

# **REGULATIONS & CURRICULUM OF GRADUATE PARAMEDICAL COURSE**

## **BACHELOR OF SCIENCE IN CARDIAC CARE TECHNOLOGY**

**2020**



### **Sri Siddhartha Academy of Higher Education Deemed-to-be-University**

**Established under Section 3 of the UGC Act, 1956  
MHRD, GOI No. F.9-31/2006-U.3 (A) Dtd. 30th May 2008**

**Agalakote, B.H. Road, Tumkur – 572107, Karnataka, India**

# SRI SIDDHARTHA ACADEMY OF HIGHER EDUCATION

(DEEMED TO BE UNIVERSITY)

Declared under Section 3 of the UGC Act, 1956, MHRD GOI No. F.9-31/2006-U.3 (A) Dated: 30/05/2008

Accredited 'A' Grade by NAAC

Agalakote, B.H.Road, Tumkur – 572 107. KARNATAKA, INDIA.

Ph. 0816- 2275516, Fax : 0816-2275510 website: sahetumkur.ac.in email: info@sahe.in



No. SSAHE/ACA-S&C(AHSP)/13/2022

Date: 01/09/2022

## NOTIFICATION

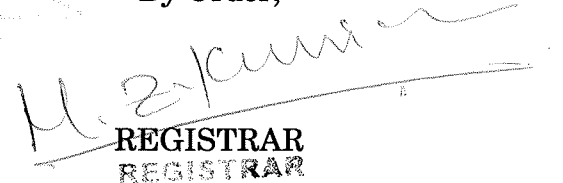
Sub: Ordinance pertaining to Regulations and Curriculum of Bachelor of Science in Cardiac Care Technology.

- Ref: 1). Proceedings of BOS Allied Health Sciences Programmes held on 06/04/2021  
2). Proceedings of the Academic Council meeting held on 19/08/2021  
3). Proceedings of the Board of Management held on 29/08/2022

In exercise of the powers vested under section 6 of 6.4 of MoA / Rules of SSAHE, the Ordinance pertaining to Regulations and Curriculum of Bachelor of Science in Cardiac Care Technology is notified herewith as per Annexure.

The above Regulations shall be applicable to the students admitted to the said course from the academic year 2020-21 onwards.

By Order,

  
REGISTRAR  
REGISTRAR

Sri Siddhartha Academy of Higher Education  
TUMKUR - 572 107, Karnataka.

To,  
Dean / Principal, Sri Siddhartha Medical College & Hospital,

Copy to

- 1) Office of the Chancellor, SSAHE, for kind information,
- 2) PA to Vice-Chancellor / PA to Registrar / Controller of Examinations / Finance Officer, SSAHE
- 3) The Director (AHSP), SSAHE
- 4) All Officers of the Academy Examination Branch / Academic Section
- 5) Guard File / Office copy.

**REGULATIONS & CURRICULUM FOR BACHELOR OF  
B.Sc. CARDIAC CARE TECHNOLOGY -2020**

**1. Eligibility for admission:**

A candidate seeking admission to the BSc. Cardiac Care Technology shall have studied English as one of the principal subject during the tenure of the course and shall have passed:

1. Two year Pre-University examination or equivalent as recognized by Sri Siddhartha Academy of Higher Education with, Physics, Chemistry and Biology as subjects of study.

OR

2. Pre-Degree course from a recognized University considered as equivalent by SSAHE, (Two years after ten years of schooling) with Physics, Chemistry and Biology as subjects of study.

OR

3. Any equivalent examination recognized by the Sri Siddhartha Academy of Higher Education Bangalore for the above purpose with Physics, Chemistry and Biology as subjects of study.

OR

4. The vocational higher secondary education course conducted by Vocational Higher Secondary Education, Government of Kerala with five subjects including Physics, Chemistry, Biology and English in addition to vocational subjects conducted is considered equivalent to plus TWO examinations of Government of Karnataka Pre University Course.

OR

5. Candidates with two years diploma from a recognized Government Board in Cardiac Care Technology shall have passed class 12 [10+2] with Physics, Chemistry and Biology, as subjects or candidates with 3 years diploma from a recognized Government Board in Cardiac Care Technology should have studied Physics, Biology and Chemistry as subjects during the tenure of the course.

6. Lateral entry to second year of B.Sc.Cardiac CareTechnology for candidates who have passed diploma program from the Government Boards and recognized by SSAHE, fulfilling the conditions specified above under Sl. No. 5 and these students are eligible to take admission on lateral entry system only in the same subject studied at diploma level for the academic year.

**Note:**

- a. The candidate shall have passed individually in each of the subjects.
- b. Candidates who have completed diploma or vocational course through Correspondence shall not be eligible for any of the courses mentioned above.

**2. Duration of the course:**

Duration shall be for a period of four years including one year of Internship.

**3. Medium of instruction:**

The medium of instruction and examination shall be in English.

**4. Scheme of examination:**

There shall be three examinations one each at the end of 1 st, 2nd and 3rd year.

**5. Attendance**

Every candidate should have attended at least 80% of the total number of classes conducted in an academic year from the date of commencement of the term to the last working day as notified by university in each of the subjects prescribed for that year separately in theory and practical. Only such candidates are eligible to appear for the university examinations in their first attempt. Special classes conducted for any purpose shall not be considered for the calculation of percentage of attendance for eligibility. A candidate lacking in prescribed percentage of attendance in any subjects either in theory or practical in the first appearance will not be eligible to appear for the University Examination in that subject

## **6. Internal Assessment (IA):**

### 1st Year B.Sc Cardiac Care Technology

Theory - 20 marks

Practical's - 10 marks\*. [Lab work- 06 marks and Record-04marks] 2nd

### & 3rd year B.Sc Cardiac Care Technology

Theory – 20 Marks

Practicals – 20Marks

There shall be a minimum of two periodical tests preferably one in each term in theory and practical of each subject in an academic year. The average marks of the two tests will be calculated and reduced to 20. The marks of IA shall be communicated to the University at least 15 days before the commencement of the University examination. The University shall have access to the records of such periodical tests. The marks of the internal assessment must be displayed on the notice board of the respective colleges with in a fortnight from the date test is held. If a candidate is absent for any one of the tests due to genuine and satisfactory reasons, such a candidate may be given a re-test within a fortnight.

\* There shall be no University Practical Examination in First year.

## **7. Subject and hours of teaching for Theory and practical's**

The number of hours of teaching theory and practical, subject wise in first year, second year and third year are shown in Table-I, Table-II and Table-III

Main and Subsidiary subjects are common in first year for all the courses in Allied Health Science.

