



AMRITA SCHOOL OF MEDICINE

Centre for Allied Health Sciences

AIMS Ponekkara PO, Kochi – 682 041

Tel: 0484 – 2858131, 2858375, 2858845

Fax: 0484-2858382

Email: ahs@aims.amrita.edu

Web: www.amrita.edu

PROGRAM

BSc Cardiac Perfusion Technology

(Revised with effect from 2014-2015 onwards)



A Super Speciality Tertiary Care Hospital Accredited by ISO 9001-2008, NABL & NABH

Our Chancellor



SPIRITUAL PRINCIPLES IN EDUCATION

“In the gurukulas of ancient rishis, when the master spoke it was love that spoke; and at the receiving end disciple absorbed of nothing but love. Because of their love for their Master, the disciples’ hearts were like a fertile field, ready to receive the knowledge imparted by the Master. Love given and love received. Love made them open to each other. True giving and receiving take place where love is present. Real listening and ‘sraddha’ is possible only where there is love, otherwise the listener will be closed. If you are closed you will be easily dominated by anger and resentment, and nothing can enter into you”.

“Satguru Mata Amritahanandamayi Devi”

Amrita Institute of Medical Sciences

Since its inception, Amrita Institute of Medical Sciences (AIMS) in fifteen short years has grown from a 115 bed specialty hospital to a 1250 bed super-specialty tertiary care health centre with an attached medical school and hospital. On the 17th of May 1998, AIMS was inaugurated by the Prime Minister of India, Shri Atal Bihari Vajpayee, in the presence of Her Holiness, Sri Mata Amritanandamayi Devi. The Amrita Institute of Medical Sciences is the adjunct to the term "new universalism" coined by the World Health Organisation. This massive healthcare infrastructure with over 9,00,000 sq. ft of built-up area spread over 100 acres of land supports a daily patient volume of approx 3000 outpatients and an average of 135 admissions. Annual patient turnover touches an incredible figure of over 9,00,000 outpatients and nearly 41,000 inpatients.

With extensive facilities comprising 25 modern operating theatres, 200 equipped intensive-care beds, a fully computerised and networked Hospital Information System (HIS), a fully digital radiology department, a 24/7 telemedicine service and a comprehensive well-equipped clinical laboratory, AIMS offers a total and comprehensive health solution comparable to the best hospitals in the world. AIMS features one of the most advanced hospital computer networks in India. The network supports more than hundreds computers and has computerised nearly every aspect of patient care including all patient information, lab testing and radiological imaging. The AIMS team comprises physicians, surgeons and other healthcare professionals of the highest calibre and experience. Our Hospital services are accredited by ISO 9001-2008 and National Accreditation Board for Hospitals & Healthcare Providers (NABH) and lab services by National Accreditation Board for Testing and Calibration Laboratories.

The educational institutions of Amrita Institute of Medical Sciences, which include the Amrita School of Medicine, the Amrita School of Dentistry, the Amrita College of Nursing, the Amrita School of Pharmacy and Amrita Centre for Allied Health Sciences are committed to being centres of excellence providing value-based medical education, where the highest human qualities of compassion, dedication, purity and service are instilled in the youth. Amrita Institute of Medical Sciences strives to help all students attain the competence and character to humbly serve humanity in accordance with the highest principles and standards of the healthcare profession.

Based on evaluation of all our University campuses and programs by a peer review committee, the university has been accredited by the National Assessment and Accreditation Council (NAAC) with an 'A' grade. Amrita has also been ranked in the Ivy League of Indian Universities along with Indian Institute of Science, Bangalore, Tata Institute of Fundamental Research (TIFR), Mumbai etc. in a review of deemed universities by the Ministry of Human Resource Development (MHRD) of the Government of India. In a recent review of Deemed Universities by a high-power committee of reputed academicians, popularly known as the Tandon Committee, set up by the Ministry of Human Resources Development, Amrita Vishwa Vidyapeetham was placed in Category 1. In Tamil Nadu, besides Amrita, only the Chennai Mathematical Institute, a Deemed University, was given this recognition.

Table of Contents
Part I – Rules and Regulations

SI No	Contents	Page No.
I	Under Graduate Programs	
	1. Details of Under Graduate Courses	7
	2. Medium of Instruction	8
II	3. Eligibility	8
	General Rules	
	1. Duration of the course	8
	2. Discontinuation of Studies	8
III	3. Educational Methodology	8
	4. Academic Calendar	9
	Examination Regulations	
	1. Attendance	10
	2. Internal Assessment	10
	3. University Examination	11
	4. Eligibility to appear University Examination	12
5. Valuation of Theory – Written Paper	12	
IV	6. Supplementary Examination	12
	7. Rules regarding Carryover subjects	13
V	Criteria for Pass in University Examination – Regulations	
	1. Eligibility criteria for pass in University Examinations	13
VI	2. Evaluation and Grade	13
	Internship	
VII	1. Eligibility for Internship – Regulations	14
	2. Attendance and leave details during Internship	14
VIII	General considerations and Teaching Approach	14

Table of Contents
Part II – Syllabus

SL No:	Contents	Page No
1	Introduction and Advancement of the program	16
2	Main Objective of the program	16
3	Course Structure	17
	First Year	
4	Anatomy (Section A) – Paper I	19
5	Physiology (Section B) – Paper I	22
6	Biochemistry (Section A) – Paper II	24
7	Pharmacology (Section B) – Paper II	26
8	Microbiology (Section A) – Paper III	27
9	Pathology (Section B) – Paper III	28
10	Introduction to Computer Application (Section A) – Paper IV	32
11	Quality Assurance & Accreditation (Section B) – Paper IV	33
12	English – Paper V	35
	Second Year	
13	Applied Basic Sciences – Paper VI	37
14	BASICS OF CARDIOPLUMONARY BYPASS – Paper VII	39
	Third Year	
15	Cardiac Perfusion Technology - Clinical – Paper VIII	39
16	Cardiac Perfusion Technology - Applied – Paper IX	40
17	Cardiac Perfusion Technology - Advanced – Paper X	41
18	Scheme of Examination	42

Part I

Rules and Regulations

I. Under Graduate Programmes (Bachelor of Sciences)

1. Details of Under Graduate Courses :			
Sl.No.	Course	Duration	Conditions of Eligibility for admission to the course
1	Medical Laboratory Technology (MLT)	4 years	Pass in plus Two with 50% marks with Physics, chemistry and Biology
2	Medical Radiologic Technology (MRT)	4 Years	First class in plus two with Mathematics, Physics, Chemistry, and Biology
3	Emergency Medical Technology	3 Years + One year internship	Pass in plus two with 50% marks in Physics, Chemistry and Biology.
4	Anaesthesia Technology	3 Years + One year internship	Pass in plus two with 50% marks in Physics, Chemistry and Biology
5	Respiratory Therapy (RT)	3 Years + one year Internship	Pass in plus two with 50% marks in Physics, Chemistry and Biology
6	Dialysis Therapy	3 Years + One year internship	Pass in plus two with 50% marks in Physics, Chemistry and Biology
7	Physician Assistant	3 years + one year internship	Pass in plus two with 50% marks in Physics, Chemistry and Biology.
8	Cardio Vascular Technology (CVT)	3 Years + One year internship	Pass in plus two with 50% marks in Physics, Chemistry and Biology.
9	Echocardiography Technology	3 Years + One year internship	Pass in plus two with 50% marks in Physics, Chemistry and Biology.
10	Cardiac Perfusion Technology (CPT)	3 Years + One year internship	Pass in plus two with 50% marks in Physics, Chemistry and Biology.
11	Diabetes Sciences	3 years + one year internship	Pass in plus two with 50% marks in Physics, Chemistry and Biology.
12	Optometry	3 Years + one year Internship	Pass in plus two with 50% marks in Physics, Chemistry and Biology.
13	Optometry (Lateral Entry)	2 Years + one year Internship	Pass in Diploma in Optometry
14	Bachelor of Audiology & Speech Language Pathology (BASLP)	3 years + one year internship	Pass in plus two with 50% marks in Physics, Chemistry and Biology.

