and experiments related to biochemistry

Course Outcome – COs At the end of the course,the students will able to,		Cognitive Skill
CO-01	Chemistry of cell and chemistry of carbohydrates ,proteins ,lipids	U
CO-02	Know about enzymes and acid base balance	An
CO-03	Know about vitamins and minerals	U
CO-04	Deals with the nutrition,blood chemistry and urine chemistry	E
CO-05	Know about clinical biochemistry	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- -I	PO- J	PO- k	PO - L	PO-M
CO-01	S	N	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	L	S	N	M	M	M	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	N	S	M	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

Practicals

- 1) General Reactions of Carbohydrates.
- 2) Color reactions of Proteins.
- 3) Reactions of Non Protein nitrogenous substances.
- 4) Demonstration of pH meter, Colorimeter and spectrophotometer.
- 5) Demonstration of Chromatography and Electrophoresis.

TOTAL: 30 HOURS

SEMESTER II

Sl. No	Course Code	Course Title	L	T	P	C
THEORY						
1.	BS3605	General Pathology	3	1	0	4
2.	BS3606	Microbiology	3	1	0	4
3.	BS3607	Pharmacology	3	1	0	4
4.	BS3608	Psychology	2	0	0	2
5.	BS3609	Introduction to Computer	2	0	0	2
PRACTICALS						
6.	BS3674	Pathology Laboratory	0	0	2	2
7.	BS3675	Microbiology Laboratory	0	0	2	2
8.	BS3676	Pharmacology Laboratory	0	0	2	2
TOTAL			13	3	6	22

BS3605	GENERAL PATHOLOGY	L	T	P	C
		3	1	0	4

OBJECTIVE

To deals with the concepts of Clinical Pathology,.

Course Outcome – COs At the end of the course, the students will be able to,		Cognitive Skill
CO-01	Exposure to a knowledge on introduction and scope of pathology	R
CO-02	Understanding on the learning about types of hematological disorders	U
CO-03	Analyze on basic hematological techniques.	U
CO-04	Students will learn about transfusion medicine.	R,A
CO-05	To understand about clinical pathology.	U,E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	N	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	L	S	N	M	M	M	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	N	S	M	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I: Introduction- & scope of pathology

12

Cell injury and Cellular adaptations - Normal cell, Cell injury - types, etiology, morphology, Cell death-autolysis, necrosis, apoptosis, Cellular adaptations-atrophy, hypertrophy, hyperplasia, metaplasia. Inflammation-Introduction, acute inflammation-vascular events, cellular events, chemical mediators, chronic inflammation-general features, granulomatous inflammation, tuberculosis. Healing and repair - Definition, different phases of healing, factors influencing wound healing, fracture healing. Haemodynamic disorders-Oedema, hypermia, congestion, haemorrhage, embolism, thrombosis, infarction. Neoplasia - definition, nomenclature, features of benign and malignant tumors, spread of tumors, dysplasia, carcinoma in situ, precancerous lesions. Environmental and nutritional pathology - smoking, radiation injury, malnutrition, obesity, vitamin deficiencies.

Unit II: Haematological Disorders

12

Introduction and Haematopoiesis. Anaemia - introduction and classification (morphological and etiological), iron deficiency anemia: distribution of body iron, iron absorption, causes of iron deficiency, lab findings, megaloblastic anemia: causes, lab findings, haemolytic anemias: definition. Causes, classification and lab findings. WBC disorders - quantitative disorders, leukemia - introduction and classification, acute leukemias, chronic leukemias. Bleeding disorders - introduction, physiology of hemostasis. Classification, causes of inherited and acquired bleeding disorders, thrombocytopenia, DIC, laboratory findings. Pancytopenia.

Unit- III: Basic Hematological Techniques**12**

Characteristics of good technician, Blood collection - methods (capillary blood, venipuncture, arterial puncture) complications, patient after care, anticoagulants, transport of the specimen, preservation, effects of storage, separation of serum and plasma, universal precautions, complete hemogram - CBC, peripheral smear, BT, CT, PT, APTT, ESR, disposal of the waste in the laboratory.

Unit IV: Transfusion Medicine**12**

Selection of donor, blood grouping, Rh typing, cross matching, storage, transfusion transmitted diseases, transfusion reactions, components - types, indications.

Unit V: Clinical Pathology**12**

Introduction to clinical pathology - collection, transport, preservation, and processing of various clinical specimens. Urinalysis - collection. Preservatives, physical, chemical examination and microscopy. Physical examination; volume, color, odor, appearance, specific gravity and pH, Chemical examination; strip method- protein - heat and acetic acid test, sulfosalicylic acid method, reducing sugar-benedicts test, ketone bodies - rothas test, bile pigments fouchet method, bile salt - hays method, blood - benzidine test, urobilinogen and porphobilinogen - ehrlich aldehyde and schwartz test, bence jones protein., microscopy. Examination of cerebrospinal fluid - physical examination, chemical examination, microscopic examination, examination of body fluids (pleural, pericardial and peritoneal), physical examination, chemical examination, microscopic examination, sputum examination.

TOTAL: 60 HOURS**TEXT BOOKS**

- 1) Basic Pathology Robbins Saunders, an imprint of Elsevier Inc., Philadelphia, USA.
- 2) Text book of Pathology HarshaMmohanJaypee Brothers, New Delhi.
- 3) Practical Pathology P. Chakraborty, GargiChakarborty New Central book agency, Kolkata.
- 4) Text book of Haematology Dr Tejinder Singh Arya Publications, Sirmour (H P)
- 5) Text book of Medical Laboratory Technology PrafulGodkarBhalani Publications house, Mumbai.

BS3606	MICROBIOLOGY	L	T	P	C
		3	1	0	4

OBJECTIVE

To learn basic sterilization methods, know the importance of immunity and understand various pathogens.

Course Outcome At the end of the course, students should be able to,		Cognitive Skill
CO-01	Knowledge in sterilization and know the importance of immunity.	U, R,A
CO-02	Understand and identify common bacterial infectious agents and the disease that they cause.	U,R,An
CO-03	Learn basic diagnostic methods, treatment for mycobacterium and parasitic infections	U,R,An
CO-04	Know the morphology and diagnostics methods for various fungal infections.	An, R
CO-05	Understand the interaction between viruses and its host and know the preventive measures of viruses.	U, R

R- Remember, U – Understand, A – Apply, An – Analyze, E – Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO -A	PO- B	PO - C	PO -D	PO - E	PO- F	PO -G	PO -H	PO - I	PO- J	PO- k	PO - L	PO- M
CO-01	S	S	S	M	L	M	M	N	N	M	S	S	S
CO-02	S	S	S	L	S	N	M	N	L	S	S	M	S
CO-03	S	S	S	M	M	M	M	N	N	M	S	M	S
CO-04	S	S	S	S	M	M	S	N	L	S	M	M	S
CO-05	S	S	S	M	L	L	M	N	N	S	S	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

UnitI: General Microbiology

12

History of Microbiology. Sterilization and Disinfection - Principles and use of equipment's of sterilization namely hot air oven, autoclave and serum inspissator, pasteurization, antiseptics and disinfectants. Immunology - Antigen, Antibodies, Immunity, Vaccines and immunization schedule. Hospital acquired infection - Causative agents, transmission methods, investigation, prevention and control of hospital acquired infections.

Unit II: Bacteriology

12

Morphology, infections, lab diagnosis, treatment and prevention of common bacterial infections - Staphylococcus, Streptococcus, Neisseria, Corynebacterium diphtheriae, Clostridia, Shigella, Salmonella, Klebsiella, E.coli, Proteus, Vibrio cholerae, Pseudomonas.

Unit III: Mycobacteriology & Parasitology **12**

Mycobacteria- Morphology, pathogenesis, lab diagnosis, treatment and prevention. Morphology, infections, lab diagnosis, treatment and prevention of following parasites - Entamoeba, Giardia, Malaria, Hookworm, Roundworm and Filarial worms.

Unit IV: Mycology **12**

Morphology, disease caused and lab diagnosis of following fungi - Candida, Cryptococcus, Dermatophytes, Opportunistic fungi (Aspergillus, Zygomycetes and Penicillium).

Unit V: Virology **12**

General properties of viruses, diseases caused lab diagnosis and prevention of following viruses - Hepatitis, HIV, Dengue, Influenza, Chikungunya, Rabies, Corona and Poliomyelitis.

TOTAL:60 HOURS

TEXT BOOKS

- 1) Anathanarayana&Panikar: Medical Microbiology - Revised 8th edition University Press.
- 2) Parasitology by Chatterjee - Interpretation to Clinical Medicine.
- 3) Textbook of Microbiology - Baveja, 5th edition, Arya Publications.

REFERENCE BOOKS

1. Microbiology by Prescott L M, J P Harley and D A Klein, 2005. Sixth edition, International edition, Mc Graw Hill.
2. Microbiology by Pelczar TR M J Chan ECS and Kreig N R, 2006. Fifth edition, Tata Mc Graw-Hill INC. New York.

BS3607	PHARMACOLOGY	L	T	P	C
		3	1	0	4

OBJECTIVE

Describe the General Pharmacology and Blood, basic technical terminology of Chemotherapy, Hormones

Course Outcome – COs		Cognitive Skill
At the end of the course,the students will able to,		
CO-01	Understand regarding the general pharmacology including pharmacokinetics and pharmacodynamics of adrenergic drugs	R
CO-02	Enlist skeletal muscle relaxants, ionotropic drugs, antihypertensives and diuretics	U
CO-03	Understand regarding general anesthetics, antiepileptics, opioidsanalgesics and NSAIDS	A
CO-04	Enhance their knowledge on chemotherapeutic drugs	R
CO-05	List out antibiotics, antifungal, antiviral and hormonal drugs	U

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	L	S	M	S	S	M	S	S	L	S	S	M	S
CO-02	L	S	M	S	M	M	S	S	L	M	M	M	S
CO-03	L	S	M	S	M	S	S	S	M	S	S	L	S
CO-04	L	S	M	S	S	M	S	S	L	M	M	M	S
CO-05	L	S	M	S	M	M	S	S	L	S	S	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I: General Pharmacology, ANS, PNS.

12

Sources of Drugs. Route of drug administration. Pharmacokinetics (Absorption, Metabolism, Distribution, Excretion). Pharmacodynamics (Mechanisms of action) Adverse drug reactions. ANS ADRENERGIC Drugs - Adrenaline, Noradrenaline, Ephedrine, Dopamine, Dobutamine. Anti adrenergic - Phentolamine, Phenoxybenzamine, Prazocin, Tamsulosin, Propranolol, Atenolol, Carvidelol. Cholinergic drugs-Acetyl choline, Pilocarpine, Neostigmine, Organophosphorous compounds. Anti cholinergic agents-Atropine, Glycopyrrolate, Ipratropium Bromide, Dicyclomine

Unit II: PNS, CVS, Renal System

12

Skeletal muscle relaxants - D Tubocurarine, Succinyl choline, Diazepam. Dantrolene Local anaesthetics - lignocaine, la + vasoconstrictor CVS - ionotropic agents - Digoxin, Antianginal drugs - GTN, Antihypertensives - Betablockers (Propranolol, Atenolol, carvidelol), CCBs (Nifedine), Diuretics (Thiazide, Furosemide, ace inhibitors, ARBs, Clonidine Drugs used in treatment of different types of shock, Plasma expanders Renal system - Diuretics Furosemide, Thiazide, Spiranolactone Antidiuretics - Vasopressin

Unit III: CNS, Blood

12

CNS - general Anaesthetics - nitrous oxide, Halothane, iv anaesthetics. Sedative hypnotics - diazepam, barbiturates, zolpidem. Antiepileptics - Phenytoin, carbamazepine, phenobarbitone, valproate. Opioid analgesics - morphine, pethidine, codeine. NSAIDS - Aspirin, Diclofenacibuprofen, Selective COX2 inhibitors. Respiratory system-treatment of cough And Bronchial asthma. Blood - Hematinics, Anticoagulants - Warfarin, Heparin Thrombolytics& Antiplatelet drugs - streptokinase, aspirin, clopidogrel.

Unit IV: GIT, Chemotherapy

12

GIT - drugs used in peptic ulcer - ppi, H2 blockers, Antacids Antiemetics - Metaclopramide, Domperidone, Ondansetron Purgatives & Laxatives-bran, ispaghula, Lactulose, Bisacodyl&senna Drugs used in Diarrhoea- ORS, Super ORS, Antimotility drugs (loperamide, diphenoxylate). Chemotherapy - general considerations MOA, Resistance, Prophylaxis Sulfonamides, cotrimoxazoles, Quinolones Tetracyclines, chloramphenicol. Betalactam antibiotics

Unit V: Chemotherapy, Hormones**12**

Aminoglycosides, Macrolides, other antibiotics (vancomycin, linezolid) & treatment of UTI Antifungal (clotrimazole, flucanazole), Antiviral (Acyclovir, Few drugs used in HAART), Cancer chemotherapy (names, common Adverse effects, general principles in the treatment of cancer) Hormones - Corticosteroids its uses and adverse effects, Treatment of Diabetes mellitus(insulin, Metformin, Glibenclamide).