The number of hours for teaching theory and practical for main subjects in first, Second and Third year are shown in Table-I, II and III

**Table - I Distribution of Teaching Hours in First Year Subjects Main**

**subjects**

Sl. No.	Subject	Theory No. of Hours	Practical No. of Hours	Total No. of Hours
1.	Human Anatomy	70	20	90
2.	Physiology	70	20	90
3.	Biochemistry	70	20	90
4.	Pathology-[Clinical pathology, Hematology & Blood -Banking	70	20	90
5.	Microbiology	70	20	90
	Total	350	100	450

The classes in main and subsidiary subjects are to be held from Monday to Thursday. On Fridays and Saturdays students shall work in hospitals in the respective specialty or department chosen by them

### **Subsidiary Subjects**

English 25 Hours

Kannada 25 Hours

Health-Care 40 Hours

Clinical/Lab posting –470 hours (Friday 9am – 1pm and 2pm - 4-30 pm

Saturday 9am - 1pm)

**Table - II Distribution of Teaching Hours in Second Year Subjects Main**

**Subjects**

Sl. No.	Subject	Theory	Practical No. of Hours	Clinical posting	Total No. of Hours
		No of Hours			
1.	Medicine relevant cardiac care to technology	50	--	--	50
2.	Section A Applied Pathology	30	30	--	120
	Section B Applied Microbiology	30	30	--	
3.	Applied Pharmacology	50	--	--	50
4.	Introduction to Cardiac care Technology	80	100	650	830
	Total	240	160	650	

**Subsidiary Subjects:**

Subsidiary Subjects:

Sociology 20 Hours  
Constitution of India 10 Hours  
Environmental Science & Health 10 Hours

**Table - III Distribution of Teaching Hours in Third Year Subjects Main**

**Subjects**

Sl. No.	Subject	Theory	Practical No. of Hours	Clinical posting	Total No. of Hours
		No of Hours			
1.	Cardiac care Technology – Clinical	50	50	250	350
2.	Cardiac care Technology - Applied	50	50	250	350
3.	Cardiac care Technology – Advanced	50	50	250	350
	Total	150			

**Subsidiary Subjects:**

Ethics, Database Management                      50 Hours

Research & Biostatistics                              20 Hours

Computer application                                  10 Hours

**8. Schedule of Examination:**

The university shall conduct two examinations annually at an interval of not less than 4 to 6 months as notified by the university from time to time. A candidate who satisfies the requirement of attendance, progress and conduct as stipulated by the university shall be eligible to appear for the university examination. Certificate to that effect shall be produced from the Head of the institution along with the application for examination and the prescribed fee.

**9. Scheme of Examination**

There shall be three examinations, one each at the end of I, II and III year. The examination for both main and subsidiary subjects for all courses in Allied Health Sciences shall be common in the first year.



Distribution of Subjects and marks for First Year, Second year & Third year University theory and practical Examinations are shown in the Table – IV, V & VI.

**First year examination:**

The University examination for 1st year shall consist of only theory examination and there shall be no University Practical Examination.

**Second & Third year examination:**

The University examination for 2nd and 3rd year shall consist of Written Paper & Practical. Written Examinations consists of 4 papers in the 2nd Year 3 papers in the 3rd Year:

**Practical examination:**

Three practical examinations, at the end 2nd Year and three practical examinations at the end of the 3rd year. One practical exam at the end of internship (4<sup>th</sup> year)

**TABLE-IV**

**Distribution of Subjects and marks for First Year University theory Examination**

A	Main Subjects*	Written Paper		I A Theory	Total
		Duration	Marks	Marks	Marks
1	Basic Anatomy (Including Histology)	3 Hours	80	20	100
2	Physiology	3 Hours	80	20	100
3	Biochemistry	3 Hours	80	20	100
4	Pathology	3 Hours	80	20	100
5	Microbiology	3 Hours	80	20	100
	Subsidiary Subject**				
1	English	3 Hours	80	20	100
2	Kannada	3 Hours	80	20	100
3	Health Care	3 Hours	80	20	100

Note: I A = Internal Assessment

\*Main Subjects shall have University Examination.

There shall be no University Practical Examination.

\*\* Subsidiary subjects: Examination for subsidiary subjects shall be conducted by respective colleges.

**TABLE - V****Distribution of Subjects and marks for Second Year Examination.**

Theory					Practical			
Paper	Subjects	Theory	I.A	Sub Total	Practicals	I.A	Sub total	Grand Total
i	Section A - Applied Pathology Section B - Applied Microbiology	40 40	20	100	40	10	50	150
ii	Introduction to Cardiac care Technology	80	20	100	40	10	50	150
iii	Applied Pharmacology	80	20	100		No Practical		100
iv	Medicine relevant to technology	80	20	100		No Practical		100

**Distribution of Subsidiary Subjects and marks for Second Year Examination**

B	Subsidiary Subject**	Duration	Marks	I .A Theory Marks	Total Marks
1.	Sociology	3 hours	80	20	100
2.	Constitution of India	3 hours	80	20	100
3.	Environmental Science & Health	3 hours	80	20	100

\*\* Subsidiary subjects: Examination for subsidiary Subjects shall be conducted by respective colleges

**TABLE - VI****Distribution of Subjects and marks for Third Year Examination.**

SL NO	THEORY				PRACTICAL			
PAPER	SUBJECTS	THEORY	I.A	SUBTOTAL	PRACTICAL	I.A	SUBTOTAL	GRAND TOTAL
1	Cardiac care technology clinical	80	20	100	120 (40+40+40)	30	150	450
2	Cardiac care technology applied	80	20	100				
3	Cardiac care technology advanced	80	20	100				

\*\* Practical-One common practical for all the three papers with equal weightage of marks i.e. 40 practical mark and 10 I.A. marks for each paper.

**Distribution of Subsidiary Subjects and marks for Third Year Examination**

B	Subsidiary Subject**	Duration	Marks	I.A Theory Marks	Total Marks
1.	Ethics, Database Management	3 hours	80	20	100
2.	Research & Biostatistics	3 hours	80	20	100
3.	Computer application				

Subsidiary subjects : Examination for subsidiary subjects shall be conducted by respective college

## **10. PASS CRITERIA**

### **10.1. First year examination**

a. Main Subjects: A candidate is declared to have passed in a subject, if he/she secures 50% of marks in University Theory exam and internal assessment added together.

b. Subsidiary Subjects: The minimum prescribed marks for a pass in subsidiary subject shall be 35% of the maximum marks prescribed for a subject. The marks obtained in the subsidiary subjects shall be communicated to the University before the Commencement of the University examination.

### **10.2. Second and Third year Examination**

a. Main Subjects: A candidate is declared to have passed the examination in a subject if he/she secures 50% of the marks in Theory and 50% in practical separately. For a pass in theory, a candidate has to secure a minimum of 40% marks in the University conducted written examination, and 50% in aggregate in the University conducted written examination and internal assessment added together and for pass in Practical, a candidate has to secure a minimum of 40% marks in the university conducted Practical/Clinical examination and 50% in aggregate i.e. University conducted Practical/Clinical and Internal Assessment.

b. Subsidiary Subjects: The minimum prescribed marks for a pass in subsidiary subject shall be 35% of the maximum marks prescribed for a subject. The marks obtained in the subsidiary subjects shall be communicated to the University before the commencement of the University examination.

## **11. Carry over benefit**

### **11.1 First year examination:**

A candidate who fails in any two of the five main subjects of first year shall be permitted to carry over those subjects to second year. However, he/ she must pass the carry over subjects before appearing for second year examination.

### **11.2. Second year examination:**

A candidate is permitted to carry over any one main subject to the third year but shall pass this subject before appearing for the third year examination.

## **12. Declaration of Class:**

**a.** A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 75% of marks or more of grand total marks prescribed will be declared to have passed the examination with Distinction.

**b.** A candidate having appeared in all subjects in the same examination and passed that examination in the first attempt and secures 60% of marks or more but less than 75% of grand total marks prescribed will be declared to have passed the examination in First Class.

**c.** A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 50% of marks or more but less than 60% of grand total marks prescribed will be declared to have passed the examination in Second Class.

**d.** A candidate passing the university examination in more than one attempt shall be placed in Pass class irrespective of the percentage of marks secured by him/her in the examination.

**e.** The marks obtained by a candidate in the subsidiary subjects shall not be considered for award of Class or Rank.

[Please note, fraction of marks should not be rounded off clauses (a), (b) and (c)]

### **13. Eligibility for the award of Degree:**

A candidate shall have passed in all the subjects of first, second and third year to be eligible for a compulsory one year of rotational internship. On completion of one year of the internship the candidate is then eligible for the award of degree.