2. Medium of Instruction :

English shall be the medium of instruction for all subjects of study and for examinations.

3. Eligibility :

Generally Science Graduates with Physics, Chemistry, Biology are eligible as detailed under for admission to the Under Graduate Courses except in respect of certain specialties for which other qualification or subjects are specifically called for. Essential qualifications for eligibility are mentioned under clause No. I.

II. General Rules :

Admissions to the courses will be governed by the conditions laid down by the University from time to time and as published in the Regulations for admissions each year.

1. Duration of the Course

Duration details are mentioned under clause No.I of this booklet.

Duration of the course	: 4 Years (3 years + 1 year Internship)
Weeks available per year	: 52 weeks
Vacation / holidays	: 5 weeks (2 weeks vacation + 3 weeks calendar holidays)
Examination (including preparatory)	: 6 weeks
Extra curricular activities	: 2 weeks
Weeks available	: 39 weeks
Hours per week	: 40 hours
Hours available per academic year	: 1560 (39 weeks x 40 hours)

Internship wherever specified are integral part of the course and needs to be done in Amrita Institute of Medical Sciences, Centre for Allied Health Sciences, Kochi itself.

2. Discontinuation of studies

Rules for discontinuation of studies during the course period will be those decided by the Chairman /Admissions, Centre for Allied Health Sciences, and Published in the "Terms and Conditions" every year.

3. Educational Methodology

Learning occurs by attending didactic lectures, as part of regular work, from co-workers and senior faculty, through training offered in the workplace, through reading or other forms of self-study, using materials available through work, using

materials obtained through a professional association or union, using materials obtained on students own initiative, during working hours at no cost to the student.

4. Academic Calendar

Annual Scheme

FIRST YEAR

Commencement of classes	– August
First sessional exam	– 20 October - 30 October
Second sessional exam	– 20 January - 30 January
Model Exam (with practical)	– 15 May - 15 June (includes 10 days study leave)
University exam (with practical)	– 15 June - 15 July (includes 10 days study leave)
Annual Vacation	– After the exam

SECONDER YEAR

Commencement of classes	– August
First sessional exam	– 20 October - 30 October
Second sessional exam	– 20 January - 30 January
Model Exam (with practical)	– 15 May - 15 June (includes 10 days study leave)
University exam (with practical)	– 15 June - 15 July (includes 10 days study leave)
Annual Vacation	– After the exam

THIRD YEAR

Commencement of classes	– August
First sessional exam	– 20 October - 30 October
Second sessional exam	– 20 January - 30 January
Model Exam (with practical)	– 01 May - 30 May (includes 10 days study leave)
University exam (with practical)	– 01 June - 30 June (includes 10 days study leave)
Annual Vacation	– 15 days after the theory and practical exam.

(For the successful completion of the course the students should complete the entire tenure of the course till 31st July in the parent departments)

INTERNSHIP

Commencement of internship	– 01 August
Completion of internship	– 31 July

III. Examination Regulations :

1. Attendance :

80% of attendance (physical presence) is mandatory. Medical leave or other types of sanctioned leaves will not be counted as physical presence. For those who possess a minimum of 75% attendance, deficiency up to 5% may be condoned on medical or other genuine grounds by the Principal at his sole discretion and as per the recommendation of the Heads of Departments concerned. Students are allowed such condonation only once for entire course of study. Condonation fee as decided by the Principal has to be paid. Attendance will be counted from the date of commencement of the session to the last day of the final examination in each subject..

2. Internal Assessment :

- 1. Regular periodic assessment shall be conducted throughout the course. At least two sessional examinations in theory and preferably two practical examinations should be conducted in each subject. The model examination should be of the same pattern of the University Examination. Average of the two examinations and the marks obtained in assignments / oral / viva / practicals also shall be taken to calculate the internal assessment.**
- 2. A candidate should secure a minimum of 35% marks in the internal assessment in each subject (separately in theory and practical) to be eligible to appear for the University examination.**
- 3. The internal assessment will be done by the department twice during the course period in a gap of not more than six months and final model exam which will be the same pattern of university examination as third sessional examination. The period for sessional examinations of academic year are as follows :**
 - First Sessional Exam : October**
 - Second Sessional Exam : January**
 - Model Exam : May /June**
4. Each student should maintain a logbook and record the procedures they do and the work patterns they are undergoing. It shall be based on periodical assessment, evaluation of student assignment, preparation for seminar, clinical case presentation, assessment of candidate's performance in the sessional examinations, routine clinical works, logbook and record keeping etc.

5. Day to day assessment will be given importance during internal assessment, Weightage for Internal assessment shall be 20% of the total marks in each subject.
6. Sessional examination as mentioned above and the marks will be conducted and secured by the students along with their attendance details shall be forwarded to the Principal (Result of the first sessional examination should reach before December 1st week of the academic year and result of the second sessional examination should reach to the Principal before March 1st week of the academic year)
7. Third sessional examinations (model exam) shall be held three to four weeks prior to the University Examination and the report shall be made available to the Principal ten days prior to the commencement of the university examination.

3. University Examinations :

- University Examination shall be conducted at the end of every academic year.
- A candidate who satisfies the requirement of attendance, internal assessment marks, as stipulated by the University shall be eligible to appear for the University Examination.
- One academic year will be twelve months including the days of the University Examination. Year will be counted from the date of commencement of classes which will include the inauguration day.
- The minimum pass for internal assessment is 35% and for the University Examination is 45%. However the student should score a total of 50% (adding the internal and external examination) to pass in each subject (separately for theory and practical)
- If a candidate fails in either theory or practical paper, he/she has to re-appear for both the papers (theory and practical)
- Maximum number of attempts permitted for each paper is five (5) including the first attempt.
- The maximum period to complete the course shall not exceed 6 years.
- All practical examinations will be conducted in the respective clinical areas.
- Number of candidates for practical examination should be maximum 12 to 15 per day
- One internal and external examiner should jointly conduct the theory evaluation and practical examination for each student during the final year.

4. Eligibility to appear university Examination :

A student who has secured 35% marks for Internal Assessment is qualified to appear for University Examination provided he/she satisfies percentage of attendance requirement as already mentioned at the III (1) of the clause.

5. Valuation of Theory – Revaluation Papers :

1. Valuation work will be undertaken by the examiners in the premises of the Examination Control Division in the Health Sciences Campus.
2. There will be **Re-Valuation** for all the University examinations. Fees for revaluation will be decided by the Principal from time to time.
3. Application for revaluation should be submitted within 5 days from date of result of examination declared and it should be submitted to the office with payment of fees as decided by the Principal.

6. Supplementary Examinations :

Every main University examination will be followed by a supplementary examination which will normally be held within four to six months from the date of completion of the main examination.

As stipulated under clause No. 2 under Internal Assessment, HOD will hold an internal examination three to four weeks prior to the date of the University Examination. Marks secured in the said examination or the ones secured in the internal examination held prior to the earlier University Examination whichever is more only will be taken for the purpose of internal assessment. HODs will send such details to the Principal ten days prior to the date of commencement of University examination.

Students who have not passed / cleared all or any subjects in the first University examination will be permitted to attend the second year classes and also eligible to appear for second year university examination along with first year supplementary examination. However, he / she can appear for the third (final) year university examination, only if he / she clears all the subjects in the first as well as in the second year examinations.

Same attendance and internal marks of the main examination will be considered for the supplementary examination, unless the HOD furnish fresh internal marks and attendance after conducting fresh examination.

Students of supplementary batches are expected to prepare themselves for the University Examinations. No extra coaching is expected to be provided by the Institution. In case at any time the Institution has to provide extra coaching, students will be required to pay fees as fixed by the Principal for the said coaching.

7. Rules regarding carryover subjects:

A candidate will be permitted to continue the second and third year respectively of the course even if he/she has failed in the first or second year university examinations.

A candidate must have passed in all subjects to become eligible to undergo compulsory internship of one year, for the candidates who have not passed all the subjects the duration of the third year shall be extended until they become eligible to undergo compulsory internship.