TOTAL: 60 HOURS**TEXT BOOKS**

- 1) 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.
- 2) PadmajaUdaykumar -Pharmacology for Allied Sciences.
- 3) R.S. Satoskar, S.D. Bhandarkar, S.S. Ainapure, Pharmacology and Pharmacotherapeutics, 18th edition, Single Volume, M/s Popular Prakashan, 350, Madan Mohan Marg, Tardeo, Bombay - 400 034.

BS3608	PSYCHOLOGY	L	T	P	C
		2	0	0	2

OBJECTIVE

After studying this applied paper, at the end of the semester students shall be able to demonstrate and develop the skills to understand patients better in the respective field.

Course Outcome – COs At the end of the course,the students will able to,		Cognitive Skill
CO-01	Get a clear picture about the basic of psychology, scope, branches and history of psychology and understands the concept of normality and abnormality	U & A
CO-02	Develop a knowledge about the classification, signs, symptoms and management of psychological disorders like anxiety, panic, phobia, OCD and PTSD	U & A
CO-03	Will be prepared to manage stress as they learn about how stress impairs a normal life style and health. Students learns about the stress and the models provided by Hans Selye and Lazarus & Folkman	U & A
CO-04	Study about the process of learning proved by scientists Ivan Pavlo and Skinner in the psychological perspectives	R
CO-05	Learn about the therapeutic techniques, the concept of counselling and relaxation techniques	U & A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO - I	PO- J	PO- k	PO -L	PO- M
CO-01	L	S	M	M	L	S	S	S	S	S	S	L	S
CO-02	L	S	M	M	M	S	S	S	S	M	M	L	S
CO-03	L	S	M	L	L	S	S	S	S	M	M	L	S
CO-04	L	M	M	M	L	M	M	M	M	M	M	L	
CO-05	L	M	M	M	M	S	S	S	S	S	S	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I:

6

Introduction to Psychology; Meaning and Definitions psychology. Evolution of modern psychology. Scope of Psychology. Branches of psychology. Concept of normality and abnormality.

Unit II:

6

Identifying psychological disorders. Anxiety disorders (panic, phobia, OCD, PTSD signs symptoms and management).

Unit III:

6

Stress, Hans Selye Model of stress. Lazarus and Folkman model of stress. Sources of stress. Stress, disease and health. Changing health- impairing behavior.

Unit IV:

6

Learning; Meaning, definition, Theories of learning .Pavlov's classical conditioning, Skinner's operant conditioning.

Unit V:

6

Therapeutic Techniques. Counselling-meaning and definition. Psychotherapy- meaning and definition. Relaxation-types. (Brief introduction to psychoanalytical, behavioral and cbt techniques)

TOTAL: 30 HOURS

TEXT BOOKS

- 1) C.P. Khokhar (2003) Text book of Stress Coping and Management Shalab Publishing House.
- 2) S.M.Kosslyn and R.S.Rosenberg (2006) Psychology in Context. Pearson Education Inc.
- 3) C.R. Carson, J.N. Bitcher, S.Mineka and J.M. Hooley (2007), Abnormal Psychology13th, Pearson Education, Inc.

- 4) D.A. Barlow and V.M. Durand (2004) Abnormal Psychology Wadsworth, Thompson Learning, 3rd edition USA.
- 5) R.J. Gerrig & P.G. Zimbardo (2006) Psychology and life, Pearson Education, Inc.
- 6) Pestonjee, D.M. (1999). Stress & Coping, The Indian Experience 2nd edn. New Delhi, Sage India Publications. University Publications, 2015.

BS3609	INTRODUCTION TO COMPUTER	L	T	P	C
		2	0	0	2

OBJECTIVE

To deals with the concepts of the Computer and its Functions.

Course Outcome – COs At the end of the course, the students will able to,		Cognitive Skill
CO-01	Remember with the basic concepts of computer and its history	R
CO-02	Understand the computer hardware, various types of storage devices and parts of computer.	U
CO-03	Understand the computer memory.	U
CO-04	Familiar with the file management, application software packages used and various types of application softwares	R,A
CO-05	Understand the basics of operating system and evaluate the number system.	U,E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO \ CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	N	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	L	S	N	M	M	M	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	N	S	M	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I:

6

Functionalities of a computer, Definition, Advantages, Disadvantages. Applications - Banking, Insurance, Education, Marketing, HealthCare, Engineering Design, Military, Communication, Government. Generations - First Generation, Second Generation, Third Generation, Fourth Generation, Fifth Generation. Types of Computer - PC (Personal Computer), Workstation, Minicomputer, Mainframe, Supercomputer.

Unit II:**6**

Components - Input Unit, CPU, (Central Processing Unit) Output Unit. CPU - Central Processing Unit, Memory or Storage Unit, Control Unit, ALU (Arithmetic Logic Unit), Arithmetic Section, Section Logic. Input Devices - Keyboard, Mouse, Joystick, Light Pen, Track Ball, Scanner, Digitizer, Microphone, Magnetic Ink, Card Reader (MICR), Optical Character Reader(OCR), Bar Code Readers, Optical Mark Reader(OMR). Output Devices - Monitors, Cathode-Ray Tube (CRT) Monitor, Flat-Panel Display Monitor, Printers, Impact Printers, Character Printers, Dot Matrix Printer, Daisy Wheel, Printers Line, Printer Drum, Printer Chain, impact Non- Printers, Printers Laser, Inkjet Printers.

Unit III:**6**

Memory - Cache Memory, Primary Memory, (Main Memory) Secondary Memory. Random Access Memory - Static RAM (SRAM), Dynamic RAM (DRAM). Read Only Memory - MROM (Masked ROM), PROM (Programmable Read only Memory), EPROM (Erasable and Programmable Read Only Memory) EEPROM (Electrically Erasable and Programmable Read Only Memory) Advantages of ROM. Mother board - Features of Mother board, Popular Manufacturers, Description of Mother board.

Unit IV:**6**

Ports - Port Serial, Port Parallel, Port PS/2, Port VGA, Power Connector, Port Firmware, Port Modem, Ethernet Port, Port Game, Digital Video Interface, DVI port, Sockets. Hardware - Relationship between Hardware and Software. Software - System Software, Application Software, Emerging trends in IT-introduction, E-commerce, mobile communication, global positioning system(GPS), infrared Communication, smart card, artificial intelligence in health care.

Unit V:**6**

Documentation using MS Word- Introduction to office automation, Creating and editing worksheet, Formatting document, Auto test, Autocorrect, spelling and grammar tool, document, Template. MS Excel- Introduction to MS Excel, formulas and functions, Charts, advance features of MS Excel. MS PowerPoint- Presentation, creating and manipulating slides, Inserting recorded sound effect or Inbuild sound effect.

TOTAL: 30 HOURS**REFERENCES BOOKS**

1. Introduction to computer by Gilbert Brands, 2010. PHI Learning Pvt Ltd, New Delhi, First edition.
2. Advances in Computer science and Information Technology by HojattAdeli, 2003, New Age International (P), Ltd.
3. Computer organisation and Architecture, Rajaraman V, Radhakrishnan.T., 2001. First edition. PHI Learning Private Limited, New Delhi.
4. Computer Science, Robert Sedgewick, Kevin Wayne, 2012. PHI Learning Pvt Ltd, New Delhi, First edition.

BS3674	PATHOLOGY LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE

To deals with the Concepts of Hematological Techniques and Diagonosis of the diseases.

Course Outcome – COs At the end of the course,the students will able to,		Cognitive Skill
CO-01	Understanding the concerned techniques for blood collection	U
CO-02	Acquire knowledge about hematological techniques	A
CO-03	Enables to understand the indications and procedure involved in blood transfusion	U
CO-04	Able to gain basic knowledge of morphology of blood cells	A
CO-05	Enhanced with the basic knowledge of collection and examination of CSF	E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	N	M	M	S	N	M	M	L	S	L	L	M
CO-02	M	M	M	L	S	N	M	L	M	S	M	N	M
CO-03	S	L	S	M	M	N	L	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	M	M
CO-05	N	M	L	M	L	N	M	N	S	M	L	M	L

S- Strong, M- Medium, L-Low, N- Not Relevant

Practicals

1. Laboratory organization.
2. Reception of specimen, dispatch of reports, records keeping, coding of cases.
3. Laboratory safety guidelines.
4. SI units and conventional units in hospital laboratory.
5. Haematology techniques
6. Basic requirements for hematology laboratory
7. Glasswares for hematology
8. Equipments for haematology.
9. Anticoagulant vials
10. Complete blood counts.
11. Determination of haemoglobin.
12. RBC count and TLC by hemocytometer.

13. Differential leukocyte count.
14. Determination of platelet count
15. Determination of ESR and PCV.
16. Erythrocyte Indices - MCV, MCH, MCHC.
17. Reticulocyte count
18. Absolute eosinophilic count
19. Morphology of blood cells
20. Urinalysis
21. Examination of cerebrospinal fluid
22. Examination of body fluids (pleural, pericardial, peritoneal)
23. Sputum examination.

TOTAL: 30 HOURS

BS3675	MICROBIOLOGY LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE

To know about the microscope, methods of staining techniques, antibody reaction and microbial growth

Course Outcome – COs At the end of the course, the students will be able to		Cognitive Skill
CO-01	Develop basic skill in aseptic techniques and know the parts of the microscope and its principles	U
CO-02	Understand the different methods of staining techniques	A
CO-03	Understand nutritional requirements of bacteria and different cultivation techniques	U
CO-04	To determine the concepts of various antigen antibody reactions	A
CO-05	To determine the effect of antibiotics on microbial growth	E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	S	S	S	M	S	S	N	N	S	M	M	S
CO-02	S	S	S	S	S	L	N	N	N	S	M	N	N
CO-03	S	S	M	M	L	L	L	N	N	M	M	M	M
CO-04	S	S	M	M	L	N	N	N	N	M	N	N	S
CO-05	S	S	S	S	M	S	S	N	N	S	M	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Practicals

- 1) Compound microscope and its application in microbiology.
- 2) Demonstration of sterilization equipments: hot air oven, autoclave, bacterial filters.
- 3) Preparation of commonly used culture media - Nutrient broth, nutrient agar, blood agar, MacConkey agar.
- 4) Determine serological test Widal.
- 5) Determine C Reactive protein.
- 6) Determine Antistreptolysin O in human serum.
- 7) Determine Rheumatoid arthritis.
- 8) Rapid test for HIV .
- 9) Rapid test for HBV.
- 10) Perform Simple staining.
- 11) Perform Grams staining.
- 12) Perform Acid fast staining.

TOTAL: 30 HOURS

BS3676	PHARMCOLOGY LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE

To deals with the Concepts of General Pharmacology and Blood, basic technical terminology of Chemotherapy, Hormones.

Course Outcome – COs At the end of the course,the students will able to,		Cognitive Skill
CO-01	Understand the rules of drug administration	U
CO-02	Know the dosages of various drugs	A
CO-03	Students will be able to understand fixed dose combinations	U
CO-04	Understand regarding the drug stations of various drugs	A
CO-05	Gain knowledge regarding different instruments and devices used for the administration of drugs	E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	L	S	M	S	S	M	S	S	L	S	S	M	S
CO-02	L	S	M	S	M	M	S	S	L	M	M	M	S

CO-03	L	S	M	S	M	S	S	S	M	S	S	L	S
CO-04	L	S	M	S	S	M	S	S	L	M	M	M	S
CO-05	L	S	M	S	M	M	S	S	L	S	S	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Practicals

1. Dosage forms
2. Routes of Drug administration
3. Fixed dose combination - Amoxicillin + clavulanic acid, Cotrimoxazole, Lignocaine + Adrenaline
4. Drug stations
5. Instrument & devices (Nasogastric tube, laryngoscope, Different Catheters, nebulizers, Inhalers, Rotahalers, Insulin Syringe, Pen Insulin)
6. Adverse Drug Reactions

TOTAL: 30 HOURS

SEMESTER III

Sl. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1	BS36S1	Applied Pathology	3	1	0	4
2	BS36S2	Applied Microbiology	3	1	0	4
3	CT3601	Basic Cardiac Care Technology	3	1	0	4
4	BS36S3	Introduction Biomedical Instrumentation	2	0	0	2
5	BS36S4	Health care	3	0	0	3
PRACTICAL						
6	BS3677	Applied Pathology Laboratory	0	1	2	2
7	BS3678	Applied Microbiology Laboratory	0	1	2	2
8	CT3671	Basic Cardiac Care Technology Laboratory	0	1	2	2
TOTAL			14	6	6	23

BS36S1	APPLIED PATHOLOGY	L	T	P	C
		3	1	0	4

OBJECTIVE

The course assists the students to understand the heart disease, pulmonary diseases, renal diseases