### **INTERNSHIP**

One year compulsory rotational postings during which students have to work under the supervision of experienced staff

#### 14. Eligibility for the award of Degree:

A candidate shall have passed in all the subjects of first, second and third year to be eligible for a compulsory 12 months of rotational internship. On completion of 12 months of the internship with pass criteria in outgoing clinical assessment exams the candidate is then eligible for the award of degree

#### 15. Distribution of Type of Questions and Marks

SUBJECTS HAVING MAXIMUM MARKS= 80 (for <b>First year</b> )		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	1	10
Short Essay	5	5
Short Notes Type	5	3
Short Answer Type	10	2
MCQ's	10	1

- |   |                  |
|---|------------------|
| 1. Long essay- 1 Questions (answer any one)         | 1x10= 10 marks   |
| 2. Short essay- 7 Questions (answer any five)       | 05x5= 25 marks   |
| 3. Short Notes Type – 8 Questions (answer any five) | 05x3= 15 marks   |
| 4. Short answer- 12 Questions (answer any ten)      | 10x2= 20 marks   |
| 5. MCQ's – 10 Questions                             | 10x1= 10 marks   |
|   | <b>Total= 80</b> |

SUBJECTS HAVING MAXIMUM MARKS= 80 (for <b>Second and Third Year</b> )		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	1	10
Short Essay	5	5
Short Notes Type	5	3
Short Answer Type	10	2
MCQ's	10	1

- |   |                  |
|---|------------------|
| 1. Long essay- 1 Questions (answer any one)         | 1x10= 10 marks   |
| 2. Short essay- 7 Questions (answer any five)       | 05x5= 25 marks   |
| 3. Short Notes Type – 8 Questions (answer any five) | 05x3= 15 marks   |
| 4. Short answer- 12 Questions (answer any ten)      | 10x2= 20 marks   |
| 5. MCQ's – 10 Questions                             | 10x1= 10 marks   |
|   | <b>Total= 80</b> |

SUBJECTS HAVING MAXIMUM MARKS= 80 (for <b>Subsidiary subjects</b> )		
Type of Questions	No. of Questions	Marks for Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	8 (6 x 5)	05
Short Answer Type	12 (10 x 3)	03

# SRI SIDDHARTHA ACADEMY OF HIGHER EDUCATION

*("Deemed to be University u/s 3 of the UGC Act, 1956")*

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## STUDENT LEARNING OUTCOMES ALLIED HEALTH SCIENCES PROGRAMMES

- Employ critical thinking and innovation to analyze challenges, concepts, research, and clinical outcomes and apply them to professional practice.
- Analyze, interpret, integrate and evaluate information with the ability to communicate findings in a written or oral format.
- Demonstrate a broad-based and integrative understanding of basic biological, physical, chemical, and/or psychological concepts that prepare them for careers in health science.
- Approach patient care from a cultural humility perspective that respects varied backgrounds including but not limited to: cultural, social, religious, racial, gender, and ethnic diversity of the patient and family regarding disease and their health.
- Integrate concepts from various scientific fields to meet the requirements for entry-level healthcare administrative positions or admission to professional programs in allied health fields (e.g. athletic training, physical therapy, occupational therapy, physician assistant, chiropractic, etc)

## INTENDED LEARNING OUTCOMES- COMMON FOR ALL SPECIALITY

COURSE TITLE	OUTCOMES	ASSESSMENT METHODS V-Verbal W-Written P-Practical
Anatomy	<ol style="list-style-type: none"> <li>1. Define basic technical terminology and language associated with anatomy</li> <li>2. Identify the structures of human body</li> <li>3. Describe the anatomy of human body</li> <li>4. Describe the structure and features of the organ systems of the human body</li> <li>5. Identify the anatomical structure in the dissected specimen</li> </ol>	W,P,V Internal [20]+ university [80] Total marks=100
Physiology	<ol style="list-style-type: none"> <li>1. Describe the functional anatomy and histology of various organ systems</li> <li>2. Describe the basic physiological principles involved in the normal functioning of the human body</li> <li>3. Apply the physiological principles in comprehending the pathophysiology of disease and its management</li> </ol>	W,P,V Internal [20]+ university [80] Total marks=100
Biochemistry	<ol style="list-style-type: none"> <li>1. Describe chemistry &amp; metabolism of macromolecules, vitamins and minerals</li> <li>2. Correlate biochemical mechanisms to diseases</li> <li>3. Discuss the importance of biochemical parameters in clinical decision making</li> </ol>	W,P,V Internal [20]+ university [80] Total marks=100 Practical
Microbiology	<ol style="list-style-type: none"> <li>1. Classify microorganisms, discuss the morphological and growth characteristics and its association with causation of disease</li> <li>2. Demonstrate and interpret basic laboratory techniques used in the detection of micro organisms</li> <li>3. Explain principles of antimicrobial therapy and Immunization</li> <li>4. Demonstrate basic infection control practices</li> </ol>	W,P,V Internal [20]+ university [80] Total marks=100
Pathology	<ol style="list-style-type: none"> <li>1. Identify and Describe the causative agent in various disease</li> <li>2. Comprehend the major signs and symptoms of the various diseases</li> <li>3. Describe the pathophysiology of various disease related to anesthetic care Apply pathophysiology</li> <li>4. knowledge in anesthetic care</li> <li>5. To Analyze the patient pre-operative fit for undergoing procedure</li> </ol>	W,P,V Internal [20]+ university [80] Total marks=100



## LEARNING OUTCOMES –CARDIAC CARE TECHNOLOGY

COURSE TITLE		OUTCOMES	ASSESSMENT METHODS V-Verbal,W- Written,P-Practical
Medicine relevant cardiac care to technology		1. Identify cardiac structures seen in each 2D ultrasound view 2. Describe the hemodynamics of blood flow seen in each cardiac view	Internal [20] University [80] Total marks=100
Applied Science	Elective :I A Applied Pathology Elective :II Applied Microbiology	1. Classify microorganisms, discuss the morphological and growth characteristics and its association with causation of disease	Internal [20] University [80] Total marks=100 P=40+ IA 10=50 Total W+P=150
Applied Pharmacology		1. Describe the classification and dosage of drugs used in cardiac care 2. Describe the pharmacokinetics and pharmacodynamics of commonly used cardiac drugs	Internal [20] University [80] Total marks=100
Introduction to Cardiac care Technology		1. Describe the aetio pathology of heart diseases 2. Discuss the signs and symptoms of heart diseases	Internal [20] University [80] Total marks=100 P=40+ IA 10 = Total W+P=150
Cardiac care Technology Clinical		1. Describe the various cardiac catheterization procedures and is familiar with his/her role during each of those procedures. 2. Discuss the various equipments used for a cardiac catheterization lab	Internal [20] University [80] Total marks=100 P=40+ IA 10=50 Total W+P=150
Cardiac care Technology Applied		1. Discuss about the physics and instrumentations of ECG 2. Discuss about the physics and instrumentation of ECHO	Internal [20] University [80] Total marks=100 P=40+ IA 10=50 Total W+P=150
Cardiac care Technology Advanced		1. Describe the newer procedures in 2D, M-MODE and Doppler measurements 2. Demonstrate how to obtain strain and strain rate imaging 3. Describe the principles of 3D ECHO	Internal [20] University [80] Total marks=100 P=40+ IA 10=50 Total W+P=150

# FIRST YEAR B.SC. CARDIAC CARE TECHNOLOGY

## ANATOMY

No. of theory classes: 70 hours

No. of practical classes: 20 hours

### **Chapter 1**

#### **Introduction:**

##### **Theory:**

- Definition of anatomy and its divisions
- Terms of location, positions and planes
- Epithelium-definition, classification, describe with examples, function
- Glands- classification, describe serous, mucous & mixed glands with examples
- Basic tissues – classification with examples