IV. Criteria for Pass in University Examination - Regulations:

1. Eligibility criteria for pass in University Examination:

In each of the subjects, a candidate must obtain 50% in aggregate for a pass and the details are as follows :

- A separate minimum of 35% for Internal Assessment
- 45% in Theory & 35% in Oral / Viva
- A separate minimum of 50% in aggregate for Practicals / Clinics (University Examinations)
- Overall 50% is the minimum pass in subject aggregate (University Theory + Viva / Oral + Practicals + Internal Assessment)

2. Evaluation and Grade:

1. Minimum mark for pass shall be 50% in each of the theory and practical papers separately (including internal assessment) in all subjects except English. Only a minimum of 40% is required to pass in English
2. A candidate who passes the examination in all subjects with an aggregate of 50% marks and above and less than 65% shall be declared to have passed the examination in the second class.
3. A candidate who passes the examination in all subjects in the first attempt obtaining not less than 65% of the aggregate marks for all the three years shall be declared to have passed the examination with First Class.
4. A candidate who secures an aggregate of 75% or above marks is awarded distinction. A candidate who secures not less than 75% marks in any subject will be deemed to have passed the subject with distinction in that subject provided he / she passes the whole examination in the first attempt.
5. A candidate who takes more than one attempt in any subject and pass subsequently shall be ranked only in pass class.
6. A Candidate passing the entire course is placed in Second class / First class / Distinction based on the cumulative percentage of the aggregate marks of all the subjects in the I, II and III (Final) university examinations
7. Rank in the examination : - Aggregate marks of all three year regular examinations will be considered for awarding rank for the B.Sc Graduate Ex-

amination. For the courses where the number of students are more than 15 rank will be calculated as under :

- Topmost score will be declared as First Rank
- Second to the topmost will be declared as Second Rank
- Third to the topmost will be declared as Third Rank

V. Internship :

1. Eligibility for Internship - Regulations :

Wherever internship is a part of the curriculum, students will have to do the internship in Amrita Institute of Medical Sciences itself. A candidate must have passed in all subjects to become eligible to undergo compulsory internship of one year. For the candidates who have not passed all the subjects the duration of the third year shall be extended until they become eligible to undergo compulsory internship.

“Internship has to be done continuously for a period provided in the syllabus except in extra ordinary circumstances where subject to the approval of the Principal the same may be done in not more than two parts with an interruption not exceeding six months. In any case Internship shall be completed within 18 months from the date of acquiring eligibility to the internship.

2. Attendance and leave details during Internship :

For 30 days of duty an intern will be eligible for casual leave and one weekly off. For all Under Graduate courses, the period of internship will be one year and so an intern is eligible for one casual leave and one weekly off in a month and total 12 days casual leave is permitted during internship for a student. For example if a student has taken more than 15 days leave in an emergency situation, then he/she is permitted 12 days as casual leave and the remaining 3 days she / he has to compensate by doing duty for 3 days.

A Student will become eligible to receive his/her degree only after completion of internship to the complete satisfaction of the Principal.

VI. General considerations and teaching / learning approach:

There must be enough experience to be provided for self learning. The methods and techniques that would ensure this must become a part of teaching-learning process.

Proper records of the work should be maintained which will form the basis for the students assessment and should be available to any agency who is required to do statutory inspection of the school of the course.

Part II Syllabus

INTRODUCTION AND ADVANCEMENT

Cardiovascular perfusion is the science of providing extracorporeal circulation in order to artificially support and temporarily replace a patient's respiratory and circulatory systems. Clinical Perfusionists are expert members of the cardiac surgical team, and can be found provide life saving support of patients requiring extra corporeal circulation, including but not limited to major cardiothoracic, vascular and transplant surgeries, as well as support of the critically-ill patient.

Cardiovascular Perfusionists are important members of the open-heart surgical team whose primary role is to conduct cardiopulmonary bypass using a heart-lung machine and other ancillary equipment. They closely monitor the patient's blood flow and other vital signs during open heart surgery and are also responsible for administering intravenous fluids, blood products and anesthetic drugs. Perfusionists are also experts of other life support equipment such as ventricular assist devices and intra-aortic balloon pumps.

The primary aim of B.Sc Cardiac Perfusion Technology is to academically and clinically prepare the cardiovascular perfusion student for professional practice. The curriculum focuses on developing a strong knowledge base in cardiothoracic anatomy, physiology and pathophysiology, as well as pharmacology, fetal and neonatal cardiac development and perfusion science. At the end of three years the candidates will have to pass the University examination to be eligible for the bachelor degree. Upon completion of the 3-year course and one year internship the candidates will evolve in to a full trained, qualified cardiac perfusion technologist capable of working independently. Throughout the program, the you are given many opportunities to develop their critical thinking and problem solving skills.

MAIN OBJECTIVES OF THE COURSE

The primary aim of our B.Sc in Cardiovascular Perfusion is to academically and clinically prepare the cardiovascular perfusion student for professional practice. The curriculum focuses on developing a strong knowledge base in cardiothoracic anatomy, physiology and pathophysiology, as well as pharmacology, fetal and neonatal cardiac development and perfusion science. Throughout the program, the you are given many opportunities to develop their critical thinking and problem solving skills.

Program Outcomes (PO):

1. **PO1:** Fundamental knowledge on the subject.
2. **PO2:** Effective communication skills.
3. **PO3:** Knowledge in professional ethics.
4. **PO4:** Leadership qualities and team work.
5. **PO5:** Problem Analysis and solving skills.
6. **PO6:** Basic knowledge on research methodology.
7. **PO7:** Higher Technical skills and competences.
8. **PO8:** Higher study options in many fields.

9. **PO9:** Employability in various sectors.

Program Specific Outcomes (PSO)

1. **PSO1:** strong knowledge base in cardiothoracic anatomy, physiology and pathophysiology, as well as pharmacology, fetal and neo- natal cardiac development and perfusion science.
2. **PSO2: Basics of CPB**
3. **POS3: Expertise in perfusion procedures**
4. **POS4:** Introduction to advanced perfusion studies.
5. **PSO5:** Recent advances in perfusion studies

Elective Course

BCPT40

Value Based Education

CO1: The attitude to be a good human being, with the curiosity to continue lifelong learning.

CO2: The conviction to do service to humanity - to put the interests of the individual patient as the foremost priority. Acquisition of values of gender sensitivity, environment & sustainability.

CO3: Acquisition of the "skills for life" in addition to the skills to live.

CO4: Acquisition of positive lifelong values including ethics and etiquette.

CO5: The "practical applications" of the right values

Units:

Unit 1: The basis of patient care – ideas about the needs of the patient – economics of the patient and the family when there is sickness. 4 hours

Unit 2: What does it mean to be a caregiver. Skills for life – positive values 4 hours

Unit 3: What is it that the society expects from a hospital and caregivers. 4 hours

Unit 4: Practical application of good behavior - peer feedback – reflections 4 hours

Unit 5: Assessment through daily evaluation, 360 degree evaluation.

COURSE STRUCTURE

First year

Theory classes and practicals of following subjects

Anatomy

Physiology

Biochemistry

Pharmacology

Microbiology

Pathology

Introduction to Computer application

Quality Assurance & Accreditation

English

Second year

Theory class and posting in the clinical area

Applied Basic Sciences
Applied Pathology and Pathophysiology

Third year

Theory class and posting in the clinical area

Cardic Perfusion Technology – Clinical
Cardic Perfusion Technology – Applied
Cardic Perfusion Technology - Advanced

Fourth Year

Fourth year is internship in the clinical area

FIRST YEAR

During the first year the students will have didactic lecture in the medical college from 10 am to 4 pm

Internal Assessment

Three sessional examinations will be conducted in this year. Average marks of these sessional examinations will be counted as internal marks.

Paper I –AHS11 Section A: ANATOMY

COURSE OBJECTIVE:

An outline of anatomy with special emphasis on applied aspects is provided to the students for better understanding of the technical and diagnostic procedure.

Course Outcome:

1. Knowledge of general anatomy and locomotion.
2. Knowledge of basic human anatomy and histology of CVS and Respiratory systems.
3. Knowledge of basic human anatomy and histology of CNS, GI, excretory and reproductive systems.
4. Knowledge of basic human anatomy and histology of endocrine system and special senses.