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Understand various congenital disorders of the heart disease, Atherosclerosis, Ischemic heart diseases and Hypertension	U,A,E
CO-02	Know the various pathological changes and signs and symptoms heart failure, Rheumatic heart disease and congenital heart disease	R,A,E
CO-03	Get the adequate the difference between Atlectasis, Chronic obstructive pulmonary disease and Restrictive pulmonary diseases.	U,A,E
CO-04	Get a clear picture regarding the pathological changes, respiratory conditions like pneumoconiosis, pulmonary embolism, pneumonia etc	R,A
CO-05	Know the basic knowledge regarding clinical manifestations of renal diseases and various associated diseases	U,A,E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	M	L	L	S	M	M	L	L	N	L	M	L	M
CO-02	M	L	M	S	L	M	M	L	L	M	L	N	L
CO-03	L	L	M	S	M	M	M	L	L	M	L	L	M
CO-04	M	L	M	S	M	L	M	L	M	M	L	L	L
CO-05	M	M	L	S	M	M	M	L	M	L	M	M	L

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I : Atherosclerosis **12**

Atherosclerosis-definition, risk factors, pathogenesis, morphology and complications. Ischemic heart disease: Myocardial infarction - definition, pathogenesis, morphology and complications. Hypertension- Benign and malignant hypertension: pathogenesis, pathology and complications

Unit II:Heart failure **12**

Heart failure - Right and left heart failure: causes, pathophysiology and morphology. Rheumatic heart disease and infectious endocarditis - definition, etiopathogenesis, morphology and complications. Congenital heart disease- Types and atrial septal defect; aneurysms - types and morphology; cardiomyopathies in brief

Unit III: Atelectasis **12**

Atelectasis - types, Adult respiratory distress syndrome - causes, pathogenesis and morphology; pulmonary edema- classification, causes and morphology. Chronic obstructive pulmonary disease- Chronic bronchitis, emphysema, asthma, bronchiectasis: Definition, etiopathogenesis and morphology. Restrictive pulmonary diseases - Definition, categories, pathogenesis and morphology

Unit IV: Pneumoconiosis **12**

Pneumoconiosis - types, asbestosis, coal workers pneumoconiosis - etiopathogenesis and morphology. Pulmonary embolism, infarction, pulmonary hypertension - Definition, etiopathogenesis and morphology. Pneumonia - Classification of pneumonias; Lobar pneumonia and bronchopneumonia - etiology, pathology and complications

Unit V : Clinical manifestations of renal diseases **12**

Clinical manifestations of renal diseases. Glomerular lesions in systemic diseases - diabetes, amyloidosis and systemic lupus erythematosus. Pericardial and pleural effusions - causes and microscopy

TOTAL: 60 HOURS

REFERENCE BOOKS

1. Basic Pathology Robbins Saunders an imprint of Elsevier Inc., Philadelphia, USA
2. Text book of Pathology Harsh Mohan Jaypee Brothers, New Delhi
3. Practical Pathology P. Chakraborty, GargiChakraborty New Central Book Agency, Kolkata
4. Text Book of Haematology Dr.Tejinder Singh Arya Publications, Sirmour (H.P)
5. Text Book of Medical Laboratory Technology PrafulGodkar, Bhalani Publication House, Mumbai

BS36S2	Applied Microbiology	L	T	P	C
		3	1	0	4

OBJECTIVE

To learn the basic concepts in Clinical Microbiology

Course Outcome At the end of the course students should be able to		Cognitive Skill
CO-01	Deep knowledge in sterilization and disinfection	U, R
CO-02	Acquire knowledge about the concept of infection and its control.	U
CO-03	Students gains knowledge in health care associated infection.	R
CO-04	Students learns about chemotherapy and drug resistance.	An, R
CO-05	Students obtains knowledge in heart and lung diseases and its diagnosis, treatment and prevention.	U, R

R- Remember, U – Understand, A – Apply, An – Analyze, E – Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	P O - M
CO-01	S	S	S	L	L	M	M	N	N	M	S	S	S
CO-02	S	S	S	L	M	N	M	N	L	S	S	M	S
CO-03	S	S	S	M	M	M	M	N	N	M	S	M	S
CO-04	S	S	S	S	M	M	S	N	L	S	M	M	S
CO-05	S	S	S	M	L	L	M	N	N	S	S	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I: Sterilization and Disinfection

12

Sterilization and disinfection - classification, principle, methods - Disinfection of instruments used in patient care, Patient care unit -Central sterile supply department - Biomedical waste management.

Unit II: Infection and Infection Control**12**

Infection, Sources, transmission, portal of entry and exit, Standard (Universal) safety Precautions & hand hygiene, Infection control measures for Hospitals- Biosafety & Biohazard.

Unit III: Health care associated infections**12**

Sources, causes and factors of Health care associated Infections - Surgical site infections - Urinary tract infections - Ventilator associated pneumonia- Catheter associated blood stream infections - Antibiotic associated diarrhea

Unit IV: Chemotherapy and Drug resistance**12**

Chemotherapeutic agents –classification – Mechanism of Action, Chemotherapy –Routes and Methods of Chemotherapy administration -Drug Resistance and its Mechanism – Resistance minimization.

Unit V: Common Infections in heart and lungs**12**

Endocarditis, Myocarditis, Sore throat, common cold, SARS, Corona - Collection, handling, transport and processing of various clinical samples, Diagnosis, treatment and prevention of heart and lung diseases.

TOTAL: 60 HOURS**TEXT BOOKS**

1. Textbook of Microbiology by Ananthnarayan and Paniker.
2. Textbook of Hospital Infection Control by Purvamathur.
3. Textbook of Microbiology by Baveja.
4. Hospital Infection Control by Mayhall.

REFERENCE BOOKS

1. Microbiology by Prescott L M, J P Harley and D A Klein, 2005. Sixth edition, International edition, Mc Graw Hill.
2. Microbiology by Pelczar TR M J Chan ECS and Kreig N R, 2006. Fifth edition, Tata Mc Graw-Hill INC. New York.

CT3601	BASIC CARDIAC CARE TECHNOLOGY	L	T	P	C
		3	1	0	4

OBJECTIVES: The course objective is to develop the skills of students in evaluating and interpreting the diagnostic reports in order to assessing the cardiovascular functions for cardiac patients.

Course Outcome – COs		Cognitive Skill
Students will understand		
CO-01	The basic concepts of Applied anatomy and physiology of human heart.	R
CO-02	The methods of taking TMT and ECG.	U
CO-03	The views and modes of Echocardiography.	U
CO-04	The invasive diagnostic test done in Cath lab.	R,A
CO-05	The basic methods of gas administration devices.	U,E

R- Remember, U-Understand, A-Apply, An-Analyse, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO - C	PO -D	PO- E	PO- F	PO -G	PO- H	PO - I	PO - J	PO - k	PO -L	PO -M
CO-01	S	N	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	L	S	N	M	M	M	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	N	S	M	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I: Applied Anatomy and Physiology

12

Applied Anatomy

Structure of the heart and gross anatomy, normal position situs solitus, situs inversus with dextrocardia, situs solitus with dextrocardia, situs inversus with levocardia. Systemic and pulmonary circulation, coronary structure, coronary sinus structure and circulation. Chest topography - identification of imaginary lines, topographical landmarks over thorax, topography of heart and lungs. Surface marking of heart, aorta, pulmonary artery, precordium, heart valves, subclavian.

Applied Physiology

Control of heart rate. Concepts of congenital heart (ASD, VSD, PDA, TOF and transpositions). Blood circulation, cardiac output, pulmonary circulation, pulmonary oedema. Concepts of myocardial functions. Control of circulation. Conduction system of the heart

Unit II: Non-invasive ECG and TMT

12

ECG

Technique of ECG recording. ECG Leads system. ECG waves - PQRSTU, Osborn wave, delta wave, epsilon wave. ECG rates, rhythm, axis calculation, lead positioning. Intervals and

segments - PR interval, PR segment, ST segment, QT interval, J point and QRS complex. ECG anatomy - Chambers enlargement. Technical artefacts. ECG reporting

TMT

Pretest ECG, Introduction to Treadmill Test - Indications and Safety, equipment and Protocols, exercise End Points, basics of Interpretation of the Exercise Test. Exercise Testing to Diagnose Obstructive Coronary Artery Disease - Rationale and Guidelines, Pretest Probability (true positive, false positive, true negative and false negative ST-Segment Interpretation, Confounders of Stress ECG Interpretation. Result Reporting

Unit III: Non-invasive Echocardiography

12

Introduction and purposes, demonstration of machine parts. Basic windows. Echocardiographic views. Imaging modes - two-dimensional (2D) imaging, M-mode imaging, and Doppler imaging, color - flow mapping.

Unit IV: Invasive technologies

12

Orientation to the Cath - Lab and biomedical equipments, Introduction and purposes of the Cath - Lab. Radiation safety and protocols. Vascular access - arterial in femoral, radial and ulnar, venous in femoral. Catheterization left heart and right heart, Angiography - Chambers. Transducers balancing, measurement of pressures, Calculations of gradients. Blood flows, cardiac output and Calculations of cardio shunts, resistances. Management of patient in the Cath - Lab, coronary angiogram views. Prerequisites of cat lab procedures: CBC, RFT, Serology, ECG, Echo, and customised list for all types of procedures. Maintaining sterility, PPE - Personnel protective equipment's.

Unit V: Gas Administration Devices

12

Gas administration devices (reducing valves, flow meters and regulators). Simple oxygen administration devices. Methods of controlling gas flow. Reducing valve, Flow meters, restrictors and regulators. Selection of device. Precautions, advantages and disadvantages

TOTAL: 60 HOURS

REFERENCE BOOKS

1. Hutchison's Clinical Methods
2. A text book of Electrocardiography - Goldberger
3. Nanda's A Text book of Echocardiography
4. A Text of Cardiac Catheterization & Interventions. Dr. W. Grossman's D. Baim
5. A Text book of Cardiovascular Medicine. Dr. Bruanwald's
6. A Text book of Medicine, Davidsons

BS36S3	INTRODUCTION TO BIOMEDICAL INSTRUMENTATION	L	T	P	C
		2	0	0	2

OBJECTIVE

The course enables the students to understand basic concepts of biomedical instrumentation.

BS26S3 Introduction to Biomedical Instrumentation		
Course Outcome – COs At the end of the course the student should be able to		Cognitive Skill
CO-01	Familiar with the basic concepts of Biomedical Instrumentation	R,U
CO-02	Understand the various types of bioelectric signals and the electrodes used to record these signals	U,An,A
CO-03	Understand the principle and the applications of modern imaging systems	R,U,A
CO-04	Understand the working and applications of various therapeutic equipment	R,U,A
CO-05	Familiar with the recent advancements in the field of biomedical engineering	R,U,An

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	S	M	L	L	M	M	M	M	M	L	L	M
CO-02	S	S	M	L	L	M	M	M	M	M	L	L	M
CO-03	S	S	S	M	M	M	M	M	M	M	N	L	L
CO-04	S	S	S	S	S	S	S	M	M	L	N	L	M
CO-05	S	S	M	M	M	M	M	S	S	L	L	L	M

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I : Fundamentals of Medical Instrumentation

6

What is Biomedical Engineering? Anatomy and Physiological systems of the body, Sources of biomedical signals, Basic Medical Instrumentation System, Performance Requirement of Medical Instrumentation System, Intelligent Medical Instrumentation System, General Constraints in design of Medical Instrumentation System, Types of Biomedical Instrumentation Systems.

Unit II: Bioelectric Signals and Electrodes**6**

Origin of Bioelectric Signals, Bioelectric Signals – Electrocardiogram (ECG), Electroencephalogram (EEG), Electromyogram (EMG), Electroretinogram (ERG), Electrooculogram (EOG). Purpose of Electrode paste, Electrodes for ECG, EEG and EMG.

Unit III: Modern Imaging Systems**6**

Basic concepts and fundamentals of – X-ray machines, Computed Tomography, Nuclear Medical Imaging system, Magnetic Resonance Imaging system, ultrasonic Imaging system, Thermal Imaging system.

Unit IV: Therapeutic Equipment**6**

basic concepts and fundamentals of – Cardiac Pacemaker, Cardiac Defibrillators, Physiotherapy and Electrotherapy Equipment, Haemodialysis Machines, Lithotriptors, Anaesthesia Machine, Ventilators, Radiotherapy Equipment, Automated Drug delivery systems.

Unit V : Recent Trends in Biomedical

Basic concepts and Applications in Biomedical- LASER, BIOMEMS and Nano Technology, Biomaterials and Implants, Artificial Organs, Rehabilitation Engineering.

TOTAL: 30 HOURS**TEXT BOOKS**

1. Leslie Cromwell, “Biomedical Instrumentation and measurement”, Prentice hall of India, New Delhi, 1997.
2. Khandpur R.S, “Handbook of Biomedical Instrumentation”, Tata McGraw-Hill, New Delhi, 1997.

REFERENCES

1. John G. Webster, “Medical Instrumentation Application and Design”, John Wiley and sons, New York, 1998.
2. Joseph J.carr and John M. Brown, “Introduction to Biomedical equipment technology”, John Wiley and sons, New York, 1997.