##### **Practical:**

- Histology of types of epithelium
- Histology of serous, mucous & mixed salivary gland

### **Chapter 2 Connective tissue:**

##### **Theory:**

- Cartilage – types with example & histology theory
- Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, intervertebral disc, fontanelles of fetal skull
- Joints – Classification of joints with examples, synovial joint (in detail for radiology)
- Muscular system: Classification of muscular tissue & histology
- Names of muscles of the body

##### **Practical:**

- Histology of the 3 types of cartilage
- Histology of compact bone (TS & LS)
- Histology of skeletal (TS & LS) & cardiac muscle
- Demo of all bones showing parts, radiographs of normal bones & joints
- Demonstration of important muscles of the body

### **3. Cardiovascular system:**

#### **Theory:**

- Heart-size, location, chambers, exterior & interior, pericardium
- Blood supply of heart
- Systemic & pulmonary circulation
  - Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery
- Inferior vena cava, portal vein, portosystemic anastomosis ,Great saphenous vein, Dural venous sinuses
- Lymphatic system- cisterna chyli & thoracic duct ,Histology of lymphatic tissues, Names of regional lymphatics, axillary and inguinal lymph nodes in brief

#### **Practical:**

- Demonstration of heart and vessels in the body
- Histology of large artery & vein, medium sized artery & vein
- Histology of lymph node, spleen, tonsil & thymus
- Radiology: Normal chest radiograph showing heart shadows

### **4. Gastro- intestinal system**

#### **Theory:**

- Parts of GIT: Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer's ring), Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas, spleen, peritoneum & reflections

#### **Practical:**

- Demonstration of parts of GIT
- Radiographs of abdomen

### **5. Respiratory system**

- Parts of RS: nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments, diaphragm
- Histology of trachea, lung and pleura
- Names of paranasal air sinuses

#### **Practical:**

- Demonstration of parts of respiratory system.
- Normal radiographs of chest, X-ray paranasal sinuses
- Histology of lung and trachea

## **6. Urinary system**

### **Theory:**

- Kidney, ureter, urinary bladder, male and female urethra
- Histology of kidney, ureter and urinary bladder

### **Practical:**

- Demonstration of parts of urinary system
- Histology of kidney, ureter, urinary bladder
- Radiographs of abdomen-IVP, retrograde cystogram

## **7. Reproductive system**

### **Theory:**

- Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology)
- Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)
- Mammary gland – gross

### **Practical:**

- Demonstration of section of male and female pelvis with organs in situ
- Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes, ovary
- Radiographs of pelvis – hysterosalpingogram

## **8. Endocrine glands**

### **Theory:**

- Names of all endocrine glands in detail on pituitary gland, thyroid gland & suprarenal gland – (gross & histology)

### **Practical:**

- Demonstration of the glands
- Histology of pituitary, thyroid, parathyroid, suprarenal glands

## **9. Nervous system**

### **Theory:**

- Neuron & Classification of NS
  - Cerebrum, cerebellum, midbrain, Pons, medulla oblongata, spinal cord with spinal nerve (gross & histology) Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei
- Blood supply of brain
- Cranial nerves
- Sympathetic trunk & names of parasympathetic ganglia

### **Practical:**

- Histology of peripheral nerve & optic nerve

- Demonstration of all plexuses and nerves in the body
- Demonstration of all part of brain
- Histology of cerebrum, cerebellum, spinal cord

## **10. Sensory organs**

### **Theory:**

- Skin: Skin-histology & Appendages of skin
- Eye: Parts of eye & lacrimal apparatus, Extra-ocular muscles & nerve supply
- Ear: parts of ear- external, middle and inner ear and contents

### **Practical:**

- Histology of thin and thick skin
- Demonstration and histology of eyeball
- Histology of cornea & retina

## **11. Embryology:**

### **Theory:**

- Spermatogenesis & oogenesis
- Ovulation, fertilization
- Fetal circulation
- Placenta

### **INTERNAL ASSESSMENT**

Theory-average of 2 exams conducted  
 20 Practicals: record and lab work\* 10

\*There shall be no university practical examination and internal assessment marks secured in Practicals need not be sent to the university.

### Distribution of Marks for University Theory and Practical Exam

Theory				Practicals			Grand total
Theory		IA	Sub Total	Practicals	IA	Sub Total	100
80		20	100	*			100

### REFERENCE BOOKS:

1. William Davis (P) understanding Human Anatomy and Physiology – McGraw Hill
2. Chaurasia- A Text Book of Anatomy
3. T. S. Ranganathan- A Text Book of Human Anatomy
4. Fattana, Human Anatomy (Description and applied)- Saunder's & C P Prism Publishers, Bangalore
5. ESTER. M. Grishcimer- Physiology & Anatomy with Practical Considerations, J. P. Lippin Cott. Philadelphia
6. Bhatnagar- Essentials of Human Embryology- Revised Edition. Orient Blackswan Pvt. Ltd.

# PHYSIOLOGY

Theory 70 hours Practical 20hours

## 1. General Physiology

Introduction to cell physiology, transport across cell membrane Homeostasis, Body Fluid compartment & measurement

## 2. Blood

Introduction - composition and function of blood Plasma. proteins, types and functions

Red blood cells - erythropoiesis, stages of differentiation, factors affecting it, function, normal count, physiological variation.

Hemoglobin- function, concentration, types & methods of Hb estimation, fate of hemoglobin Jaundice- types Anaemia, -types

ESR, PCV, osmotic fragility & blood indices

WBC- morphology, production, functions, normal count, differential count, variation, variation

Immunity (in brief) Platelets- origin, morphology, normal count, function-Platelet plug ,bleeding disorder

Haemostasis - definition, normal haemostasis, clotting factors, mechanism of clotting, anticoagulants disorders of clotting factors.

Blood group-ABO & Rh system, Rh incompatibility blood typing ,cross matching, hazards of mismatched blood transfusion

RES, spleen and lymph

## 3. Nerve-Muscle

Neuron structure, types, neuroglia-types, nerve fibre classification, properties of nerve fibres, RMP,action potential, wallerian degeneration

NMJ, blockers, Myasthenia gravis

Classification of muscle, structure of skeletal muscle, sarcomere, contractile proteins Excitation

contraction coupling, mechanism of muscle contraction, types of contraction Motor unit, fatigue, rigor mortis Smooth muscle

## 4. Respiratory system

Physiological anatomy of respiratory system, muscles of respiration, respiratory & non respiratory functions of lungs, dead space

Mechanics of breathing, intrapulmonary & pleural pressures Compliance, Surfactant, Hyaline membrane disease

Lung volumes and capacities

Respiratory membrane , transport of O<sub>2</sub> & CO<sub>2</sub>

Chemical regulation of respiration Neural regulation of respiration Hypoxia, Acclimatization, Dysbarism. Artificial respiration

Definition-Periodic breathing ,dyspnoea, apnoea, asphyxia,, cyanosis

## **5. Cardiovascular system**

Introduction to CVS & general principles of circulation Properties of Cardiac muscle  
Cardiac cycle, heart sounds, Pulse Cardiac output, factors and measurement Heart rate  
BP-factors, measurement, Short term regulation Intermediate and long term regulation of BP  
ECG uses and significance, .normal waveform, heart block Coronary circulation, Cutaneous  
circulation-Triple response Shock  
Effects of exercise on CVS and Respiratory system