1. The human body as a whole

1 hour

Definition
Sub divisions of anatomy
Terms of location and positions
Fundamental planes, Vertebrate structure of man
Organization of body cells and tissues

2. Locomotion and Support

8 hours

The Skeletal System
Types of bones
Structure and growth of bones
Divisions of the skeleton
Appendicular skeleton, Axial skeleton
Name of all the bones and their parts
Joints: Classification, Types of movements with examples
Muscles: Structure, classification, muscles of abdominal wall, muscles of Respiration, pelvic diaphragm, muscles of head and neck

Practicals:

2 hours

Demonstrations of all bones:

Showing parts
Joints, X-rays of all normal bones and joints
Muscles: Classification of muscle

3. Anatomy of nervous system

6 hours

Introduction and divisions of nervous system
Central nervous system: Spinal cord, Anatomy, and functions, Reflex arc
The Brain:
Location, gross features, parts, functional areas
Hindbrain, Midbrain, fore brain
Coverings of brain and peripheral nervous system
anatomy of cerebral blood supply& coverings
Spinal cord –gross features, extent, blood supply and coverings
Injuries to spinal cord and brain
Peripheral nervous system – organization& structure of a typical spinal nerve

Practicals:

1 hour

Demonstration of brain and spinal cord

4. Anatomy of Cardiovascular system

Gross anatomy & Structural features of the Heart and Great vessels:

Heart

2 hours

Location, size, surface features, pericardium & valves
Right Atrium :- structural features
Venous area, Septum and atrial appendage
Right Ventricle :- structural features, inflow & Out flow characteristics
Left Atrium :- structural features, venous area, Septum and appendage
Left ventricle :- structural features, inflow & out flow characteristics
Valves :- valve apparatus, location
Structure & functions of each valve
Blood Supply of heart :- coronary arteries, cardiac cycle
Innervations :- sympathetic and parasympathetic sensory
Pulmonary circuit-names of the arteries and veins & positions
Lymphatic drainage of the Heart

Great Vessels

2 hours

Structure of blood vessels and its organization
Aorta
Pulmonary artery & pulmonary vein
General plan of systemic circulation
Pulmonary circulation

PRACTICALS

2 hours

Demonstration to illustrate normal angiograms.
Demonstration of surface features & interior of the heart
Demonstration of aorta and its branches
Histology of cardiac muscles and artery

5. Anatomy of the Respiratory system

4 hours

Organs of Respiratory System:

Conducting portion, respiratory portion.

(Nose –nasal cavity, paranasal air sinuses

Larynx, trachea, bronchial tree)

Muscles of Respiration

Cross structure and the interior features of nose & nasal cavity

Para nasal air sinuses

Cross structure and interior features of the pharynx and larynx

Cross structures and interior features of the trachea and bronchial tree

Gross structure, histology, position and coverings of the lungs

Pulmonary circulation – pulmonary arteries pulmonary veins & bronchial arteries

Nerve supply to the respiratory system

Practicals

2 hours

Demonstration of the parts and function

Demonstration of the different parts of the respiratory system with special emphasis

On lungs

Histology of lungs

6. Anatomy of the digestive system

1 hour

Components of the digestive system

Alimentary tube

Mouth, tongue, tooth

Salivary gland, liver, biliary apparatus and its secretion, pancreas and pancreatic

Secretion, movements of intestine defecation, GI hormones malabsorption and

Practicals

1 hour

Demonstrations of the parts and functions

Normal x-rays

7. Anatomy of excretory system & Reproductive system

1 hour

Organization of the renal system

Kidneys: location, gross features, structure, blood supply and nerve supply

Excretory ducts, ureters, urinary bladder, urethra location gross features and structure

Male reproductive system:

2 hours

Testis, Duct system, Prostate

Female Reproductive system:

Ovaries, duct system, accessory organs

Practicals

1 hour

Demonstration of Kidneys, ureter, bladder

Histology of kidney

8. Anatomy of endocrine system **1 hour**
Name of all endocrine glands and their positions
Hormones and their functions

9. Histology **6 hours**

General Slides:

Hyaline cartilage, Fibro cartilage, Elastic cartilage, T.S & L.S of bone, Blood vessels, Tonsils, Spleen, Thymus, Lymph node, Epithelial tissue, Skeletal and cardiac muscle, Peripheral nerve and optic nerve

Systemic Slides **5 hours**

4. G.I.T
5. Lung-Trachea
6. Kidney, Ureter, Urinary bladder
7. Endocrine- Adrenal,pancreas,pituitary,thyroid and parathyroid
8. Uterus, Ovary, testis

Reference books:

Human Anatomy- Regional and Applied Volume

B.D Chaurasia

Clinical Anatomy For Medical Students

Richard S.Snell

Paper I – Section B: PHYSIOLOGY

Course outcome:

1. CO1: Knowledge of general physiology, nerve-muscle physiology and haematology.
2. CO2: Knowledge of basic human physiology with respect to CVS, Respiratory system and GI system.
3. CO3: Knowledge of basic human physiology of excretion and CNS.
4. CO4: Knowledge of basic human physiology of special senses and endocrine system.

1. INTRODUCTION TO PHYSIOLOGY AND GENERAL PHYSIOLOGY-1 hr

2. MUSCLE and NERVE - 3 hrs

- Neurons and glial cells - Structure, function, Types, electrical property, degeneration and regeneration.
- Muscle- Structure & Functions of skeletal muscle & smooth muscle
- Neuromuscular transmission – Functional anatomy, Transmission & Clinical importance.

3. HAEMATOLOGY - 9 hrs

- Fluid compartments, Composition & functions of blood, Plasma protein – names, functions.
- Erythrocyte - Morphology, Count, Function, Erythropoiesis, Factors affecting erythropoiesis, Structure of Haemoglobin, Erythrocyte Sedimentation rate, Anaemia, Polycythemia, Fate of RBC, Jaundice.
- Leucocytes - Morphology, Types, Properties & Functions, variations in count.

- Thrombocytes- Morphology, Count, Function, Variations.
- Hemostasis. Coagulation and its disorders.
- Blood groups and its importance, Blood transfusion.
- Tissue fluid and Lymph
- Immunity.

4. CARDIOVASCULAR SYSTEM - 10 hrs

- Organisation of CVS, Properties of Cardiac Muscle, Origin and spread of cardiac impulse
- Cardiac Cycle – Electrical (ECG) and mechanical events,
- Cardiac output, Measurement, (Fick's Principle) regulation
- Blood pressure, measurement & variation, determinants, regulation, Shock.
- Regional circulation.(Salient features only)-coronary, Pulmonary, Cerebral, Cutaneous

5. RESPIRATORY SYSTEM - 8 hrs

- Introduction. Functional anatomy, Mechanics of ventilation, Pressure changes, volume changes, Surfactant, Compliance, Airway resistance.
- Alveolar ventilation, Dead space, Ventilation perfusion ratio and its significance,
- Spirogram
- Diffusion of gases, O₂ transport, CO₂ transport.
- Regulation of respiration – Voluntary, Neural, Chemical.
- Abnormalities of respiration Hypoxia, Cyanosis, Dyspnea, Asphyxia, High altitude,
- Dysbarism.