BS36S4	HEALTH CARE	L	T	P	C
		3	0	0	3

OBJECTIVE

The course enables the students to understand the primary health care in India and national health programme.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Get a clear picture about the concepts of health and dimensions of health	U & A
CO-02	Develop a knowledge about the evolution of health care delivery systems and the levels of health care	U & A
CO-03	Understand the Primary health care, Secondary and tertiary health care delivery of services	U & A
CO-04	Learn about the Primary health care - Current status in India and National Health Programmes	U
CO-05	Learn about the National Health Programmes and first aid	U & A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	L	M	M	M	L	S	S	S	M	S	S	L	S
CO-02	L	M	M	M	M	M	S	S	S	M	M	L	S
CO-03	L	M	M	L	L	S	S	M	S	M	M	L	S
CO-04	L	M	M	M	L	S	M	S	S	M	M	L	S
CO-05	L	M	M	M	M	S	S	S	M	S	S	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I : Concepts of Health

9

Definition of health; evolution in concepts of public health; public health events-sanitary awakening, germ theory of disease, rise of public health in various countries, changing concepts of health- biomedical concept, ecological concept, psycho-social concept and holistic concept.

Dimensions of Health

Physical dimension, mental dimension, Social dimension etc; Common health problems in India - Communicable diseases, Non communicable diseases, MCH problems, Nutritional problems, Environmental sanitation, Glance over National Health profile.

Unit II: Evolution of health care delivery systems**9**

History of health care delivery services; Genesis of primary health care; National health policy; MDGs.

Levels of health care

Primary health care, secondary health care, tertiary health care. Primary health care-principles of primary health care, elements of primary health care.

Unit III: Primary health care: Delivery of services**9**

services at village level; Village health guide, ASHA, ICDS: Subcentre: Primary health centre.

Secondary and tertiary health care: Delivery of services

Community Health centre; First referral Unit; District hospital.

Unit IV: Primary health care - Current status in India**9**

Status of health care infrastructure; Health team concept; Health insurance; Social security and social assistance in health; AYUSH.

National Health Programmes

Introduction; National Vector Borne Disease Control Programme; National Leprosy Eradication Programme; Revised National Tuberculosis Control. Programme; National AIDS Control Programme; Universal Immunization Programme; National Rural Health Mission.

Unit V : National Health Programmes**9**

Reproductive and Child Health Programme; Integrated Management of Neonatal and Childhood Illnesses; National Nutritional Anemia Prophylaxis Programme; National Programme for Control of Blindness; National Cancer Control Programme; National Mental Health Programme.

First aid

Basic terminologies; general guidelines; first aid in specific situations; Wound, bleeding, fracture, choking, burns, epistaxis, strains and sprain, animal bites (classification, causes and first aid), Cardio-pulmonary resuscitation

TOTAL: 45 HOURS

REFERENCE BOOKS

1. Park K. Park's Textbook of Preventive and Social Medicine. 23rd ed. Jabalpur: BanarsidasBhanot Publishers, 2015. p.135-141
2. Suryakantha. Textbook of Community Medicine with recent advances. 4th edition
3. Bhalwar R editor. Textbook of Public Health and Community Medicine. 2nd Pune, Department of Community medicine AFMC; 2012
4. Essentials of Community Medicine for Allied Health Sciences, JSS University Publications, 2015

BS3677	APPLIED PATHOLOGY LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE

To provide students with essential medical knowledge and a broad understanding of human disease

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	The students will be able to understand physical, chemical and microscopic examination of urine.	U
CO-02	The students will be able to analyze blood grouping and Rh typing.	A
CO-03	The students will be able to remember the hemoglobin estimation and packed cell volume.	R
CO-04	The students will be able to understand to perform erythrocyte sedimentation rate	U
CO-05	The students will be able to remember the specimens of atherosclerosis, pneumonia, tuberculosis, contracted kidney.	R

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	S	M	M	S	M	N	S	N	L	N	M	S
CO-02	L	S	M	S	M	L	S	S	N	M	N	S	M

CO-03	S	M	L	S	S	M	L	N	S	M	S	L	N
CO-04	L	S	M	L	S	L	S	M	N	S	N	L	S
CO-05	S	L	S	M	M	M	L	N	S	M	L	S	L

S- Strong, M- Medium, L-Low, N- Not Relevant

PRACTICAL

- 1.Urine examination: physical, chemical, microscopy
- 2.Blood grouping & Rh typing
- 3.Hemoglobin estimation, packed cell volume (PCV), erythrocyte sedimentation rate (ESR)
- 4.Charts
- 5.Specimens
 - a) Atherosclerosis
 - b) Pneumonia
 - c) Tuberculosis
 - d) Infarct - lung
 - e) Contracted kidney
 - f) Hydronephrosis

TOTAL: 30 HOURS

BS3678	APPLIED MICROBIOLOGY LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE

Students will learn the basic techniques in Clinical Microbiology

Course Outcome – COs At the end of the course students should be able to		Cognitive Skill
CO-01	Get a deep knowledge in sterilization and disinfection	U, R
CO-02	Acquire knowledge about sterility testing.	An, E
CO-03	Gains knowledge in antibiotic sensitivity pattern	E
CO-04	Learns about collection of clinical samples.	U
CO-05	Obtains knowledge in isolation of clinical pathogens.	A

R- Remember, U – Understand, A – Apply, An – Analyze, E – Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	S	S	L	L	M	M	N	N	M	S	S	S
CO-02	S	S	S	L	M	N	M	N	L	S	S	M	S
CO-03	S	S	S	M	M	M	M	N	N	M	S	M	S
CO-04	S	S	S	S	M	M	S	N	L	S	M	M	S
CO-05	S	S	S	M	L	L	M	N	N	S	S	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

PRACTICAL

1. Sterilization of patient care unit, OT, ICU.
2. Sterilization of equipment in hospitals.
3. Sterility testing by open plate method.
4. Sterility testing by swabbing.
5. Antibiotic sensitivity test.
6. Collection of clinical samples.
7. Transportation of clinical samples.
8. Isolation pathogen from urine sample
9. Isolation of pathogens from sputum sample.
10. Isolation of pathogens from blood sample.
11. Isolation of pathogens from throat swab.

TOTAL: 45 HOURS

CT3671	BASIC CARDIAC CARE TECHNOLOGY LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE

The course enables the students to understand the method of taking TMT, ECG, and Echocardiography

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Remember with the basic concepts of Applied anatomy and physiology of human heart.	R
CO-02	Understand the methods of taking TMT and ECG.	U

CO-03	Understand views and modes of Echocardiography.	U
CO-04	Familiar with the invasive diagnostic test done in cath lab.	R,A
CO-05	Understand the basic methods of gas administration devices.	U,E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- K	PO- L	PO- M
CO-01	S	N	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	L	S	N	M	M	M	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	N	S	M	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

PRACTICAL:

1. History taking
2. Clinical Examination: General Physical Examination and assessment of vital signs
3. Clinical Examination: Basic Systemic Examination
4. Conversion between different Units
5. Identifying the types of medical gas supply and its advantages/disadvantages
6. Devices: Sphygmomanometer, thermometer, pulse oximeter, simple oxygen delivery devices

TOTAL: 45 HOURS

SEMESTER IV

Sl. No.	Course Code	Course Title	L	T	P	C
THEORY						
1	BS36S5	Patient care and Basic Nursing	3	1	0	4
2	CT3602	Basics Cardiac evaluation and therapies	3	1	0	4
3	BS36S8	Basics of Medical Disorders	3	1	0	4
4	BS36S6	Biostatistics and Research Methodology	2	0	0	2
5	BS36S7	Constitution of India	3	0	0	3

CLINICAL POSTING & PRACTICAL						
6	BS3679	Patient care and Basic Nursing Laboratory	0	0	2	2
7	CT3672	Basics Cardiac evaluation and therapies Laboratory	0	0	2	2
8	BS3680	Basics of Medical Disorders Laboratory	0	0	2	2
Total			14	3	6	23

BS36S5	PATIENT CARE AND BASIC NURSING	L	T	P	C
		3	1	0	4

OBJECTIVES

To learn about patient care and basics of nursing activities, communication and documentation, infection control, medication administration and wound care.

Course Outcome – COs At the end of the course the student should be able to		Cognitive Skill
CO-01	Use intra and inter professional communication and collaboration to promote care coordination for safe quality patient care	U,A,E
CO-02	Apply levels of prevention to promote well being and prevent disease in complex situation for individuals of group	R,A,E
CO-03	Provide safe administration of medication and transport of patient safely.	R,A
CO-04	Practice caring, competent, holistic, high quality, patient centered nursing in complex situation	U,An,E
CO-05	Do wound care, first care and basic life support to the patient in any emergency situation.	R,A,E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	N	M	S	L	N	S	S	M	S	L	L	N	M
CO-02	N	L	S	M	L	L	M	N	M	S	L	M	L

CO-03	L	M	S	M	L	L	M	N	L	M	L	L	S
CO-04	L	M	S	S	M	L	M	L	L	M	L	L	M
CO-05	L	M	S	M	M	L	L	L	M	M	L	L	M

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit 1: Introduction, Communication and Documentation

12

Introduction to Patient Care:

Principles of patient care. Types of patients (gender, age, diseases, severity of illness, triage)

Communication & Documentation:

Communication with doctors, colleagues and other staffs. Non-verbal communication, Inter-personnel relationships. Patient contact techniques, communication with patients and their relatives

Documentation:

Importance of documentation, initial and follow up notes; documentation of therapy, procedures and communication

Unit II: Universal Precautions and Infection Control

12

Hand washing and hygiene. Injuries and Personal protection, Insulation and safety procedures. Aseptic techniques, sterilization and disinfection. Disinfection and Sterilization of devices and equipment. Central sterilization and supply department. Biomedical Medical waste management

Unit III: Medication Administration and Transport of patient

12

Medication Administration

Oral / Parenteral route. Parenteral medication administration: Intra venous, intra muscular, sub-cutaneous, intra dermal routes, Intra venous Infusion. Aerosol medication administration, Oxygen therapy. Intravenous fluids. Blood and blood component transfusion

Position and Transport of patient:

Patient position, prone, lateral, dorsal, dorsal recumbent, Fowler's positions, comfort measures, bed making, rest and sleep. Lifting and transporting patients: lifting patients up in the bed, transferring from bed to wheel chair, transferring from bed to stretcher. Transport of ill patients (inotropes, intubated / ventilated patients)

Unit IV: Bedside care and monitoring

12

Bedside care:

Methods of giving nourishment: feeding, tube feeding, drips, transfusion. Recording of pulse, blood pressure, respiration, saturation and temperature. Bed side management: giving and taking bed pan, urine container. Observation of stools, urine, sputum, drains

Use and care of catheters and rubber goods. Care of immobile/bed ridden patients, bed sore and aspiration prevention

Monitoring of Patient:

Pulse, ECG (Cardiac Monitor), Oxygen Saturation, Blood Pressure, Respiration. Multi parameter monitors, Capnography and End Tidal CO₂ (ETCO₂ Hydration, intake and output monitoring. Monitoring ventilator parameters: Respiratory Rate, Volumes, Pressures, Compliance, Resistance

Unit V: Wound care and first aid**12****Dressing and wound care:**

Bandaging: basic turns, bandaging extremities, triangular bandages and their application. Surgical dressing: observation of dressing procedures. Suture materials and suturing techniques. Splinting. Basic care of patient with burns

First Aid and Basic Life Support (BLS)**REFERENCE BOOKS**

1. Principles and Practice of Nursing - Sr Nancy
2. Introduction to Critical Care Nursing - Mary Lou Sole
3. First Aid - Redcross Society Guidelines
4. Basic Life Support (BLS) - American Heart Association Guidelines

TOTAL: 60 HOURS

CT3602	BASICS CARDIAC EVALUATION AND THERAPIES	L	T	P	C
		3	1	0	4

OBJECTIVE

To learn about basic concepts of common medical evaluation therapies and its therapeutic options

Course Outcome – COs At the end of the course the student should be able to		Cognitive Skill
CO-01	Understand about the different types of heart disease	U
CO-02	Understand about importance of different noninvasive cardiovascular investigation	U
CO-03	Remember about the importance of different invasive cardiovascular investigation	R
CO-04	Remember with the various cardiovascular pharmacological therapies	R
CO-05	Understand about the care of patient undergoing vascular procedure.	U

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- K	PO- L	PO- M
CO-01	S	N	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	L	S	N	M	M	M	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	N	S	M	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I : Heart diseases and related disorders

12

Ischaemic heart disease, Rheumatic heart disease, Congenital heart disease, Arrhythmias, Peripheral vascular disease, Pericardial disease, Shock state, Cardiomyopathy, Hypertension, diabetes, dyslipidaemias, Infective endocarditis, Heart failure, Pulmonary hypertension and embolism

Unit II: Cardiovascular investigations: Non-invasive

12

ECG - cardiac diagnosis by ECG: Chambers enlargement, arrhythmias, myocardial ischaemia and infarction, Echocardiography - cardiac diagnosis: valvular heart diseases, myocardial diseases, ischaemic heart diseases, Cardiomyopathies, Pulmonary hypertension, infective endocarditis, intracardiac masses, Stress test- treadmill test review, pharmacological stress testing, 24 hours Holter monitoring, Ambulatory BP monitoring, Tilt table test, Ankle-Brachial Index