## **6. Renal system, Skin and body temperature**

Kidneys- functions, structure of nephron, type, juxtaglomerular apparatus-structure and function, non-  
excretory functions of kidney  
Glomerular filtration rate (GFR)- Definition ,normal value, factors affecting GFR Tubular reabsorption  
- sites, substance reabsorbed, mechanisms of reabsorption Tubular secretion- sites, substance secreted,  
mechanisms of reabsorption  
Counter current mechanism of concentration of urine Obligatory and Facultative reabsorption of water  
Micturition reflex, Diuretics  
Artificial kidney, renal function tests-clearance tests  
Skin -structure and function, body temperature measurement, physiological variation,  
Regulation of body Temperature by physical, chemical and nervous mechanisms-Role of  
Hypothalamus Hypothermia and fever

## **7. Digestive system**

Physiological anatomy, Enteric nervous system & functions of GIT Saliva- composition,  
regulation,disorder.  
Deglutition- stages & disorders  
Stomach-functions, composition and regulation of gastric juice Gastric motility, MMC, vomiting  
reflex.  
Pancreas- function, composition and regulation of pancreatic juice  
Liver & gall bladder-functions, bile- composition, secretion and regulation Small intestine- Succus  
entericus-composition, functions & movements Large intestine- functions, movements and defecation  
reflex  
Digestion & absorption of Carbohydrates, fats and proteins

## **8. Endocrine system**

Classification of Endocrine glands & their hormones & properties-chemistry and receptor, feedback  
mechanisms of hormone regulation.  
Anterior pituitary hormones- secretion, functions , disorders Posterior pituitary hormones- secretion ,  
functions , disorders Thyroid hormones- secretion, functions, disorders Parathyroid hormones-  
secretion, functions, disorders Calcium homeostasis & disorders  
Pancreatic hormones, -Insulin and Glucagon- . secretion, functions, disorders  
Adrenal cortex- Glucocorticoids & Mineralocorticoids, Androgen - secretion, functions, disorders  
Adrenal medulla- secretion, functions, disorders Thymus & Pineal gland



## 9. Reproductive system

Introduction to reproductive system, sex differentiation & Puberty Male reproductive system, functions of testosterone & Spermatogenesis

Female reproductive system, functions of Estrogen, Progesterone, Oogenesis Ovulation & Menstrual cycle

Physiological changes during pregnancy, pregnancy tests, parturition & lactation Male & Female contraceptive methods

## 10. Central nervous system

Introduction to CNS, Sensory receptors classification, properties Synapse– classification, properties

Sensory pathways: Anterior spino thalamic tract and Posterior column pathway

Lateral spino thalamic tract, Types of pain, Referred pain, Thalamus; nuclei and function

Classification of reflexes, Monosynaptic reflex- Stretch reflex , muscle spindle ,inverse stretch reflex.

Polysynaptic reflex-Withdrawal reflex

Motor pathways : Pyramidal pathway and functions, UMNL, LMNL Cerebral cortex (Sensory and motor)-functions, Medulla and Pons-functions Cerebellum –functions, disorders

Basal ganglia-functions, disorders Hypothalamus and Limbic system-functions CSF, lumbar puncture Sleep, EEG,

Autonomic Nervous System - Sympathetic and parasympathetic distribution and functions

## 11. Special senses

Vision –Functional anatomy of eye, visual pathway, lesion Refractive errors, color vision

Audition – Physiological anatomy of ear, Mechanism of hearing, auditory pathway, deafness Olfaction –modalities, receptor, function, abnormalities

Gustation-modalities, receptor, function, taste pathway, abnormalities

Practicals

Blood pressure Recording

Auscultation for Heart Sounds

Artificial Respiration

Determination of vital capacity

### INTERNAL ASSESSMENT

Theory-average of 2 exams conducted 20

Practicals: record and lab work\* 10

\*There shall be no university practical examination and internal assessment marks secured in Practical need not be sent to the university.

## Distribution of Marks for University Theory and Practical Exam

Theory				Practicals			Grand total
Theory	Viva Voce	IA	Sub Total	Practicals	I A	Sub Total	
80		20	100	*			100

### REFERENCE BOOKS:

Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism Publishers Chatterjee (CC) Human Physiology Latest Ed. New Central Book  
Physiology Latest Ed. New Central Book Allied Agency Choudhari (Sujith K) Concise Medical

Ganong (William F) Review of Medical Physiology. Latest Ed. Appleton

# BIOCHEMISTRY

No. Theory classes: 70hours

No. of practical classes: 20 hours

## 1. Carbohydrate Chemistry [3 hours]

- Classification (Definition/ examples for each class)
- Monosaccharides (classification depending upon number of carbon atoms and functional group with examples)
- Disaccharides (Sucrose/ lactose/ maltose and their composition)
- Polysaccharides :
  - a) Homopolysaccharides (Structure of starch and glycogen)
  - b) Heteropolysaccharides (Functions )

## 2. Lipid Chemistry [3 hours]

- Definition of lipids
- Functions of lipids in the body
- Classification of lipids (subclasses with examples)
- Definition and Classification of fatty acids
- Essential fatty acids
- Phospholipids and their importance

## 3. Amino-acid and Protein Chemistry [3 hours]

- General structure of D and L amino acids
- Amino acids; Definition and Classification of amino acids with examples.
- Peptides; definition & Biologically important peptides
- Classification of Proteins based on composition, functions and shape (with examples)
- Functions of amino acids and Proteins

## 4. Nucleotide and Nucleic acid Chemistry [ 3 hours]

- Nucleosides & Nucleotides
- Nucleic acid Definition & types
- Composition & functions of DNA & RNA
- Structure of DNA (Watson and Crick model)
- Structure of tRNA, & functions of tRNA, rRNA, mRNA
- Difference between DNA and RNA

## 5. Enzymes [5 hours]

- Definition & Classification of Enzymes with example
- Definitions of Active site, Cofactor (Coenzyme, Activator),
- Proenzyme; Definition and examples (Pepsin & trypsin)

## 6. Digestion and Absorption [ 3 Hours]

- General characteristics of digestion and absorption,
- Digestion and absorption of carbohydrates, proteins and lipids.

## 7. Carbohydrate Metabolism [ 5 Hours]

- Glycolysis ; Aerobic, Anaerobic, Definition , Site and subcellular site , Steps with all the enzymes and coenzymes at each step , mention the regulatory enzymes , Energetics,
- Citric acid cycle; Pyruvate dehydrogenase complex (reaction and coenzymes) , Site and subcellular site , Reactions with all the enzymes and coenzymes ,Regulatory enzymes , Energetics
- Significance of HMP Shunt pathway.
- Hyperglycemic and hypoglycemic hormones
- Blood Glucose Regulation.
- Diabetes mellitus (definition, classification, signs and symptoms)
- **Glycogen metabolism and gluconeogenesis**

## 8. Lipid Metabolism [ 4 Hours]

- Introduction to lipid metabolism, Lipolysis
- Beta oxidation of fatty acids ; Definition ,Site and subcellular site , Activation of palmitic acid , Transport of activated palmitic acid into mitochondria , Reactions , Energetics.
- Name the different ketone bodies . Note on ketosis

## 9. Amino acid and Protein Metabolism [ 3 Hours]

- Introduction, transamination, deamination, Fate of ammonia, transport of ammonia,
- Urea cycle.