6. DIGESTIVE SYSTEM - 7 hrs

- Functional anatomy of GI tract,
- Secretions - Salivary secretion & its regulation, Gastric secretion and its regulation,
- Peptic ulcer, Pancreatic secretion and its regulation, Functions of liver. Bile – storage and functions. Intestinal juice
- Movements - Mastication, Deglutition, Movements of stomach, Small intestine, Large intestine. vomiting, Defecation.
- GI Hormones,
- Digestion & Absorption of carbohydrates, Proteins, Fat & vitamins

7. Excretion - 7 hrs

- Functional anatomy of kidney, Structure and function of kidney and nephron
- Renal blood flow, Glomerular filtration rate, Definition, Measurement and factors
- affecting Tubular functions – Reabsorption, Secretion, Acidification, concentration and abnormalities.
- Micturition – Bladder innervation, Micturition reflex.
- Functions of skin

8. ENDOCRINOLOGY - 6 hrs

- a) Introduction to endocrinology (Different glands, hormones)
- b) Pituitary gland (Anterior and posterior glands, actions and applied aspects.
- c) Thyroid gland (Actions and applied aspects)
- d) Calcium homeostasis (Parathyroid, Vitamin D, Calcitonin, actions and applied aspects

- e) Pancreas (Endocrine part – insulin, glucagon – actions and applied aspects)
- f) Adrenal cortex and medulla (Actions and applied aspects)

9. REPRODUCTIVE SYSTEM - 3 hrs

- Male Reproductive System- Different parts, spermatogenesis, hormones
- Female reproductive system – Different parts, Sexual cycles – Menstrual cycles – Ovarian, endometrium
- Lactation, Pregnancy & Contraception (Basics only)

10. CENTRAL NERVOUS SYSTEM (Basics only) - 10 hrs

- a) Organization of Nervous system.
- b) Synapse, Properties & Function
- c) Reflexes, Reflex action, Property ,Function.
- d) Sensory system – Receptor, Ascending sensory pathway (basics only), Thalamus, sensory cortex
- e) Motor System – Spinal control of Motor activity, Motor areas in Cerebral Cortex,
- f) Pyramidal & extra pyramidal tracts (basics only),
- g) Basal ganglia & Cerebellum.
- h) Hypothalamus
- i) Autonomous nervous system
- j) Cerebro spinal fluid- formation and functions.

11. SPECIAL SENSES (Basics only) - 4 hrs

- Audition
- Vision

Revision and evaluation session – 4-5 hours

Reference books:

Essentials of Medical Physiology

Anil Baran Singha Mahapatra

Paper II – AHS12
Section A: BIOCHEMISTRY

Course outcome:

1. CO1: Knowledge of biochemistry of cell structure, functions, digestion, enzymes and proteins.
2. CO2: Knowledge of biochemistry of carbohydrates, minerals and vitamins.
3. CO3: Knowledge of biochemistry of liver and renal function tests, specialized laboratory investigations and lipids.
4. CO4: Knowledge of biochemistry of metabolism, homeostasis, nucleic acids and cancer.

I. CELL STRUCTURE & FUNCTIONS

1hr

- Mitochondria
- Endoplasmic reticulum, Lysosomes
- Fluid mosaic model for membrane structure

II. DIGESTION AND ABSORPTION OF NUTRIENTS

2hrs

1. Digestion of carbohydrates
2. Fats

3. Enzymes in digestion of proteins

III. ENZYMES	1hr
<ul style="list-style-type: none">• Normal serum range and diagnostic importance of serum AST, ALP,ALT,CK,GGT and AMYLASE.	
IV. PROTEINS	1hr
<ul style="list-style-type: none">• Essential amino acids• Plasma proteins• Immunoglobulins	
V. CARBOHYDRATES	2hr
<ul style="list-style-type: none">• Diabetes mellitus- symptoms and complications• Glucose tolerance test• Action of insulin and glucagon on carbohydrate metabolism	
VI VITAMINS	2hrs
<ul style="list-style-type: none">• Deficiency manifestations of Vitamin A, C, D, E, K• Vit B Complex	
VII MINERALS	1hr
<ul style="list-style-type: none">• Factors maintaining serum calcium level and important functions of calcium• Importance of trace elements	
VIII HEMOGLOBIN	1hr
1 Hemoglobin metabolism	
IX LIVER FUNCTION TESTS	1hr
<ul style="list-style-type: none">• Jaundice and types of jaundice• Enzymes in liver disease	
X RENAL FUNCTION TESTS	1hr
<ul style="list-style-type: none">• Serum Creatinine	
XI SPECIALIZED LABORATORY INVESTIGATIONS	1hr
Principle and applications of	
<ul style="list-style-type: none">• Radioimmunoassay (RIA)• ELISA• Colorimetry	
XII LIPIDS	1hr
<ul style="list-style-type: none">• Essential fatty acids (EFA)• Poly unsaturated fatty acids (PUFA)• Phospholipids	
XIII METABOLISM	1hr
<ul style="list-style-type: none">• TCA cycle (steps only)	
XIV MAINTENANCE OF HOMEOSTASIS	1hr
<ul style="list-style-type: none">• Plasma buffers• Renal mechanisms in pH regulation• Anion gap• Metabolic acidosis,	
XV NUCLEIC ACIDS	1hr
<ul style="list-style-type: none">• DNA and RNA• Purine and pyrimidine bases,	
XVI CANCER	1hr

- Chemical and physical carcinogens
- Tumor markers.

Reference books:

The Text Book of Biochemistry

Dr. D.M.Vasudevan, Sreekumari.S

Text Book of Biochemistry

T.N.Pattabhiraman

Essentials of Biochemistry

U.Sathyarayanan

Paper II – Section B: PHARMACOLOGY

Course outcome:

1. CO1: Basic knowledge in pharmacology.
2. CO2: Detailed systemic pharmacology.
3. CO3: Detailed knowledge of drugs and groups of drugs.

Course

- General Pharmacology – 4 hours
- Evaluation of drugs in man, drug prescribing and drug interactions – 3 hours
- Sedatives, hypnotics and pharmacotherapy of insomnia – 1 hour
- Drugs effective in convulsive disorders – 1hour
- Opioid analgesics – 1 hour
- Analgesic – antipyretics and non-steroidal anti-inflammatory drugs – 1 hour
- Psychopharmacology – 1 hour
- Drug therapy of parkinsonism and other degenerative disorders of the brain – 1 hour
- Local anesthetics – 1 hour
- Adrenergic and adrenergic blocking drugs – 1 hour
- Histamine and anti histamic drugs – 1 hour
- Pharmacotherapy of cough – 1 hour
- Pharmacotherapy of bronchial asthma and rhinitis – 1 hour
- Digitalis and pharmacotherapy of cardiac failure – 1 hour
- Vasodilator drugs and pharmacotherapy of angina pectoris – 1 hour
- Pharmacotherapy of hypertension – 1 hour
- Drugs and blood coagulation – 1 hour
- Drugs effective in iron deficiency and other related anemias – 1 hour
- Diuretics – 1 hour
- Emetics, drug therapy of vomiting, vertigo and diarrhea – 1 hour
- Pharmacotherapy of constipation – 1 hour
- Pharmacotherapy of peptic ulcer – 1 hour
- Sulfonamides, Trimethoprim, cortimoxazole, nitrofurans and quinolones – 1 hour
- Penicillins and antibiotics effective mainly against gram positive organisms – 1 hour
- Amonoglycosides and other antibiotics effective mainly against gram negative organisms – 1 hour

- Antibiotics effective against both gram positive and gram negative organisms – 1 hour
- General principles of chemotherapy of infections – 1 hour
- Chemotherapy of urinary tract infections – 1 hour
- Antiseptics, disinfectants and insecticides – 1 hour
- Thyroid and antithyroid drugs – 1 hour
- Insulin and antidiabetic drugs – 1 hour
- Adrenal cortical steroids – 1 hour
- Vitamins and antioxidants – 1 hour
- Drugs, pregnancy and the newborn – 1 hour

Reference books:

Essentials of Medical Pharmacology

Tripathi

Basics and Clinical Pharmacology

Katzung

Paper III – AHS 13

Section A: MICROBIOLOGY

Course Outcome:

1. CO1: To understand the morphological characters of bacteria.
2. CO2: To master the preparation of smear, fixation and staining of bacterial smears and its quality control methods
3. CO3: Learn to use microscope, autoclave, hot air oven, water bath, steamer, filters
4. CO4: To differentiate between innate and adaptive immunity, and explain the main defence lines as well as biological barrier to the infections.
5. CO5: Employ antigen-antibody interaction to conduct different immunological and serological tests in the laboratory