Unit III: Cardiovascular investigations: Invasive

12

Diagnosis of coronary artery disease, Diagnosis of valvular heart diseases in the cath-lab - stenosis, regurgitation and mixed, Diagnosis of shunts, Evaluation of pulmonary hypertension, Diagnosis of pericardial constriction, Diagnosis of peripheral and aortic diseases, Complications of cardiac catheterization, Complications and management of Contrast

Unit IV: Cardiovascular pharmacological therapies

12

Antiplatelets, Anticoagulants, Antiarrhythmic, Antihypertensive, Intravenous fluids, Atropin, Inotropic, 2B 3A receptors blocking agents, Diuretics, Nitrates, miscellaneous

Unit V : Cardiovascular interventional therapies

12

Coronary angioplasty, Peripheral angioplasty, Mitral valvoplasty, Pulmonary and aortic valvoplasty, Device closures, Pacemakers, Pericardiocentesis, Myocardial biopsy, Retrieval of foreign bodies, Clot aspiration

TOTAL: 60 HOURS

REFERENCE BOOKS

1. A text book of Electrocardiography - Goldberger
2. Nanda's A Text book of Echocardiography
3. A Text of Cardiac Catheterization & Interventions. Dr. W. Grossman's D. Baim
4. A Text book of Cardiovascular Medicine. Dr. Bruanwald's
5. A Text book of Medicine. Davidsons

BS36S8	BASICS OF MEDICAL DISORDERS	L	T	P	C
		3	1	0	4

OBJECTIVE

To learn about basic concepts of common medical disorders and its therapeutic options

Course Outcome – COs At the end of the course the student should be able to		Cognitive Skill
CO-01	Study about various medical conditions	U
CO-02	Understand signs and symptoms of general medical disorders	U
CO-03	Make diagnosis by analyzing clinical manifestations	An
CO-04	Gain knowledge about different investigative methods	R
CO-05	Study various treatment plans and drug dosages	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	M	L	S	S	M	S	M	M	S	S	M	S	S
CO-02	S	M	M	L	S	S	M	S	S	L	M	M	S
CO-03	M	M	S	S	S	M	S	M	S	S	M	M	S
CO-04	S	S	M	M	S	M	M	S	M	M	S	S	M
CO-05	S	M	S	M	S	S	S	M	S	M	M	M	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I: Cardiac and Respiratory diseases **12**

Cardio vascular diseases: Hypertension, Ischemic heart diseases, Myocardial Infarction, arrhythmias, Heart failure, shock - types, causes
Respiratory diseases: Pneumonia, tuberculosis, Chronic obstructive pulmonary disease, asthma, Pleural effusion, pneumothorax, Interstitial lung disease

Unit II: Neurological, Renal, GI and infectious diseases **12**

Neurological diseases: Polio myelitis, Gullian Barre Syndrome, Myasthenia Gravis, epilepsy / seizure disorder, cerebro vascular accident / stroke
Renal Diseases: Acute kidney injury, Chronic Kidney Disease
Gastro intestinal and Liver Diseases: Gastritis / APD, peptic ulcer, Acute gastroenteritis, Hepatitis, Hepatic failure, Alcoholic liver disease
Infectious diseases: Dengue, malaria, leptospirosis

Unit III: Blood, fluid, electrolyte and acid base abnormalities **12**

Blood loss and Anaemia, thrombocytopenia, Fluid Electrolyte imbalance and corrective methods, Acid Base abnormalities and corrective methods

Unit IV: Pulmonary Oedema, Sepsis and MODS **12**

Pulmonary Oedema, Acute Lung Injury and Acute Respiratory Distress Syndrome, Sepsis, multi-organ failure, Multi-organ dysfunction syndrome

Unit V: Health problems in Specific conditions and Toxicology **12**

Health problems in specific conditions-Pregnancy - antenatal care, disorders in pregnancy
Children and new born-Obesity-Diabetes mellitus-HIV infections and AIDS-Elderly subjects and disability-Brief mention about endocrine disorders-Poisoning and drug over dosing
Classification of poisons-Principles of treatment of poisoning and Primary care Poisons and drug over dosing requiring ventilation-Miscellaneous-Drowning-Hanging

TOTAL: 60 HOURS**REFERENCE BOOKS**

1. Davidson's Principles and Practice of Medicine - Elsevier Publications
2. Harrison's Principle of Internal Medicine

BS36S6	BIOSTATISTICS AND RESEARCH METHODOLOGY	L	T	P	C
		2	0	0	2

OBJECTIVE

To have overview of data analysis and sampling techniques and to understand various study designs in medical field.

Course Outcome – COs At the end of the course the student should be able to		Cognitive Skill
CO-01	Deals with basic knowledge of biostatistics and its application in medicine	U
CO-02	Deals with various types of data presentation and data summarization	R
CO-03	Deals with data analysis and sampling technique	An
CO-04	Deals with various study designs	E
CO-05	Deals with application of various study designs in medical research	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	S	M	M	L	L	M	S	S	M	S	N	M
CO-02	L	S	L	M	L	M	S	S	M	M	S	L	S
CO-03	M	S	M	M	L	M	S	S	S	L	S	L	S
CO-04	M	S	M	L	M	M	M	S	S	M	S	N	M
CO-05	S	S	L	L	M	L	S	S	M	M	S	L	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit I: Introduction and Presentation of data

6

Meaning, Branches of Statistics, Uses of statistics in medicine, Basic concepts, Scales of measurement, Collection of data, Presentation of data; Tabulation, Frequency Distribution, Diagrammatic and Graphical Representation of Data.

Measures of central tendency and Measures of Variation

Arithmetic Mean (Mean), Median, Mode, Partition values, Range, Interquartile range, Mean Deviation, Standard Deviation, Coefficient of Variation.

Unit II: Probability and standard distributions**6**

Definition of some terms commonly encountered in probability, Probability distributions; Binomial distribution, Poisson distribution, Normal distribution, Divergence from normality; Skewness and kurtosis

Census and Sampling Methods

Census and sample survey, Common terms used in sampling theory, Non-probability (Non random) Sampling Methods; Convenience sampling, Consecutive Sampling, Quota sampling, Snowball sampling, Judgmental sampling or Purposive sampling, Volunteer sampling, Probability (Random) Sampling methods; Simple random sampling, Systematic Sampling, Stratified Sampling, Cluster sampling, Multi-stage sampling, Sampling error, Non-sampling error.

Unit III: Inferential statistics**6**

Parameter and statistic, Estimation of parameters; Point estimation, Interval Estimation, Testing of hypothesis; Null and alternative hypotheses, Type-I and Type-II Errors.

Unit IV: Introduction to research methodology**6**

Types of research; Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical.

Study Designs-Observational Studies

Epidemiological study designs; Observational studies, Descriptive studies; Case reports, Case series, Analytical studies; Case control studies, Cohort studies, Cross sectional

Unit V: Experimental Studies**6**

Experimental studies (Interventional studies); Randomized control Trials (Clinical trials), Field trials, Community trials, Non-Randomized Trials

Uses of Epidemiology, Application of study Designs in Medical Research

TOTAL: 30 HOURS**REFERENCES BOOKS**

1. K.R.Sundaram, S.N. Dwivedi and V Sreenivas (2010), Medical statistics, Principles and Methods, BI Publications Pvt Ltd, New Delhi
2. NSN Rao and NS Murthy (2008), Applied Statistics in Health Sciences, Second Edition, Jaypee Brothers Medical Publishers (P) Ltd.
3. J.V. Dixit and L.B. Suryavanshi (1996), Principles and Practice of Biostatistics, First Edition, M/S Banarsidas Bhanot Publishers.
4. Getu Degu and Fasil Tessema (2005), Biostatistics, Ethiopia Public Health Training Initiative.
5. Essentials of Community Medicine for Allied Health Sciences, JSS University Publications, 20.

BS36S7	CONSTITUTION OF INDIA	L	T	P	C
		3	0	0	3

OBJECTIVE

The students will be able to understand basic concepts of Indian constitution

BS36S7		Constitution of India	
Course Outcome – COs			Cognitive Skill
At the end of the course the student should be able to			
CO-01	Understand the emergence and evolution of Indian Constitution.	U	
CO-02	Understand the autonomous nature of constitutional bodies like Supreme Court and high court, controller and auditor general of India and election.	R	
CO-03	Understand and analyse the three organs of the state in the contemporary scenario.	An	
CO-04	Understand and analyse federalism in the Indian context.	E	
CO-05	Understand and Evaluate the Indian Political scenario amidst the emerging challenges.	A	

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	M	S	M	M	M	M	M	M	M	M	M	M	M
CO-02	S	S	M	L	L	M	M	S	S	L	M	M	M
CO-03	S	S	M	M	M	M	M	M	M	M	M	M	M
CO-04	M	M	S	M	M	S	S	L	M	M	M	M	M
CO-05	M	M	M	M	M	M	M	M	M	M	S	L	M

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit – I: Introduction to Constitution	9
Meaning of the term 'Constitution', Making of the Indian Constitution 1946-1950, The democratic institutions created by the constitution, Bicameral system of Legislature at the Centre and in the States.	
Unit – II: Fundamental Rights and Duties	9
Fundamental rights and duties their content and significance, Directive principles of States, policies the need to balance fundamental rights with directive principles Special rights created in the Constitution for dalits, backwards, women and children and the religious and linguistic minorities.	
Unit – III: Doctrine of Separation of Powers	9
Doctrine of Separation of Powers, legislative, executive and judicial and their functioning in India, The Election Commission and State Public Service commissions.	
Unit – IV: Constitutional amendment	9
Method of amending the Constitution, Enforcing rights through writs	
Unit – V: Sustainable development	9
Constitution and sustainable development in India.	

TOTAL: 45 HOURS

REFERENCE BOOKS

1. T.R. Andhyarujina “The Kesavananda Bharati Case :The Untold Story of Struggle For Supremacy by Supreme Court and Parliament”.
2. Subhash C. Kashyap “ Our Constitution: An introduction to India's Constitution and Constitutional law”
3. H.M. Seervai. “Constitutional Law of India”

BS3679	PATIENT CARE AND BASIC NURSING LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE

To learn about patient care and basics of nursing activities, communication and documentation, infection control, medication administration and wound care.

Course Outcome – COs At the end of the course the student should be able to		Cognitive Skill
CO-01	The students will able to use intra and inter professional communication and collaboration to promote care coordination for safe quality patient care	U,A,E
CO-02	The students will be able to apply levels of prevention to promote well being and prevent disease in complex situation for individuals of group	R,A,E

CO-03	The students will be able to provide safe administration of medication and transport of patient safely.	R,A
CO-04	The students will be able to practice caring, competent, holistic, high quality, patient centered nursing in complex situation	U,An,E
CO-05	The students will be able to do wound care, first care and basic life support to the patient in any emergency situation.	R,A,E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- K	PO- L	PO- M
CO-01	N	M	S	L	N	S	S	M	S	L	L	N	M
CO-02	N	L	S	M	L	L	M	N	M	S	L	M	L
CO-03	L	M	S	M	L	L	M	N	L	M	L	L	S
CO-04	L	M	S	S	M	L	M	L	L	M	L	L	M
CO-05	L	M	S	M	M	L	L	L	M	M	L	L	M

S- Strong, M- Medium, L-Low, N- Not Relevant

PRACTICAL:

1. Demonstration of Patient care Procedures:

- Positioning of patient, transport of the patient, Dressing and Bandaging, Care of inter costal drain tube, Insertion of naso-gastric tube and feeding
- Phlebotomy and obtaining blood samples, Arterial Blood sampling for ABG
- Injections: intra muscular, intra venous, sub cutaneous, intra dermal
- Insertion of intra venous catheter and infusion of medications, blood transfusion
- Recording of ECG and monitoring of patient
- Oxygen therapy: oxygen cannula, masks. Aerosol therapy: nebulization, inhalers
- Suctioning and care of artificial airway
- Insertion of urinary bladder catheter

2. Uses, principles, advantages and disadvantages of instruments and Devices in patient care

3. First aid and Basic Life Support (BLS)

TOTAL: 45 HOURS

CT3672	BASICS CARDIAC EVALUATION AND THERAPIES LABORATORY	L	T	P	C
		0	1	2	2

OBJECTIVE

To learn about basic concepts of common medical disorders and its therapeutic options

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Understand about the different types of heart disease	U
CO-02	Understand about importance of different noninvasive cardiovascular investigation	U
CO-03	Remember about the importance of different invasive cardiovascular investigation	R
CO-04	Remember with the various cardiovascular pharmacological therapies	R
CO-05	Understand about the care of patient undergoing vascular procedure.	U

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	N	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	M	S	N	M	M	S	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	N	S	M	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

Practical:**Non-invasive Technology;**

- a) ECG recording basic
- b) ECHO evaluation basic
- c) Preparation for treadmill test
- d) Preparation for 24 hours Holter monitoring
- e) Preparation for ABPM