## 10. Vitamins [5 Hours]

- Definition and classification.
- RDA, sources, coenzyme forms, biochemical functions and disorders for the following water soluble vitamins: Thiamine, Niacin, Pyridoxine, Cobalamine, Folic acid, Ascorbic acid RDA, sources, coenzyme forms, biochemical functions and deficiency disorders for the following fat soluble vitamins; A and vitamin D

## 11. Mineral Metabolism [3 Hours]

- Name the macro/ microminerals

- Iron: Sources ,RDA, Functions and Disorders of deficiency and excess
- Calcium and phosphorus: Sources ,RDA, functions, normal serum levels and hormones regulating their levels

## 12. Nutrition [6 hours]

- Balanced diet (Definition)
- Caloric value ; Definition , Caloric values of carbohydrates, proteins and fats
- Total daily caloric requirements of an adult male and female,
- RDA (Definition, standard values for nutrients)
- Basal metabolic rate(BMR) ; Definition , Magnitude of BMR in men and women, Factors affecting BMR
- Thermic effect/ SDA of food (Definition, values for major macronutrients)
- Carbohydrates ;. Daily dietary requirement. 2. Dietary fibers (Definition, functions, importance and their daily requirements)
- Proteins ;. Daily requirement, Biological value. a. Definition b. Protein used as a standard for this, Protein sources with high and low biological value , Mutual supplementation of proteins (Definition, examples).
- Fats ; Daily requirement , Essential fatty acids (Definition, functions, daily requirement and deficiency manifestations) , Saturated and unsaturated fatty acids (Definition, sources, examples).
- Malnutrition

## 13. Renal Function Tests [ 2 hours]

- Name the different tests to assess the kidney functions
- Explain Creatinine clearance & Inulin clearance
- Urinary acidification test

## 14. Radioactive Isotopes [1 hour]

- Definition, clinical applications
- Biological effects of radiations

## 15. Clinical Biochemistry [ 5 hours ]

A. Definitions of acid, base, pH and pKa [1 hour]

B. Buffers • Definition [2 hours]

- Henderson Hasselbalch equation,
- Principal buffer systems in the ECF ICF and urine

- Bicarbonate and phosphate buffer systems (pKa value, normal ratio of base/acid in the plasma)
  - Acidosis & Alkalosis (Definition, classification, causes and biochemical findings)
- C. Normal serum levels and condition where they are altered [2 hour]
- Glucose, Protein, urea, uric acid, and creatinine
  - Bilirubin, cholesterol
  - Serum Electrolytes

#### **16. Fundamental Chemistry (1 hour)**

- Valency, Molecular weight & Equivalent weight of elements and compounds. Normality, Molarity, Molality.

#### **17. Solutions: Definition, use, classification where appropriate, preparation and storage (5 hours)**

- Stock and working solutions.
- Molar and Normal solutions of compounds and acids. (NaCl, NaOH, HCl, H<sub>2</sub>SO<sub>4</sub>, H<sub>3</sub>PO<sub>4</sub>, CH<sub>3</sub>COOH etc.,)
- Preparation of percent solutions – w/w, v/v w/v (solids, liquids and acids), Conversion of a percent solution into a molar solution
- Saturated and supersaturated solutions
- Standard solutions. Technique for preparation of standard solutions and Storage. E.g: glucose, albumin etc.
- Dilutions- Diluting Normal , Molar and percent solutions. Preparing working standard from stock standard.
- Part dilutions: Specimen dilutions. Serial dilutions. Reagent dilution. Dilution factors

#### **ASSIGNMENT TOPICS**

- 1. Units of measurement**
2. Hazards - Physical, Chemical, Biological
3. Arterial blood gas analysis
4. Responsibilities of Health care personnel
5. Biomedical waste management

## PRACTICAL DEMONSTRATION [20 hours]

Color Reactions of Carbohydrates & amino acids.

Precipitation Reactions of proteins

Colorimetry Estimation of Blood glucose Folin Wu and enzymatic method

Estimation of Urea by DAM method

## INTERNAL ASSESSMENT

Theory-average of 2 exams conducted

20 Practicals: record and lab work\* 10

\*There shall be no university practical examination and internal assessment marks secured in Practicals need not be sent to the university.

### Distribution of Marks for University Theory and Practical Exam

Theory				Practicals			Grand total
Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
80	-	20	100	*			100

### Text Book References

- Biochemistry – 3<sup>rd</sup> revised edition by U Sathyanarayana & U Chakrapani
- Textbook of Medical Biochemistry-6<sup>th</sup> Edition by MN Chatterjea & Rana Shinde
- Textbook of Medical Laboratory technology 2<sup>nd</sup> edition by Godkar and Godkar.
- Biochemistry-3<sup>rd</sup> edition by Pankaja Naik
- Medical Laboratory technology 6<sup>th</sup> edition by Ramnik Sood.
- Manipal Manual of Clinical Biochemistry for medical laboratory and M.Sc., students-3<sup>rd</sup> edition by Shivananda Nayak B
- Varley's Practical Clinical Biochemistry, 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> editions

## **PATHOLOGY**

Histo Pathology ,Clinical Pathology, Haematology and Blood Banking

Theory – 70 hours

Practical – 20 hours

**Clinical Pathology, Hematology and Blood Banking Theory-70 hours**  
**Practicals-20 hours**

### **Clinical Pathology- Theory**

- Introduction to clinical pathology
- Collection , transport, preservation and processing of various clinical specimens
  - Urine examination- collection and preservation, Physical, chemical and microscopic examination for abnormal constituents
  - Examination of Body fluids
  - Examination of Cerebrospinal fluid (CSF)
  - Sputum examination
  - Examination of feces

### **II. Hematology – Theory**

- Introduction to hematology
- Normal constituents of Blood, their structure and functions
- Collection of Blood samples
- Various anticoagulants used in Hematology
- Hemoglobin estimation, different methods and normal values
- Packed cell volume
- Erythrocyte sedimentation rate
- Normal Haemostasis
- Bleeding time. Clotting time, prothrombin time, Activated partial Thromboplastin time



### III. Blood Bank- Theory

- Introduction blood banking
- Blood group system
- Collection and processing of blood for transfusion
- Compatibility testing
- Blood transfusion reactions
- **General Pathology:**
- **Cell injury:**
  - a. Definition, causes.
  - b. Cellular adaptations – Hypertrophy, hyperplasia, atrophy and metaplasia.
  - c. Types of cell injury – Reversible and irreversible; morphology of reversible injury.
  - d. Necrosis – Definition and patterns of tissue necrosis.
  - e. Intracellular accumulations – Lipids, cholesterol, proteins, glycogen and pigments; examples.
  - f. Pathologic calcification – Types and examples.
- **3) Inflammation:**
  - a. Definition and signs of inflammation.
  - b. Types – Acute and chronic inflammation.
  - c. Acute inflammation – Causes, morphological patterns and outcome.
  - d. Chronic inflammation – Causes, morphology and examples.
  - e. Regeneration and repair – Mechanism of cutaneous wound healing.
  - f. Factors affecting wound healing.
- **4) Hemodynamic disorders:**
  - a. Edema – Definition, pathogenesis and types: Renal, cardiac, pulmonary and cerebral.
  - b. Difference between transudate and exudate.

- c. Shock – Definition, types of shock with examples: Hypovolemic, cardiogenic and septic shock, stages of shock: Nonprogressive, progressive and irreversible.
  - d. Thrombosis – Definition, mechanism of thrombus formation (Virchow’s triad) and fate of thrombus.
  - e. Embolism – Definition and types: Thromboembolism, fat, air and amniotic fluid embolism.
  - f. Infarction – Definition and examples.
- **5) Immune system:**
    - a. Autoimmune diseases – General features, enumerate systemic and organ specific autoimmune diseases.
    - b. Systemic lupus erythematosus – Manifestations and diagnosis.
- **6) Neoplasia:**
    - a. Definition and nomenclature of tumors.
    - b. Differences between benign and malignant neoplasms.
    - c. Enumerate modes of carcinogenesis: Genes, physical, chemical and microbial agents of carcinogenesis.
    - d. Modes of spread of tumors.
    - e. Clinical aspects of neoplasia.
    - f. Grading and staging of cancers.
    - g. Laboratory diagnosis of cancer.