Introduction to medical microbiology	- 1 hr
Morphology and physiology of bacteria	- 1 hr
Sterilization and disinfection	- 2 hrs
Normal Microbial flora of the human body	- 1 hr
Infection	- 2 hrs
Antibiotics	- 1 hr
Hospital infections and prevention	- 2 hrs
Immunity	- 1 hr
Antigen, Antibody, Antigen-antibody reactions	- 1 hr
Immune response	- 1 hr
Hypersensitivity	- 1 hr
Immunoprophylaxis	- 1 hr
Tuberculosis	- 1 hr
Typhoid	- 1 hr
Virus infections	- 1 hr
HIV/AIDS	- 1 hr

Hepatitis viruses	- 1 hr
Medical Mycology	- 1 hr
Medical Parasitology	- 1 hr
Malaria	- 1 hr
Urinary Tract Infections	- 1 hr
Respiratory Tract Infections	- 1 hr
Gastrointestinal Infections	- 1 hr
Sexually Transmitted Disease	- 1 hr
Infections of the nervous system	- 1 hr
Practical Demonstrations	
Gram Staining	- ½ hr
Acid Fast Staining	- ½ hr
Antibiotic Susceptibility Testing	- ½ hr
CSSD Visit	- ½ hr
Theory Class Hours	- 28 hrs
Practical Demonstration hours	- 2 hrs
Total hours	- 30 hrs

Reference books:

Text Book of Medical Paracytology

C.K.Jayaram Panicker

Text Book of Microbiology

Anand Narayan

Paper III – Section B: PATHOLOGY

Course Outcome:

1. CO1: Knowledge of general and systemic pathology.
2. CO2: Knowledge of pathology of neoplasms.
3. CO3: Knowledge of basics of community health.

1. Introduction to Pathology

3 hrs

- Histopathology- Methods and techniques
- Cytology-FNAC,Exfoliative advantages and limitations of cytology
- Hematology-Sample collection.
- Immunohistochemistry,Immunofluorescence, Electron microscopy, Flow cytometry

2. Cell injury & adaptations

1 hr

- Etiology
- Reversible & - Irreversible cell injury
- Necrosis & Apoptosis
- Gangrene - Dry - Wet
- Atrophy, Hypertrophy, Hyperplasia, Metaplasia, Dysplasia.

Fatty change

3. Inflammation & Repair **2hrs**

- What is inflammation
- Signs of inflammation, Acute and chronic inflammation, Types of inflammation, Giant cells, Macrophages, Ulcer, abscess, Acute inflammation, Systemic effects of acute inflammation
- Factors affecting healing- Complications of healing

4. Hemodynamic Disorders **2 hrs**

- Definition of edema and causes of edema
- Exudate and transudate
- Shock – Definition and types of shock
- Thrombosis
- Embolism- Definition and types of emboli , - Pulmonary thromboembolism

5. Neoplasia **2 hrs**

- Definition
- Difference between benign and malignant cells, Nomenclature of tumors
- Routes of metastasis of tumours,- Staging of tumour,- Etiology of cancers -
- Diagnosis of cancer, including tumour markers

6. CVS **1hr**

- Definition of Ischaemia, Infarction, Aneurysm
- Rheumatic heart disease, Infective endocarditis, Atherosclerosis
- Myocardial infarction,Hypertension and pericardial effusion

7. Respiratory system **1hr**

- Tuberculosis, Pleural effusion, Pneumonia, COPD and tumours

8. GIT **1hr**

- Peptic ulcer, - Carcinoma of oesophagus, Stomach & Colon,
- Inflammatory bowel disease (UC & Crohns)

9. Liver and GB **1h**

- Hepatitis. Cirrhosis, Tumours of liver
- Cholecystitis and GB calculi

10. Renal **1hr**

- Glomerulonephritis & Pyelonephritis
- Renal calculi -Nephrotic syndrome, Renal tumors, Polycystic renal diseases-

Internal assessment Exam -1 ½ hrs

11. MGS **1hr**

- Cryptorchidism,Orchitis, epididymitis, Prostatic hyperplasia
- Carcinoma penis, Testicular tumors

12. FGS & Breast **1hr**

- Ovarain tumours,- Fibroid- Carcinoma cervix- Carcinoma endometrium pap smear Fibroadenoma breast, Carcinoma Breast-Predisposing factors & TNM

13. CNS **1hr**

- Meningitis & encephalitis.- Alzheimer’s disease, Tumours - Meningioma, Gliomas, Metastasis
- CSF collection, indication and contraindication, tests performed, cytocentrifuge

14. Skin & soft tissue **1hr**

- Skin- SCC, Melanoma,BCC inflammatory lesions lipoma,

15. Bone **1hr**

- Osteoporosis, Osteomyelitis,Rickets ,Osteomalacia
- Tumours – Osteosarcoma, Osteoclastoma , Ewings sarcoma & Arthritis

16. Endocrine **1hr**

- Organs, Pituitary, Adrenal brief; Thyroid – Goitre thyroiditis and tumours
- Diabetes and its complications

17. Anaemias - Types of anaemia **1hr**

18. WBC disorders Non neoplastic and neoplastic **1hr**

19.Lymphoreticular system- Lymphadenitis, Lymphomas **1hr**

20. Platelet and coagulation abnormalities-Primary & Secondary Hemostasis **2hrs**

21 .Clinical Pathology I Blood collection, anticoagulants used,vacuettes and their color code.complete hemogram and the various parameters ,Bone marrow – Indication of BM study & collection procedure, PT ,APTT sample collection
1hr

22. Clinical Pathology II –Urine analysis –Physical,Chemical, microscopic, Dipstick parameters
1hr

23 Transfusion Medicine- Blood grouping, cross matching, Screening of donor, Precautions to take when you start blood transfusion,Monitoring during transfusion,Transfusion reactions, Blood components.
1Hr

Internal assessment Exam -1 ½ hrs

Lab visit: Histopathology lab-1hr

Hematology lab &blood bank:1 hr

Cytology lab:1hr

Total Hours: 29 hrs lecture+3hrs exam+3 hrs lab visit=35 hrs

Reference Books:

Basic Pathology: An introduction to the mechanisms of disease
Sunil R Lakhani, Susan A Dilly,Caroline J Filayson

Paper IV (AHS 14) – Section A: INTRODUCTION TO COMPUTER APPLICATION

Course outcome:

1. CO1: basic under-standing of use of computer.
2. CO2: Applications of computer in clinical departments.
3. CO3: Deatiled knowledge on how to use hospital information system.

Coure Description: This course is designed for students to develop basic under-standing of used of computer and its applications in Clinical Departments

Unit	Time (hours)		Learning Objective	Content	Teaching Learning activities	Assessment Methods
	Th.	Pr.				
1	10	5	Identify & define various concepts used in computer Identify application of computer	Introduction * Concepts of computers * Hardware and Software * Trends and Technology * Application of Computers	* Lecture cum discussion * Explain using charts * Panel discussion	* Short answer questins * Objective Type
II	5	10	Describe and use of Disk Operating System (DOS) Demonstrate skill in the use of MS Office	Introduction to Disk Operating System * DOS * Windows (all version) * MS Word * MS Excel with Pictorial Presentation * MS - Access * MS-Power Point	* Lecture * Discussion * Demonstration * Practice session	* Short answers * Objective Type * Practical Exam and Viva voice
III	10	5	Demonstrate skill in using multimedia Identify features of computer aided teaching and testing	* Multimedia : types & uses * Computer aided teaching & testing	* Lecture * Discussion * Demonstration	* Short answers * Objective Type * Practical Exam and Viva voice

IV	10	5	Describe and use of the statistical packages	* Statistical packages: Types and their features	* Lecture * Discussion * Demonstration * Practice Session	* Short answers * Objective Type * Practical Exam and Viva voice
V	5	5	Describe the use of Hospital Management System	* Hospital Management System : Types and uses * Electronic patient records	* Lecture * Discussion * Demonstration	* Short answers * Objective Type * Practical Exam and Viva voice

Paper IV – Section B: QUALITY ASSURANCE AND ACCREDITATION

Course outcome:

1. CO4: Introduction and basic concept of quality.
2. CO5: Standardization and Implementation

Course Objectives:

Modernization and its brand conscious make an organization thrive towards perfection in the comparative world of business. The underlying factor that allows an organization to stand the test of time is quality. The students are given the working knowledge of the subject.