Invasive Technology;

- a) Cardiac Cath right Heart
- b) Cardiac Cath Left Heart
- c) Cardiovascular Angiography
- d) Cardiac Pacing
- e) Relevant instrumentation in Cath Lab
- f) Cardiac Emergencies in Cath Lab

TOTAL: 45 HOURS

BS3680	BASICS OF MEDICAL DISORDERS LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE

To have overview of data analysis and sampling techniques and to understand various study designs in medical field

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Understand and remember history collection	U
CO-02	Analyze the investigative methods and normal values	An
CO-03	Understand vital signs and variations	U
CO-04	Remember drug dosages and apply in clinics	R
CO-05	Learn various test procedures	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- K	PO- L	PO- M
CO-01	M	S	M	M	M	S	S	L	L	L	N	S	M
CO-02	S	S	M	L	S	S	M	L	M	L	M	S	N
CO-03	S	S	S	M	M	L	M	S	M	L	L	S	N
CO-04	M	S	L	M	S	L	M	M	M	S	M	L	S
CO-05	S	S	S	S	M	S	S	L	M	N	S	M	L

S- Strong, M- Medium, L-Low, N- Not Relevant

Practical:

1. History Taking and clinical examination, monitoring of patient.
2. Therapeutic options for various diseases and conditions

TOTAL: 45 HOURS

SEMESTER V

SL. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	CT3603	Cardiac Evaluation and Therapies-I	3	1	0	4
2.	CT3604	Cardiac Evaluation and Therapies-II	3	1	0	4
3.	CT3605	Cardiac Evaluation and Therapies-III	3	1	0	4
4.	CT3606	Biomedical Engineering Devices for Cardiac Care Technology	3	0	0	3
5.	BS36S9	Medical Ethics	2	0	0	2
CLINICAL POSTING & PRACTICAL						
6.	CT3673	Cardiac Evaluation and Therapies Laboratory-I	0	0	2	2
7.	CT3674	Cardiac Evaluation and Therapies Laboratory-II	0	0	2	2
8.	CT3675	Cardiac Evaluation and Therapies Laboratory-III	0	0	2	2
TOTAL			14	3	6	23

CT3603	CARDIAC EVALUATION AND THERAPIES-I	L	T	P	C
		3	1	0	4

OBJECTIVE:

The course enables the students to understand clinical disorders and drugs related to heart, invasive and noninvasive investigations and cardiac monitoring.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Remember about various cardiac disorders	R
CO-02	Understand about drugs related to heart	U
CO-03	Analyze patient monitoring in cardiac care	An
CO-04	Know about various non invasive cardiac investigations	R
CO-05	Know about various invasive cardiac investigations	U

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- -F	PO- G	PO- -H	PO- -I	PO- -J	PO- -k	PO- -L	PO- -M
CO-01	M	S	M	M	M	S	S	L	L	L	N	S	M
CO-02	S	S	M	L	S	S	M	L	M	L	M	S	N
CO-03	S	S	S	M	M	L	M	S	M	L	L	S	N
CO-04	M	S	L	M	S	L	M	M	M	S	M	L	S
CO-05	S	S	S	S	M	S	S	L	M	N	S	M	L

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit-I: Clinical Disorders of heart

12

Clinical presentation, evaluation and management of acute coronary syndromes- Clinical presentation, evaluation and management of stable is chemic heart disease- Hypertension, diagnosis, complications and management - Cardiac arrhythmia, presentation, diagnosis and management) Heart failure, classification, diagnosis and management-Valvular heart diseases.

Unit_II: Drugs Related to Heart**12**

Antiplatelet drugs-Antiischemic drugs-Thrombolytic drugs-Antiarrhythmic drugs-anti-hypertensive drugs-anti arrhythmic drugs.

Unit-III Patient Monitoring in Cardiac Care**12**

Cardiac Rhythm and rate - Trans-cutaneous oxygen monitors and Pulse oximeters – Invasive hemodynamic monitoring - Multi parameter monitoring - Monitoring response to therapy and progression of disease-Ambulatory BP monitoring.

Unit-IV: Cardiovascular investigations: Noninvasive**12**

ECG - Review of ECG patterns in ischemic heart diseases, hypertensive heart disease – Stress test-treadmill test review, pharmacological stress testing-24hours Holter monitoring.

Unit-V: Cardiovascular investigations: Invasive**12**

Coronary angiography-Diagnosis of mitral stenosis, regurgitation and mixed-Diagnosis of shunts A review - Diagnosis of peripheral and aortic diseases - Complications of cardiac catheterization-Contrast induced nephropathy prevention and management.

TOTAL: 60 HOURS**TEXTBOOK**

1. Goldberger. “A Textbook of Electrocardiography”.
2. Nandas “A Textbook of Echocardiography”.
3. Grossman Wand BaimD “A Textbook of cardiac catheterization and interventions”.
4. Bruanwalds “A Textbook of cardiovascular medicine”

CT3604	CARDIAC EVALUATION AND THERAPIES-II	L	T	P	C
		3	1	0	4

OBJECTIVE

The course enables the students to understand about optimum use of noninvasive and invasive cardiology techniques such as ECG, Stress test, Echocardiography, cardiac catheterization.

Course Outcome – COs At the end of the course the student should be able to		Cognitive Skill
CO-01	Understand about the ECG changes in various conditions and TMT.	U
CO-02	Understand about the echocardiography and its techniques	U
CO-03	Remember about the techniques in the fields of cardiology	R

CO-04	Remember with the various cardiac problem	R
CO-05	Understand about the care of patient undergoing vascular procedure.	U

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- K	PO- L	PO- M
CO-01	S	S	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	M	S	N	M	M	M	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	M	M	L
CO-04	M	N	M	S	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	M	S	M	M	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit-I: Electrocardiography

12

Optimum recording of 12 leads ECG and computerized interpretation-Troubleshooting of. ECG artefacts – Brady-arrhythmia and tachy-arrhythmias - Stress test (tread mill, bicycle and others) -Indications/contraindications-Complications.

Unit-II: Echocardiography

12

Basics of pediatric echocardiography-Echocardiography in acute rheumatic fever. Echocardiography In Chronic Rheumatic Heart Disease-Echocardiography In Cardiac Tamponade.

Unit-III: Basics of Catheterization and Hemodynamics

12

Preparation for cardiac catheterization - radiation safety and contrast agents - Hardware in catheterization laboratory - right and left heart catheterization - cardiac output and vascular resistance-shunt calculation-Hemodynamics monitoring.

Unit-IV: Invasive Procedures

12

Carotid and cerebral angiography-Renal angiography- Studies of abdominal aorta, mesenteric, iliac and others-Myocardial biopsy

Unit-V: Care of Patient Undergoing Vascular Procedures**12**

Indications, contraindications for angiographic studies-procedures, Management of complication – Acute stent thrombosis, Dissection & perforation - Monitoring physiological variables during cath lab procedures - Post procedure protocols - Reporting and data management of the cath procedures.

TOTAL:60 HOURS**TEXTBOOK**

1. Goldberger. “A Textbook of Electrocardiography”.
2. Nandas “A Textbook of Echocardiography”.
3. Grossman Wand BaimD “A Textbook of cardiac catheterization and interventions”.
4. Bruanwalds “A Textbook of cardiovascular medicine”

CT3605	CARDIAC EVALUATION AND THERAPIES-III	L	T	P	C
		3	1	0	4

OBJECTIVES:

The course enables the students to understand about optimum use of non invasive and invasive cardiology techniques such as ECG, Stress test, Echocardiography, cardiac catheterization etc.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	The students will learn about the basics of electrocardiogram	U, An
CO-02	Study about PTCA procedure and result interpretation	R, U, An
CO-03	Learn about different medical conditions	An,S,U,R
CO-04	Students will understand about cardiothoracic interventions	E,An,U
CO-05	Study about the nuclear cardiology	An, U,R

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- K	PO- L	PO- M
CO-01	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-02	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-03	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-04	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-05	S	S	S	S	S	S	S	S	S	S	S	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit-I: Electrocardiography

12

PR interval-QT interval-Calculation of heart rate-Analysis of ST segment- Abnormal Electrocardiograms

Unit-II: Interventional Techniques

12

Percutaneous Balloon Angioplasty and General Coronary Intervention - Atherectomy, Thrombectomy, and Distal Protection Devices-Coronary Stenting Percutaneous therapies for Valvular Heart Disease Aortic Endovascular Grafting- Pericardiocentesis-Balloon Pericardiotomy.

Unit-III: Important Medical Conditions and Their Relevance to Cardiac Care

12

Anemia-Renal failure-Bleeding Diathesis-Heart failure-Hypoxia (cyanosis),Angina pectoris, cor-pulmonale, Aneurysm

Unit-IV: Cardio Thoracic Interventions

12

CPR, defibrillation, pacemaker, cardioversion, ventricular assisted devices, Types of catheters, Catheters cleaning & Packing

Unit-V: Basics of Nuclear Cardiology

12

Principles of nuclear cardiology - Tracers used in nuclear cardiology – imaging techniques in nuclear cardiology-indications of nuclear diagnostic procedures in cardiology.

TOTAL: 60 HOURS

TEXTBOOK:

1. Goldberger "A Textbook of Electrocardiography".
2. Nandas "A Textbook of Echocardiography".
3. GrossmanWandBaimD "A Text book of cardiac catheterization and interventions".
4. Bruanwalds, "A Textbook of cardiovascular medicine".
5. Davidson ,,"A Textbook of Medicine".
6. Nandas "A Textbook of Echocardiography".
7. Grossman Wand BaimD "A Textbook of cardiac catheterization and interventions".

CT3606	BIOMEDICAL ENGINEERING DEVICES FOR CARDIAC CARE TECHNOLOGY	L	T	P	C
		3	0	0	3

OBJECTIVE

The course will introduce the student to know the principles, practice, trouble shooting and applications of various biomedical devices

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Learn about the basics of Biomedical devices	U, An
CO-02	Study about Echocardiogram procedure and result interpretation	R, U, An
CO-03	Learn about patient monitoring system and vital parameters	An,S,U,R
CO-04	Understand about pacemaker, TMT and Holter Monitoring	E,An,U
CO-05	Study about the setting up of IABP and know about its procedures and functions	An, U,R

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-02	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-03	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-04	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-05	S	S	S	S	S	S	S	S	S	S	S	S	S

Strong – S, Medium, L-Low, N- Not Relevant

Unit-I: Basic Biomedical Instruments

9

B.P apparatus, stethoscope, ECG machine, physiology of heart, Einthovens triangle, physiology of lungs, cardiovascular system, ECG analysis and interpretation, ECG leads representation, working mechanism of ECG machine, Normal ECG representation. ECG monitoring system, normal ECG values chart, ECG results, ECG reading.

Unit-II: Patient Monitoring System

9

ECG (heart rate), SpO₂, NIBP, sinus rhythm/ ABP (invasive and non invasive blood pressure monitoring) Functions of patient monitoring system-Physiological monitor- Working principle. Objective of patient monitoring system-Pressure transducers (AVP/CVP)-Pulse oximeter. Normal range for pulse oximetry -Function of pulse oximeter - Dangerous oxygen

level - What happens when blood oxygen levels are too low? Oxygen saturation - Co oximeter – Photoplethysmogram - Arterial blood gas test Pulse oximeter uses, readings, indications, applications.

Unit-III: Echocardiography and Defibrillator 9

Echocardiogram - types - Echo machine - 2D and 3 D echo - Echocardiogram procedure in females - Echocardiogram results interpretation - Defibrillator -, portable defibrillator, automated external defibrillator, Implantable cardioverter defibrillator, Difference between defibrillator and pacemaker.

Unit-IV: Biotelemetry system and Special equipment 9

Biotelemetry system- Holter monitoring system-setting up, function and interpretation - TMT machine - Difference between holter monitor and TMT machine. Automated drug delivery system.

Unit-V: Catheterization Laboratory (Cath Lab) 9

Cath lab- Procedure, Diagnostic and interventional cardiology, Catheterization standards, Complications, Basics and radiographic images of Cath lab-IABP (Intra-aortic balloon pump) purpose, procedure, risks, Components, working principle, troubleshooting, monitoring – Medical ventilators - Working and its uses in ICU, Anesthesia ventilator, Working principle/procedure. Nano robots and Robotic surgery. ICCU patient monitoring system.

TOTAL:45 HOURS

TEXTBOOK

1. Leslie Cromwell,” Biomedical Instrumentation and measurement”, Prentice Hall of India, New Delhi.
2. Khandpur R.S,” Handbook of Biomedical Instrumentation”, Tata McGraw-Hill, New Delhi.
3. JohnG. Webster, ”Medical Instrumentation Application and Design”, John Wiley and sons, New York.