### **Practicals**

1. Urine analysis- Physical, Chemical, Microscopic
2. Blood grouping and Rh typing
3. Hb estimation , packed cell volume (PCV), Erythrocyte Sedimentation rate (ESR)
4. Bleeding time and Clotting time

## INTERNAL ASSESSMENT

Theory-average of 2 exams conducted

20 Practicals: record and lab work\* 10

\*There shall be no university practical examination and internal assessment marks secured in Practicals need not be sent to the university.

### Distribution of Marks for University Theory and Practical Exam

Theory				Practicals			Grand total
Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
80	-	20	100	*			100

### REFERENCE BOOKS:

1. Culling Histopathology techniques
2. Bancroft Histopathology techniques
3. Koss- Cytology
4. Winifred Diagnostic cytopathology
5. Orell Cytopathology
6. Todd and Sanford- clinical diagnosis by Laboratory Medicine
7. Dacie and Lewis- Practical Hematology
8. Ramnik SOOD. Lab technology, Methods and interpretation, 4 th edition JP Bros New Delhi, 1996
9. Sathish Guptha , Short text book of Medical laboratory techniques for technicians
10. Sachdev K N. Clinical Pathology and Bacteriology, 8 th edi JP Bros, New Delhi, 1996

## **Microbiology I**

Theory: 70 Hours

Practicals: 20 Hours

### **1. Introduction (6 hrs)**

History of Microbiology - Louis Pasteur, Antony Van Leeuwenhoek, Robert Koch, Edward Jenner, Alexander Fleming.

Use of microscope in the study of bacteria - Types of microscopes - compound microscope, phase contrast microscope, electron microscope, fluorescent microscope, dark ground microscope.

Morphology of bacterial cell

### **2. Growth and Nutrition (6 hrs.)**

Nutrition, growth and multiplication of bacteria, bacterial growth curve, culture media, culture methods, anaerobic culture methods.

### **3. Sterilization and disinfection (8 hrs.)**

Principles and use of equipments of sterilization, chemicals used in disinfection, testing of disinfectants.

### **4. Biomedical waste management principle and practice Immunology ( 5hrs.)**

Immunity - mechanism of immunity, classification, types Vaccines

Immunization schedule

Definition of antigen, antibody, list of antigen antibody reaction (no need of detailed account of antigen antibody reactions)

Definition of hypersensitivity and classification (no need of detailed account of types of hypersensitivity)

### **5. Infection (5 hrs.)**

Definition, types and mode of transmission

Hospital acquired infection - causative agents, mode of transmission and prophylaxis. Antimicrobial sensitivity testing

### **6. Systematic bacteriology (15 hrs.)**

Disease caused and laboratory diagnosis of medically important bacteria (Staphylococcus, coagulase negative Staphylococcus, MRSA, Streptococcus pyogenes, Pneumococcus, gonococcus,

E.coli, diarrhoeagenic E.coli, Salmonella, Vibrio cholerae, ElTor vibrios, Halophilic vibrios, Shigella, Mycobacterium tuberculosis, Mycobacterium leprae, Atypical Mycobacteria, Treponema pallidum, leptospira)

(no need of classification, antigenic structure, virulence mechanism)

### **7. Parasitology (10 hrs.)**

Introduction to Parasitology

List of medically important parasites and diseases (E.histolytica, Plasmodium, W.bancrofti, Ascaris, Ancylostoma, B.coli, G.lambliia, T.solium, T.saginata)

Laboratory diagnosis of parasitic infection (No need of including life cycles)

### **8. Virology (10 hrs.)**

Introduction to virology

List of medically important viruses and diseases (AIDS, Hepatitis, Rabies, Polio, Arbo viruses)

Cultivation of viruses and laboratory diagnosis of viral infections

### **9. Mycology (5 hrs.)**

Introduction to Mycology

Classification of medically important fungi - (based on morphology, spore production, disease production, taxonomy)

List of medically important fungi and diseases (Candidiasis, Cryptococcosis, Dermatophytes, Aspergillosis, Mucor Mycosis)

Laboratory diagnosis of fungal infections.

#### **Practicals (20 hrs.)**

Compound microscope (Demonstration) Demonstration of sterilization equipments

Demonstration of culture media and culture methods Demonstration of antibiotic sensitivity testing

Demonstration of serological tests - Widal, VDRL, ASO, CRP, RA Demonstration of gram stain and ZN staining

Demonstration of Helminthic ova Grams stain, Acid fast staining Stool exam for Helminthic ova

There shall be no university practical examination and Internal Assessment marks secured in practicals need not be sent to the university.

#### **INTERNAL ASSESSMENT**

Theory-average of 2 exams

conducted 20 Practical: record and

lab work\*

10

\*There shall be no university practical examination and internal assessment marks secured in Practical: record and lab work\* need not be sent to the university.

## Distribution of Marks for University Theory and Practical Exam

Theory				Practicals			Grand total
Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
180	-	20	100	*			100

### Reference Books-

1. Ananthanarayana & Panikar Medical Microbiology- University Press
2. Robert Cruickshank- Medical Microbiology- The Practice of Medical Microbiology
3. Chatterjee- Parasitology- Interpretation to Clinical Medicine
4. Rippon- Medical Mycology
5. Emmons- Medical Mycology
6. Basic Laboratory methods in Parasitology, J P Bros, New Delhi
7. Basic Laboratory procedures in clinical bacteriology, J P Bros, New Delhi
8. Medical Parasitology- Ajit Damle
9. Introduction to medical microbiology- Ananthanarayana- Orient Longman Pvt. Ltd

## **SUBSIDIARY SUBJECTS**

### **ENGLISH**

#### **COURSE OUTLINE**

**COURSE DESCRIPTION:** This course is designed to help the student acquire a good command and comprehension of the English language through individual papers and conferences.

#### **BEHAVIOURAL OBJECTIVES:**

The student at the end of training is able to

1. Read and comprehend English language
2. Speak and write grammatically correct English
3. Appreciates the value of English literature in personal and professional life.

#### **UNIT - I: INTRODUCTION:**

Study Techniques

Organisation of effective note taking and logical processes of analysis and synthesis Use of the dictionary

Enlargement of  
vocabulary

Effective diction

#### **UNIT - II: APPLIED GRAMMAR:**

Correct usage

The structure of sentences

The structure of  
paragraphs

Enlargements of  
Vocabulary

#### **UNIT - III: WRITTEN COMPOSITION:**

Precise writing and  
summarizing Writing

of bibliography

Enlargement of  
Vocabulary

#### **UNIT - IV: READING AND COMPREHENSION:**

Review of selected materials and express oneself in  
one's words. Enlargement of Vocabulary.

#### **UNIT - V: THE STUDY OF THE VARIOUS FORMS OF COMPOSITION:**

Paragraph, Essay, Letter, Summary, Practice in writing

#### **UNIT - VI: VERBAL COMMUNICATION:**

Discussions and summarization, Debates, Oral reports, use in teaching

Scheme of Examination

Written (Theory): Maximum Marks: –80 marks. No Practical or

Viva voce examination

This is a subsidiary subject, examination to be conducted by respective colleges. Marks required for a pass is 35%

## **REFERENCE**

1. English Grammar Collins, Birmingham University, International Language Data Base, Rupa & Co. 1993
2. Wren and Martin - Grammar and Composition, 1989, Chanda & Co, Delhi
3. Letters for all Occasions. A S Myers. Pub - Harper Perennial
4. Spoken English V. Shasikumar and P V Dhanija. Pub. By: Tata Mcgraw Hill, New Delhi
5. Journalism Made Simple D Wainwright
6. Writers Basic Bookself Series, Writers Digest series
7. Interviewing by Joan Clayton Platkon
8. Penguin Book of Interviews.