Course Content:

Introduction to quality	- 2 hrs
Definition, Concept, Benefits	- 2 hrs
Function	- 2 hrs
Design	- 2 hrs
Formulation	- 2 hrs
Standardization	- 2 hrs
Implementation	- 2 hrs
Factors affecting quality	- 2 hrs
Need for quality	- 2 hrs
Quality cycle	- 2 hrs
Quality objectives	- 2 hrs
Quality policy	- 2 hrs
Quality measurable	- 2 hrs
Quality Control, Quality Standards, Q C Tools	- 6 hrs
Quality Documents, QC Records, Kazen techniques	- 2 hrs

Such as Market-in, TOC, Q C Circles,	- 2 hrs
Suggestion scheme, TPM, Kanban,	- 2 hrs
JIT, Zero defect programme	- 2 hrs
ISO	- 4 hrs
Quality management system Quality manual	- 4 hrs
Quality procedures	- 4 hrs
Quality records	- 4 hrs
Quality audit	- 4 hrs
Correlative and preventive action	- 2 hrs
SQC (Statistical Quality Control techniques)	- 2 hrs
Cost effectiveness	- 2 hrs
Cost of quality system	- 2 hrs
Benefit in total cost	- 4 hrs
Cost measuring system	- 4 hrs
TQM- Concept, awareness, aspects train	- 4 hrs
Total	- 80hrs

Detailed Course Plan

Unit- I

Introduction to quality –Definition, concept, Benefits-Functions-Design- Formulation-Standardization

Unit-II

Implementation –Factors affecting quality –Need for Quality Cycle –Quality objectives- Quality policy

Unit-III

Quality measurable –Quality Control Quality Standards. Q C Tools –NABH, NABL, JCI~Quality Documents, QC Records. Kazen Technique such as Market-in, TQC .Q C Circles –Suggestion scheme. TPM, Kanban –JIT, Zero defect programmes

Unit-IV

ISO- Quality management system- Quality manual-Quality procedure- Quality records- Quality audit

Unit- V

Corrective and preventive action –SQC (Statistical Quality Control technique)
Cost effectiveness- Cost of quality system- Benefit in total cost –Cost Measuring system- TOM- concept, awareness, aspects training

Reference Text:

1. Dale H Bester field. Carol Bester field, Glen H Bester field, Mary Bester field –Scare, Total Quality Management .Wesley Logman (Singapore)Pte.Ltd. Indian Branch, 482F.I.E, Patparganj, Delhi 110092, India
2. K.Shridhara bhat, Total Quality management .Himalaya Publishing Hollse. "Ramdoot" Dr Bhalerao Mag. Girgaon, Mumbai-400004

Paper V (AHS 15): ENGLISH

Course Description : The course is designed to enable students to enhance ability to comprehend spoken and written English (and use English) required for effective communication in their professional work. Students will practice their skills in verbal and written.

Course Outcome

1. CO1: Develop their intellectual, personal and professional abilities.
2. CO2: Acquire basic language skills (listening, speaking, reading and writing) in order to communication with speakers of English language
3. CO3: Acquire the linguistic competence necessarily required in various life situations

Unit	Time (Hours)	Learning Objective	Content	Teaching Learning activities	Assessment Methods
1.	10	Speak and write grammatically correct English	<ul style="list-style-type: none"> * Review of grammar * Remedial study of grammar * Building vocabulary * Phonetics * Public speaking 	<ul style="list-style-type: none"> * Demonstrate use of dictionary * Class Room conversation * Exercise on use of grammar * Practice in public speaking 	<ul style="list-style-type: none"> * Objective type * Fill in the blanks * Para Phrasing
II	10	Develop ability to read, understand and express meaning fully, the prescribed text	<ul style="list-style-type: none"> * Read and comprehend prescribed course books 	Exercise on : <ul style="list-style-type: none"> * Reading * Summarizing * Comprehension 	<ul style="list-style-type: none"> * Short answers * Essay Type
III	8	Develop writing skills	<ul style="list-style-type: none"> * Various forms of Composition * Letter writing * Note taking * Precise writing * Anecdotal records * Diary writing * Reports on health Problems etc. * Resume / CV 	Exercise on writing : <ul style="list-style-type: none"> * Letter * Note * Precise * Diary * Anecdote * Health problems * Story writing * Resume / CV * Essay Writing * Discussion on written reports / documents 	<ul style="list-style-type: none"> * Assessment of the skills based on the check list

IV	6	Develop skill in spoken English	Spoken English * Oral report * Discussion * Debate * Telephone conversation	Exercise on : * Debating * Participating in Seminar, panel, Symposium * Telephonic Conversation	* Assessment of the skills based on the check list
V	2	Develop skill in listening comprehension	Listening Comprehension * Media, audio, video, Speeches etc.	Exercise on : * Listening to audio, video, tapes and identify the key points	* Assessment of the skills based on the check list
VI	4	Develop skill in Grammar	Grammar * Transformation of Sentences * Correction of sentence * Vocabulary Building * Composition * Essay writing - on topics of every day life	Exercise on : * Voice * The Sentence * Parts of Speech * Direct and Indirect Speech * Affirmative and Negative * Change the Question Tag * Correction of Syllabus * Idioms * Letter writing – Personal, Official matters connection with daily life	* Assessment of the skills based on the check list

SECOND YEAR

During the second year the students will be posted in the clinical area from 8 am to 5 pm including one hour didactic lecture from 3 PM to 4 PM.

Internal Assessment

Three sessional examinations will be conducted in this year. Average marks of these sessional examinations will be counted as internal marks along with performance in the clinical posting.

Paper VI:
BCPT 21
APPLIED BASIC SCIENCES

Course Outcome:

1. CO1: Detailed knowledge in Applied Anatomy.
2. CO2: Detailed knowledge in Applied Physiology.
3. CO3: Detailed knowledge in Applied Microbiology.
4. CO4: Detailed knowledge in Applied Pharmacology.
5. CO5: Detailed knowledge in pathology and pathophysiology

Applied Anatomy

Anatomy of Heart:

- 1 Surface anatomy,
- 2 Gross anatomy, cardiac chambers, septa, valves,
- 3 Pericardium

Arteries, Veins, Lymphatics

- Aorta and branches
- Venous drainage
- Pulmonary vessels and circulation
- Coronary circulation and coronary venous drainage

Conduction System of Heart

Applied Physiology

- Normal Cardiac Cycle
- Pulse
- Heart rate
- Blood pressure
- Cardiac output
- Heart Sounds, Murmurs

- Measurement of Blood Pressure: Technique : Sphygmomanometer
- ECG and Cardiac Cycle
- Chambers: Pressures, Wave Forms
- Arterial, Venous Pressures and Wave Forms
- Oxygen Saturations: Physiology of Oxygen Transport
- Blood Gases – Technique and Various parameters
- Flow, pressure and resistance
- Cardiac Cycle, Circulation, Tissue Perfusion – Unified Concept
- Basic Knowledge of Arrhythmias

Applied Microbiology

- Microorganisms Classification
- Common microorganisms with respect to cardiovascular infection
- Patho physiology of infection.
- Sepsis
- Fundamentals of infection control
- Infection Control Auditing
- Fumigation and antiseptics
- Sterilization in clinical practice
- Central sterilization unit
- Sterilization procedures
- Disposal of biological and non biological waste from the lab

Applied Pharmacology

- Modes / routes of Drug Administration (Rationale)
- Intra Venous Fluids: Crystalloids, Colloids
- Common Cardiac Drugs – PART-I: Digoxin, Diuretics, Vasodilators, Nitrates
- Common Cardiac Drugs – PART-II: Beta Blockers, Calcium Blockers, ACE inhibitor
- Common Cardiac Drugs – PART-III: Antiarrhythmic drugs, Positive inotropic drugs
- Drugs for Cardiac Resuscitation
- Drugs for all Cardiac and Medical Emergencies
- Contrast Media
- Heparin, Protamine
- Anaphylaxis, Drug reactions, Drug interaction (Basics)
- Antibiotic Prescription Audit

Paper VII
BCPT22
BASICS OF CARDIOPULMONARY BYPASS

Course outcome:

1. CO1: Basic knowledge in CPB.
2. CO2: Basic knowledge in diagnostic measures blood pumps and blood gas management.
3. CO3: Basics of circuits in CPB.
4. CO4: Checklist for CPB.