REFERENCE BOOKS

1. Joseph J. carr and John M. Brown, ” Introduction to Biomedical equipment technology”, John Wiley and sons, New York

BS36S9	MEDICAL ETHICS	L	T	P	C
		2	0	0	2

OBJECTIVE

The course will assist the students in understanding basic laws and ethics related to the field of healthcare.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Learn about the basics of code of ethics	U, An
CO-02	Study about ethical decisions	R, U, An
CO-03	Learn about organizational laws	An,S,U,R
CO-04	Understand about jurisprudence	E,An,U
CO-05	Study about the legal framework	An, U,R

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- k	PO- L	PO- M
CO-01	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-02	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-03	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-04	S	S	S	S	S	S	S	S	S	S	S	S	S
CO-05	S	S	S	S	S	S	S	S	S	S	S	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit-I: Code of Medical Ethics

6

Principle of medical ethics, confidentiality, informed consent, decisions of life sustaining therapy, communication, communication barriers, doctor patient relationship, list of offences and professional misconduct of doctors, bioethics, role of ethics committees, quality assurance programs, medical etiquette.

Unit-II: Advanced Ethical Decisions and Major Laws

6

Advance decisions to refuse treatment, doctor and criminal abortion, ethical issues in stroke management, ethical issues in dementia, quality of life in health care decisions, prenatal diagnostic techniques, regulations and prevention of misuse act1994 (PNDT act),transplantation of human organs act 1994, medical termination of pregnancy act, labor laws applicable to a hospital, Indian trade union act 1926, industrial dispute act 1947, payment of wages act, employee provident fund act, maternity benefit act.

Unit-III: Organizational and Procedural Laws

6

Indian contract act, nursing home registration act, birth death registration act, regulation of genetic counselling center, regulation of prenatal diagnostic technique, determination of sex prohibited Dying declaration definition, precautions, procedure of recording, special circumstances Death certificate – precaution while issuing death certificate, contents of death certificate, importance of death certificate.

Unit-IV: Medical Jurisprudence**6**

Introduction and legal procedure, medico legal aspects of death injuries, medical ethics, consumer protection act, quality of life in healthcare decisions, ethical issues in health and social care.

Unit-V: Legal Framework for Hospitals**6**

Introduction to legal framework, patients' rights and providers responsibility, medical malpractice, medico legal aspects- impotence, sterility, sterilization and artificial insemination; medicolegal aspects of psychiatric and mental health, toxicology, laws related to toxicology, organ transplantation act.

TOTAL:30 HOURS**TEXTBOOK:**

1. Parikh C.K., "Parikhs Textbook of medical jurisprudence and toxicology", CBS Publications.
2. Jagdish Singh and Bharath Law, "Medical negligence and compensation".
3. Gurucharan S.Sai. "Medical ethics and elderly", 3rd Edition, Radcliffe publishing Ltd

CT3673	CARDIAC EVALUATION AND THERAPIES LABORATORY- I	L	T	P	C
		0	0	2	2

OBJECTIVE:

The course enables the students to understand clinical disorders and drugs related to heart, invasive and non invasive investigations and cardiac monitoring.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Understand about the different types of heart disease	U
CO-02	Understand about importance of different non invasive cardiovascular investigation	U
CO-03	Remember about the importance of different invasive cardiovascular investigation	R
CO-04	Remember with the various cardiovascular pharmacological therapies	R
CO-05	Understand about the care of patient undergoing vascular procedure.	U

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- K	PO- L	PO- M
CO-01	S	N	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	M	S	N	M	M	S	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	N	S	M	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS:

1. ECG
2. Pacemaker
3. Defibrillation and cardioversion
4. Heart valves
5. Hemodynamic monitoring
6. Ambulatory BP monitoring
7. TMT
8. Pulse oximeter
9. 24 hour holter monitoring
10. Cardiac catheterization

TOTAL: 30 HOURS

CT3674	CARDIAC EVALUATION AND THERAPIES-II LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE:

The course enables the students to understand about optimum use of noninvasive and invasive cardiology techniques such as ECG, Stress test, Echocardiography, cardiac catheterization etc.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Understand about the ECG changes in various conditions and TMT.	U
CO-02	Understand about the echocardiography and its techniques	U
CO-03	Remember about the techniques in the fields of cardiology	R
CO-04	Remember with the various cardiac problem	R

CO-05	Understand about the care of patient undergoing vascular procedure.	U
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R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis
R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- K	PO- L	PO- M
CO-01	S	N	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	L	S	N	M	M	M	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	N	S	M	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS:

1. ECG changes in brady-arrhythmias and tachy-arrhythmias
2. TMT
3. Echo
4. Coronary circulation
5. Diagnostic catheters used for Cardiac catheterization
6. Cerebral angiography
7. Renal angiography
8. Myocardial biopsy

TOTAL: 30 HOURS

CT3675	CARDIAC EVALUATION AND THERAPIES-III	L	T	P	C
		0	0	2	2

OBJECTIVE:

The course enables the students to understand about optimum use of non-invasive and invasive cardiology techniques such as ECG, Stress test, Echocardiography, cardiac catheterization etc.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Understand about the ECG changes in various conditions and TMT.	U
CO-02	Understand about the echocardiography and its techniques	U

CO-03	Remember about the techniques in the fields of cardiology	R
CO-04	Remember with the various cardiac problem	R
CO-05	Understand about the care of patient undergoing vascular procedure.	U

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- -F	PO- G	PO- -H	PO- - I	PO- - J	PO- -k	PO- -L	PO- -M
CO-01	S	N	M	M	S	N	M	M	M	S	L	L	M
CO-02	M	M	M	L	S	N	M	M	M	S	M	N	M
CO-03	S	M	S	M	M	N	M	M	N	S	N	M	N
CO-04	M	N	M	L	S	N	M	M	M	S	N	L	M
CO-05	N	M	M	M	M	N	M	N	S	M	L	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS:

1. ECG
2. Percutaneous balloon angioplasty
3. Thrombectomy
4. Coronary stenting
5. Aortic endovascular grafting
6. Pericardiocentesis
7. Balloon pericardiotomy
8. CPR
9. Pacemaker
10. IABP

TOTAL: 30 HOURS

SEMESTER VI

SL. No.	COURSE CODE	COURSE TITLE	L	T	P	C
THEORY						
1.	CT3607	Advanced Cardiac Care Technology-I	3	1	0	4
2.	CT3608	Advanced Cardiac Care Technology-II	3	1	0	4
3.	CT3609	Applied Coronary Angiography and Echocardiography	3	1	0	4
4.	CT3610	Basic Intensive Care	3	0	0	3
5.	BS36S0	Hospital Management	2	0	0	2

CLINICAL POSTING & PRACTICAL						
6.	CT3676	Advanced Cardiac Care Technology Laboratory-I	0	0	2	2
7.	CT3677	Advanced Cardiac Care Technology Laboratory-II	0	0	2	2
8.	CT3678	Applied Coronary Angiography and Echo cardiography Laboratory	0	0	2	2
TOTAL			14	3	6	23

CT3607	ADVANCED CARDIAC CARE TECHNOLOGY-I	L	T	P	C
		3	1	0	4

OBJECTIVE:

The course enables the students to understand various technologies used in the field of cardiology.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Learn about assessment for Cardiac care	R
CO-02	Study about echocardiography and its changes in various disease conditions	U
CO-03	Learn about ambulatory care techniques	U
CO-04	Know about various invasive technologies	R,A
CO-05	Know about IABP, fractional flow reserve and intravascular ultrasound	U,E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	M	S	N	L	S	S	L	L	S	N	M	M	M
CO-02	L	L	M	L	M	L	M	N	S	L	L	L	L
CO-03	S	M	S	S	L	S	L	S	L	L	S	N	S
CO-04	N	S	L	M	N	L	N	M	S	M	S	S	S
CO-05	S	L	M	S	S	M	S	L	S	S	M	L	L

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit-I: Assessment for Cardiac Care 12
Non-Invasive technology-ECG, ECHO, TMT-Invasive technology-Angiography-
Interventional procedures.

Unit-II: Electrocardiography A Review 12
Chamber hypertrophy-Acute coronary syndromes-Brady arrhythmias-Tachy arrhythmias- Peri
cardial diseases, Intra- cardiac pressure

Unit-III: Ambulatory Cardiac Technologies 12
Holter monitoring- Loop recorders, Ambulatory blood pressure recording, Newer technologies
for monitoring the patients with heart diseases.

Unit-IV: Cardiac Invasive Procedures 12
Coronary angiogram for performing angioplasty PTCA, Coronary Stents, Optimizing the results
of PTCA, Airway management, Approach to shock

Unit-V: Invasive Technologies 12
Intra-aortic balloon pump-Fractional flow reserve-Rotational atherectomy- Intravascular
ultrasound-Optical coherence tomography.

TOTAL:60 HOURS

TEXTBOOK

1. Goldberger “ A Textbook of Electrocardiography”.
2. Nandas “A Textbook of Echocardiography”.
3. Grossman W and Baim D, “A Textbook of cardiac catheterization and interventions”.
4. Bruanwalds “A Textbook of cardio vascular medicine”.

REFERENCE

1. Davidson,”A Textbook of Medicine

CT3608	ADVANCED CARDIAC CARE TECHNOLOGY-II	L	T	P	C
		3	1	0	4

OBJECTIVE:

The course enables the students to understand about optimum use of noninvasive and invasive cardiology techniques such as ECG, Stress test, Echocardiography, cardiac catheterization etc.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	The students should learn about ECG changes	R
CO-02	Study about echocardiography and its changes in various disease conditions	U
CO-03	Learn about common drugs used in cardiac patient	U
CO-04	Know about various invasive techniques	R,A
CO-05	Know about various conditions in cardiology	U,E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- K	PO- L	PO- M
CO-01	S	M	S	S	L	L	S	S	S	L	S	L	M
CO-02	L	N	S	S	M	S	L	L	S	L	S	S	M
CO-03	M	M	L	L	M	L	S	L	L	L	S	M	L
CO-04	N	S	L	N	S	L	M	M	S	M	M	S	S
CO-05	S	L	N	M	S	M	S	M	L	M	L	S	S

S- Strong, M- Medium, L-Low, N- Not Relevant

Unit-I: Electrocardiography 12

Diagnoses of acute myocardial infarction -Diagnoses of hyperkalemia - Diagnoses of WPW syndrome-Diagnoses of arrhythmias.

Unit-II: Echocardiography 12

Congenital heart diseases - ASD, VSD, PDA, Coarctation of aorta, Pulmonary and aortic stenosis, Tetralogy of Fallot, Others - Transesophageal echocardiography - Stress echocardiography -(pharmacological)-3Dechocardiography.

Unit-III: Cardiac Common Drugs used in cardiac Patients 12

Antiplatelets drugs-Anti ischaemic drugs-Thrombolytic drugs-Antiarrhythmic drugs-Atropine-Digoxin Nitrates.

Unit-IV: Invasive 12

Organization of cath lab services-Data management of cathlab -Management of intra coronary thrombus - Management of hypotension - Management of vasovagal attack – Management of coronary perforation–Pediatric intervention- Aortic & Pulmonary valvuloplasty

Unit-V: Disorders in Cardiology 12

Myocardial infarction with complications-Valvular heart diseases-Pulmonary thromboembolism- Infective endocarditis-Cardiomyopathies-Rheumatic heart diseases.

TOTAL:60 HOURS

TEXTBOOK:

1. Goldberger, "A Text book of Electrocardiography".
2. Nandas" A Text book of Echocardiography".
3. Grossman Wand BaimD,"A Textbook of cardiac catheterization and interventions".
4. Bruanwalds, "A Text book of cardiovascular medicine"

CT3609	APPLIED CORONARY ANGIOGRAPHY AND ECHOCARDIOGRAPHY	L	T	P	C
		3	1	0	4

OBJECTIVE:

The course enables the students to understand general ICU care and monitoring and infection control measure in ICU.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Study about basics of ICU	U
CO-02	Understand procedures of transport	U
CO-03	Analyze systemic diseases and care in icu	An
CO-04	Gain knowledge about Special Catheter Techniques	R
CO-05	Study various diagnostics and Various Techniques in Echo	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	M	L	S	S	M	S	M	M	S	S	M	S	S
CO-02	S	M	M	L	S	S	M	S	S	L	M	M	S
CO-03	M	S	S	S	S	M	S	M	M	S	M	M	S
CO-04	S	S	M	M	S	M	M	S	M	M	S	S	M
CO-05	S	M	S	M	S	S	S	M	S	M	M	M	S

S-Strong, M- Medium, L-Low, N- Not Relevant

Unit-I: General ICU Care and Monitoring

12

General care and transport of ICU patient - eye, skin, bladder care, position, airways, drains, catheters. Transport of critically ill patient to and out of ICU, transport of patient with drains, airway, inotropes, mechanical ventilator - Monitoring in critical care: vital signs, drains, ECG, fluid intake & output, invasive hemodynamic and central venous pressure monitoring.

Unit-II: Infection Control and Nutrition in ICU

12

Infection control in ICU: prevention of cross infection, personal protection, antibiotics and policy - Nutrition and Fluid balance - total parenteral nutrition, nasogastric tube, gastric tube, jejunostomy tube care and feeding, IV Fluids.