Course content:

Historical development of Cardiopulmonary Bypass

- Hypothermia
- Controlled cross circulation
- Development of Oxygenators
- Hemodilution

Oxygen saturation and Oxygen transport

Diagnostic measures

Patient Selection

Blood pumps

Blood gas management

Circuits for CPB

Cannula and Cannulation for CPB

Preparation for CPB

Alternatives for Cardiopulmonary Bypass

Checklist for CPB

Complications of Cardiopulmonary Bypass

THIRD YEAR

During the second year the students will be posted in the clinical area from 9 AM to 3 PM and one hour didactic lecture from 3 PM to 4 PM.

Internal Assessment

Three sessional examinations will be conducted in this year. Average marks of these sessional examinations will be counted as internal marks along with performance in the clinical posting.

Paper VIII: CARDIC PERFUSION TECHNOLOGY – CLINICAL BCPT31

Course outcome:

1. CO1: Basic knowledge in drUGs for CPB.
2. CO2: Expertise in Cannulation techniques.
3. CO3: Basics of Oxygenation

Course content:

- Pharmacokinetics and Pharmacodynamics of Cardiopulmonary bypass
- Drugs (including anesthetic drugs) used in cardiopulmonary bypass
- Conduct and monitoring of Cardiopulmonary bypass
- Adequacy of perfusion – General considerations, specific aspects of perfusion, monitoring, other concomitants which may affect its adequacy
- Pulsatile perfusion – Introduction, theory & physiology of pulsatile flow, hemodynamic, metabolic effects, Clinical use, hematological effects
- Cannulation techniques during cardiopulmonary bypass
- Identification of Myocardial Ischemic Attack
- Termination of cardiopulmonary bypass – principles and methodology
- Myocardial protection and cardioplegia- pretreatment of the Myocardium, cardioplegia, hypothermia, controlled reperfusion, myocardial protection for specific clinical problems, Complications of cardioplegia. Non cardioplegic methods during cardiac surgery on cardiopulmonary bypass
- Oxygenation – general consideration, bubble & membrane (including assessment and comparison of oxygenator function)
- Complications of Oxygen Toxicity
- Heat exchangers-principles function of heat exchangers & their assessment. Complications related to heat exchange and their management
- Priming fluids and hemodilution
- Identification of Fluid overload

Paper IX: CARDIAC PERFUSION TECHNOLOGY – APPLIED BCPT32

Course outcome:

1. CO1: Basics of Blood cell trauma.
2. CO2: Detailed knowledge in Inflammatory response to cardiopulmonary bypass.
3. CO3: Knowledge in Blood conservation hemofiltration.
4. CO4: Knowledge in Micro pore filtration.

Course Content:

- Blood cell trauma – analysis of forces of fluid motion, effects of physical forces of blood cell, clinical effect. Complications of blood transfusion.
- Blood matching and Incompatibilities

- Anticoagulation on bypass, its monitoring, its reversal and complications. Heparinless bypass. Platelet aggregation and platelet dysfunction. Coagulopathies due to cardiopulmonary bypass and its management.
- Control of local Bleeding
- Inflammatory response to cardiopulmonary bypass & its clinical effects. Methods to minimise the same. Immune response, neuroendocrine, renal, metabolic splanchnic response, pulmonary response and electrolyte response to cardiopulmonary bypass
- Blood conservation hemofiltration & dialysis during cardiopulmonary bypass including modified ultra filtration reverse autologous priming and other methods
- Micro emboli- gaseous and particulate, filters used in cardiopulmonary bypass circuit.
- Knowledge of Various Emboli such as air and thrombi
- Knowledge of Different types of emboli – Gas , Thrombus , etc
- Micro pore filtration during cardiopulmonary bypass

Counter pulsation techniques and assist devices

Paper X: CARDIAC PERFUSION TECHNOLOGY – ADVANCED BCPT33

Course Outcome:

1. CO1: Basic knowledge in Perfusion techniques for Paediatric cardiac surgery.
2. CO2: Basic knowledge in ECMO.
3. CO3: Detailed knowledge in Complications and safety during CPB.
4. CO4: Basic knowledge in Minimally invasive surgery.
5. CO5: Detailed knowledge in Recent advances in perfusion techniques

Course Content:

- Perfusion techniques for Paediatric cardiac surgery
- ECMO- special perfusion techniques for special cardiac surgeries and medical conditions (including thoracic aortic surgeries deep hypothermia and circulatory arrest). Perfusion for non cardiac surgery, invasive cardiology and outside the operation suite.
- Contraindications to ECMO
- Perfusion as a method of cardiopulmonary bypass
- Complications and safety during cardiopulmonary bypass – bypass safety, organizational aspects, accidents, coagulopathies, mechanical and electrical fail-

ures, perfusion management, perfusion systems, safety for the perfusionist and surgical team management of perfusion accidents.

- Minimally invasive surgery and the perfusionist
- Recent advances in perfusion techniques
- Experimental perfusion
- Integration with Cardiovascular Surgery

SCHEME OF EXAMINATION

B.Sc Cardiac Perfusion Technology Degree Examination Distribution of Marks for each subject

Pa- per Code	Subject Name	Theory				Pa- per Total	Aggre- gate	
		Universi- ty	Inter- nal	Ora l	Sub- ject- Total			
FIRST YEAR								
I	Section A - Anatomy	50	10	15	75	150	1500	
	Section B - Physiology	50	10	15	75			
II	Section A - Biochemistry	50	10	15	75	150		
	Section B - Pharmacology	50	10	15	75			
III	Section A - Microbiology	50	10	15	75	150		
	Section B - Pathology	50	10	15	75			
IV	Section A – Introduction to Computer Application	50	-	-	50	100		
	Section B - Quality Assurance and Accreditation	50	-	-	50			
V	English	50	-	-	50	50		
SECOND YEAR								
VI	Cardiac Anatomy & Cardiac Physiology	100	20	30	150	150		
VII	Cardiovascular Technology - Clinical	100	20	30	150	150		
THIRD YEAR								
VIII	Cardiac Perfusion Technology - Clinical	100	20	30	150	150		
IX	Cardiac Perfusion Technology - Applied	100	20	30	150	150		
X	Cardiac Perfusion Technology - Advanced	100	20	30	150	150		
XI	Practical +Viva (100+50)	-	-	-	-	150		

PATTERN OF QUESTION PAPERS

1. Paper I to Paper IV

The duration of each theory paper will be three hours; the paper will have two sections (Section A & Section B) each carrying 50 marks and a total of 100 marks.

Pattern of Question Paper

Essay Questions* (2 out of 2)	- 20 marks (2 x 10 marks)
Short Notes (3 out of 4)	- 15 marks (3 x 5 marks)
Short answer question (5 out of 7)	- 15 marks (5 x 3 marks)

Total Marks	- 50 marks

2. Paper V

The duration of Paper V will be two hours; the paper will have only one section for a total of 50 marks.

Pattern of Question Paper

Essay Questions* (2 out of 2)	- 20 marks (2 x 10 marks)
Short Note (5 out of 7)	- 30 marks (5 x 6 marks)

Total Marks	- 50 marks

3. Paper VI to Paper X

The duration of each theory paper will be three hours; the paper will have only one section of 100 marks.

Pattern of Question Paper

Essay Questions* (4 out of 4)	- 40 marks (4 x 10 marks)
Short Notes (6 out of 8)	- 30 marks (6 x 5 marks)
Short answer question (10 out of 12)	- 30 marks (10 x 3 marks)

Total Marks	- 100 marks

* Marks distribution should be subdivided and specified

IMPORTANT TELEPHONE NUMBERS

Amrita Institute of Medical Sciences : 0484-2801234/2851234
Principal's Office : 0484-2858131/4008131
Chief Programme Administrator : +91 9400998019, Oncall: 1919
Programme Co-ordinator : +91 9400998118, Oncall: 6976