Unit-III: Systemic Diseases and Care in ICU 12

Cardiac care in ICU: hypertension, hypotension, arrhythmias, cardiac arrest, ACLS-Respiratory care in ICU: airway care, tracheostomy care, endotracheal intubation, mechanical ventilation, care of ventilated patient, complications and weaning-Renal failure: types, etiology, complications, corrective measures-Hepatic failure:types, etiology, complications, corrective measures.

Unit-IV: Head Injury and Trauma Care in ICU 12

Head injury and Trauma Care: Glasgow coma scale, care of head injury patient, poly trauma patient- Blood and blood products transfusion: Transfusion reactions& complications, Massive transfusion.

Unit-V: Acid Base Disorders, Neonatal Ventilation, Imaging in ICU 12

Acid-base & electrolyte balance and their correction, fluid, electrolyte, nutrition balance and management- Neonatal mechanical ventilation: intubation and problems inherent to the neonate, basic principles of neonatal ventilation, modes, initiation and maintenance. Miscellaneous :X- rays, ultrasound, chest and limb physical therapy in ICU.

TOTAL:60 HOURS**TEXTBOOK**

1. Mary Lou Sole, "Introduction to Critical care Nursing".
2. Janice Jone, "Critical care Notes: Clinical Pocket guide".

REFERENCE BOOKS

1. Paul L. Marino, "The ICU book".
2. Jean Louis Vincent, "Textbook of Critical care: Expert consult".
3. AACN Essentials of Critical care Nursing-American Association of Critical Care Nursing

CT3610	BASIC INTENSIVE CARE	L	T	P	C
		3	0	0	3

OBJECTIVE

The course enhance students learning in hemodynamics, various angiogram and echo techniques and diagnosis.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Study about basics of cardiac catheterization	U
CO-02	Understand procedures of transeptal and apical puncture	U
CO-03	Analyze Hemodynamic Principles and Angiographic Techniques	An
CO-04	Gain knowledge about Special Catheter Techniques	R
CO-05	Study various diagnostics and Various Techniques in Echo	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

PO CO	PO- A	PO- B	PO- C	PO- D	PO- E	PO- F	PO- G	PO- H	PO- I	PO- J	PO- K	PO- L	PO- M
CO-01	M	L	S	S	M	S	M	M	S	S	M	S	S
CO-02	S	M	M	L	S	S	M	S	S	L	M	M	S
CO-03	M	S	S	S	S	M	S	M	M	S	M	M	S
CO-04	S	S	M	M	S	M	M	S	M	M	S	S	M
CO-05	S	M	S	M	S	S	S	M	S	M	M	M	S

S- Strong, M- Medium, L-Low N- Not Relevant

Unit-I: Basics of Cardiac Catheterization

9

Cardiac Catheterization History and Current Practice Standards Cineangiographic Imaging Radiation- Safety, and Contrast Agents-Integrated Imaging Modalities in the Cardiac Catheterization Laboratory-Complication- Adjunctive Pharmacology for Cardiac Catheterization

Unit-II: Basic Techniques

9

Percutaneous Approach including Trans septal and Apical Puncture - Radial Artery Approach –down Approach: Brachial, Femoral, Axillary, Aortic and Trans apical Diagnostic Catheterization in Childhood and Adult Congenital Heart Disease.

Unit-III: Hemodynamic Principles and Angiographic Technique

9

Hemodynamic principles - Pressure Measurement, Blood Flow Measurement: Cardiac output and Vascular Resistance, Shunt Detection and Quantification, Calculation of Stenotic Valve Orifice Area, Pitfall in the Evaluation of Hemodynamic Data-Angiographic techniques-Coronary Angiography, Coronary Artery Anomalies, Cardiac Ventriculography, Pulmonary Angiography, Angiography of the Aorta and Peripheral Arteries.

Unit-IV: Special Catheter Techniques

9

Evaluation of Myocardial and Coronary Blood Flow and Metabolism - Intravascular Imaging Techniques - Endomyocardial Biopsy - Percutaneous Circulatory Support: Intra-aortic Balloon Counter pulsation and Extra corporeal Bypass.

Unit-V: Diagnostics and Various Techniques in Echo

9

Transesophageal and stress echo and other echo techniques-Transesophageal echo, stress echo, contrast echo, three-dimensional (3-D) echo-Cardiac masses, infection and congenital abnormalities- Cardiac masses, infection, artificial (prosthetic) valves, congenital abnormalities Special situations and conditions-Hypertension and LVH, screening and follow-up echo.

TOTAL: 45 HOURS

TEXTBOOK

1. Goldberger, "A Text book of Electrocardiography".
2. Nandas "A Text book of Echocardiography".

3. GrossmanWandBaimD,"ATextbook of cardiac catheterization and interventions".
4. Bruanwalds, "A Text book of cardiovascular medicine

BS 36S0	HOSPITAL MANAGEMENT	L	T	P	C
		2	0	0	2

OBJECTIVES:

The course enhance students learning about Hospital Management, Biomedical Waste Management and Quality Control.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Study about basics of quality management	U
CO-02	Understand procedures of hospital information settings	U
CO-03	Analyze inventory control	An
CO-04	Gain knowledge about occupational safety	R
CO-05	Study various ways of biomedical waste management	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	M	L	S	S	M	S	M	M	S	S	M	S	S
CO-02	S	M	M	L	S	S	M	S	S	L	M	M	S
CO-03	M	S	S	S	S	M	S	M	M	S	M	M	S
CO-04	S	S	M	M	S	M	M	S	M	M	S	S	M
CO-05	S	M	S	M	S	S	S	M	S	M	M	M	S

S-Strong, M- Medium, L-Low, N- Not Relevant

Unit-I: Quality Management

6

Quality Concepts: Definition of Quality, Dimensions of Quality, Basic concepts of Total Quality Management, Quality Awards - Accreditations for hospitals: Understanding the process of getting started on the road to accreditation, National and International Accreditation bodies, overview of standards-ISO (9000&14000 environmental standards),NABH,NABL,JCI,JACHO.

Unit-II: Hospital Information System

6

Hospital Information System: Hospital Information System Management and software applications in registration, billing, investigations, reporting, ward management and bed distribution, medical records management, materials management and inventory control, pharmacy management, dietary services, management, information processing. Security and ethical challenges.

Unit-III: Inventory Control

6

Inventory Control: Concept, various costs of inventory, Inventory techniques- ABC, SDE/VED Analysis, EOQ models - Storage: Importance and functions of storage - Location and layout of stores - Management of receipts and issue of materials from stores, Warehousing costs, Stock verification.

Unit-IV: Occupational Health and Safety

6

Occupational health, occupational safety, aims and objectives, common occupational hazards in hospitals, occupational hazards in emergency Unit, general methods of prevention of occupational diseases, personal protective equipments, role of health care professionals in prevention of occupational hazards or diseases.

Unit-V: Biomedical Waste Management

6

Biomedical Waste Management: Meaning, Categories of Biomedical Wastes, Colour code practices, Segregation, Treatment of biomedical waste-Incineration and its importance- Standards for waste autoclaving, Microwaving- Packaging, Transportation & Disposal of Biomedical wastes.

TEXTBOOK:

1. Goel S L & Kumar R. 2004. Hospital Core Services: Hospital Administration of the 21st Century. Deep Publications Pvt Ltd: New Delhi
2. Gupta S & Kant S. 1998. Hospital & Health Care Administration : Appraisal and Referral Treatise. Jaypee: New Delhi
3. Harris MG & Assoc. 2003. Managing Health Service : Concepts & Practices . MacLennan + Petty: Sydney
4. Kelly DL. 2006. Encyclopaedia of Quality Management in Hospitals & Health Care Administration. Vol 1-6. Pentagon Press: Chicago

REFERENCES BOOKS

1. Kilpatrick AO & Johnson JA. 1999. Handbook of Health Administration & Policy. Marcel Dekker Inc: New York
2. Kumar A. 2000. Encyclopaedia of Hospital Administration & Development: Volume I. Anmol Publications Ltd: New Delhi.
3. Ransom SB, Joshi MS & Nash DB. 2006. The Health Care Quality Book: Vision, Strategy & Tools.

CT3676	ADVANCED CARDIAC CARE TECHNOLOGY LABORATORY-I	L	T	P	C
		0	0	2	2

OBJECTIVE:

The course enables the students to understand various technologies used in the field of cardiology.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Learn about assessment for Cardiac care	R
CO-02	Study about echocardiography and its changes in various disease conditions	U
CO-03	Learn about ambulatory care techniques	U
CO-04	Know about various invasive technologies	R,A
CO-05	Know about IABP, fractional flow reserve and intravascular ultrasound	U,E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	S	L	L	M	S	M	M	M	M	L	L	L
CO-02	M	N	M	S	L	M	L	M	M	M	L	S	L
CO-03	L	M	N	L	N	S	S	L	N	S	L	S	S
CO-04	N	L	S	M	S	L	L	S	S	L	S	M	M
CO-05	S	S	L	N	L	L	M	N	L	L	M	M	M

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS:

- 1.Angiography
- 2.ECG changes in brady-arrhythmias and tachy-arrhythmias
- 3.Ambulatory BP monitoring
- 4.Holter monitoring
- 5.PTCA
- 6.Coronary stents
- 7.Intra aortic balloon pump
- 8.Intravascular ultrasound

TOTAL:30 HOURS

CT3677	ADVANCED CARDIAC CARE TECHNOLOGY LABORATORY-II	L	T	P	C
		0	0	2	2

OBJECTIVE:

The course enables the students to understand about optimum use of noninvasive and invasive cardiology techniques such as ECG, Stresstest, Echocardiography, cardiac catheterization etc.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Learn about ECG changes	R
CO-02	Study about echocardiography and its changes in various disease conditions	U
CO-03	Learn about common drugs used in cardiac patients	U
CO-04	Know about various invasive techniques	R,A
CO-05	Know about various conditions in cardiology	U,E

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	S	S	L	L	S	L	S	M	L	M	S	L	S
CO-02	L	M	S	L	S	L	L	L	L	M	L	S	S
CO-03	M	M	M	M	S	N	L	S	S	S	L	M	M
CO-04	N	L	N	S	M	M	S	S	L	L	S	M	L
CO-05	S	S	N	S	L	M	S	S	M	N	S	S	M

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS:

1. ECG changes in Myocardial infarction, hyperkalemia, WPW syndrome, arrhythmias
2. Transesophageal echocardiography
3. Stress echocardiography
4. 3D echocardiography
5. Anti platelets
6. Antiarrhythmic drugs

7. Thrombolytic drugs
8. Myocardial biopsy
9. Artificial Heart valves
10. Coronary artery bypass graft

TOTAL:30 HOURS

CT3678	APPLIED CORONARY ANGIOGRAPHY AND ECHOCARDIOGRAPHY LABORATORY	L	T	P	C
		0	0	2	2

OBJECTIVE:

The course enhance students learning in hemodynamics, various angiogram and echo techniques and diagnosis.

Course Outcome – COs		Cognitive Skill
At the end of the course the student should be able to		
CO-01	Understand about basics of cardiac catheterization	U
CO-02	Analyze about different approaches used in cardiac catheterization	An
CO-03	Understand about hemodynamic principles and angiographic techniques	U
CO-04	Remember about special catheter techniques	R
CO-05	Learn about diagnostics and various techniques in Echo	A

R- Remember, U-Understand, A-Apply, An-Analyze, E-Evaluate, S- Synthesis

Mapping of Course Outcome with Programme Outcome

PO CO	PO-A	PO-B	PO-C	PO-D	PO-E	PO-F	PO-G	PO-H	PO-I	PO-J	PO-k	PO-L	PO-M
CO-01	M	S	M	M	M	S	S	L	L	L	N	S	M
CO-02	S	S	M	L	S	S	M	L	M	L	M	S	N
CO-03	S	S	S	M	M	L	M	S	M	L	L	S	N
CO-04	M	S	L	M	S	L	M	M	M	S	M	L	S
CO-05	S	S	S	S	M	S	S	L	M	N	S	M	L

S- Strong, M- Medium, L-Low, N- Not Relevant

LIST OF EXPERIMENTS:

1. Cardiac catheterization
2. PTCA
3. Cardiac output measurement
4. Shunt calculation
5. Coronary angiography
6. Cardiac ventriculography
7. Pulmonary angiography
8. Endomyocardial biopsy
9. Intra-aortic balloon counter-pulsation
10. Extra corporeal bypass

TOTAL: 30 HOURS

IV Year - Internship

One year internship finally prepares and trains the student who will be able to meticulously assist the doctors for providing quality patient care in selected areas of clinical speciality.

Guidelines

- Internships are mandatory
- Duration: 1 Year (During 7th & 8th semester)
- Internship can be done at NABH Certified Hospitals, Government Hospitals etc.
- Maintenance of records by students: Every student shall maintain records of the attendance and the report of the work they do in different areas. This should be certified by the head of the institutions or his/her nominee where the students is undergoing internship.
- Leave: Candidates should have an attendance of at least 100% during the internship period.
- Grading and evaluation of students: All interneers will be assessed based on their attendance.
- Certification: The institutes will award a certificate and Clinical requirements after successful completion of the internship.
- The university shall award the degree only after the successful completion of internship