## **HEALTH CARE**

Teaching Hours : 40

Introduction to Health

Definition of Health, Determinants of Health, Health Indicators of India, Health Team Concept. National Health Policy

National Health Programmes ( Briefly Objectives and scope) Population of India and Family welfare programme in India

### **Introduction to Nursing**

What is Nursing ? Nursing principles. Inter-Personnel relationships. Bandaging : Basic turns; Bandaging extremities; Triangular Bandages and their application.

Nursing Position, Bed making, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep.

Lifting And Transporting Patients: Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher.

Bed Side Management: Giving and taking Bed pan, Urinal : Observation of stools, urine.



Observation of sputum, Understand use and care of catheters, enema giving. Methods Of Giving Nourishment: Feeding, Tube feeding, drips, transfusion Care of Rubber Goods

Recording of body temperature, respiration and pulse, Simple aseptic technique, sterilization and disinfection. Surgical Dressing: Observation of dressing procedures

First Aid:

Syllabus as for Certificate Course of Red Cross Society of St. John's Ambulance Brigade.

### **Reference Books:**

**Preventive and Social Medicine** by J.Park

Text Book of P & SM by Park and Park

Counseling & Communicate skills for medical and health, Bayne- Orient Longman Pvt. Ltd.

### **Scheme of Examination**

Written (Theory): Maximum Marks: –80 marks.

No Practical or Viva voce examination

This is a subsidiary subject, examination to be conducted by respective colleges. Marks required for a pass is 35%

## SECOND YEAR B.SC CARDIAC CARE TECHNOLOGY

### APPLIED PHARMACOLOGY

- General concepts about pharmacodynamic and Pharmacokinetic Principles involved in drug activity.

Autonomic nerves system.

Anatomy & functional organisation.

- List of drugs acting on ANS including dose, route of administration, indications, contra indications and adverse effects.

II. Cardiovascular drugs - Enumerate the mode of action, side effects and therapeutic uses of the following drugs.

Antihypertensive

Beta Adrenergic antagonists

Alpha Adrenergic antagonists

Peripheral Vasodilators

Calcium channel blockers

Antiarrhythmic drugs

Cardiac glycosides

Sympathetic and non-sympathetic inotropic agents.

Coronary vasodilators.

Antianginal and anti failure agents

Lipid lowering & anti atherosclerotic drugs.

Drugs used in Haemostasis - anticoagulants Thrombolytics and antithrombolytics.

Cardioplegic drugs - History, Principles and types of cardioplegia.

Primary solutions - History, principles & types.

Drugs used in the treatment of shock.

III. Anaesthetic agents.

- Definition of general and local anaesthetics.
- Classification of general anaesthetics.
- Pharmacokinetics and Pharmacodynamics of inhaled anaesthetic agents.
- Intravenous general anaesthetic agents.
- Local anaesthetics - classification, mechanism of action, duration of action and methods to prolong the duration of action. Preparation, dose and routes of administration.

#### IV. Analgesics

- Definition and classification
- Routes of administration, dose, frequency of administration, Side effects and management of non opioid and opioidanalgesics

#### V. Antihistamines and antiemetics-

- Classification, Mechanism of action, adverse effects, Preparations, dose and routes and administration.

#### VI. CNS stimulants and depressants

- Alcohol
- Sedatives, hypnotics and narcotics
- CNS stimulants
- Neuromuscular blocking agents and muscle relaxants.

#### VII. Pharmacological protection of organs during CPB

#### VIII. Inhalational gases and emergencydrugs.

#### IX. Pharmacotherapy of respiratory disorders

- Introduction - Modulators of bronchial smooth muscle tone and pulmonary vascularsmooth muscle tone
- Pharmacotherapy of bronchial asthma
- Pharmacotherapy of cough
- Mucokinetic and mucolytic agents
- Use of bland aerosols in respiratory care.

#### X. Corticosteroids - Classification, mechanism of action, adverse effects and complications.

Preparation, dose and routes of administration.

#### XI Diuretics

- Renal physiology
- Side of action ofdiuretics
- Adverse effects
- Preparations, dose and routes of administration.

#### XII. Chemotherapy of infections

- Definition
- Classification and mechanism of action of antimicrobial agents

- Combination of antimicrobial agents
- Chemoprophylaxis.
- Classification, spectrum of activity, dose, routes of administration and adverse effects of penicillin, cephalosporins, aminoglycosides, tetracyclines, chloramphenicol, antitubercular drugs.

### XIII. Miscellaneous.

IV fluids- various preparations and their usage.

Electrolyte supplements

Immunosuppressive agents

New drugs included in perfusion technology.

Drugs used in metabolic and electrolyte imbalance.

### **PRACTICALS:**

Preparation and prescription of drugs of relevance.

2. Experimental pharmacology directed to show the effects of commonly used drugs of relevance and interpretation of few charts.

NO PRACTICAL EXAMINATION

## **Recommended Books.**

1. 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.
2. 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.  
  
Laurence and Bennet, Clinical Pharmacology, ELBS Edition, 9th Edition.
4. Experimental Pharmacology for Under Graduates, Prabhakar, , Orient Longman PVT Ltd.

## APPLIED PATHOLOGY

### CARDIOVASCULAR SYSTEM

- Atherosclerosis- Definition, risk factors, briefly Pathogenesis & morphology, clinical significance and prevention.
- Hypertension- Definition, types and briefly Pathogenesis and effects of Hypertension.

Aneurysms - Definition, classification, Pathology and complications.

Pathophysiology of Heart failure.

- Cardiac hypertrophy - causes, Pathophysiology & Progression to Heart Failure.
- Ischaemic heart diseases- Definition, Types. Briefly Pathophysiology, Pathology & Complications of various types of IHD.
- Valvular Heart diseases- causes, Pathology & complication. Complications of artificial valves.
- Cardiomyopathy - Definition, Types, causes and significance.
- Pericardial effusion- causes, effects and diagnosis.

- Congenital heart diseases - Basic defect and effects of important types of congenital heart diseases.

## II. HAEMATOLOGY

- Anaemia - Definition, morphological types and diagnosis of anaemia. Brief concept about Haemolytic anaemia and polycythaemia.
- Leukocyte disorders- Briefly leukaemia, leukocytosis, agranulocytosis etc.,
- Bleeding disorders- Definition, classification, causes & effects of important types of bleeding disorders. Briefly various laboratory tests used to diagnose bleeding disorders.

## III. RESPIRATORY SYSTEM

- Chronic obstructive airway diseases - Definition and types. Briefly causes, Pathology and complications of each type of COPD.
- Briefly concept about obstructive versus restrictive pulmonary disease.
- Pneumoconiosis- Definition, types, Pathology and effects in brief.
- Pulmonary congestion and oedema.
- Pleural effusion - causes, effects and diagnosis.

## IV. RENAL SYSTEM

- Clinical manifestations of renal diseases. Briefly causes, mechanism, effects and laboratory diagnosis of ARF& CRS. Briefly Glomerulonephritis and Pyelonephritis.
- Endstage renal disease- Definition, causes, effects and role of dialysis and renal transplantation in its management.
- Brief concept about obstructive uropathy.

## PRACTICALS

1. Description & diagnosis of the following gross specimens.

- A. Atherosclerosis.
- B. Aortic aneurysm.
- c. Myocardial infraction.
- d. Emphysema

- e. Chronic glomerulonephritis.
  - f. Chronic pyelonephritis.
2. Interpretation & diagnosis of the following charts.
    - a. hematology Chart - AML, CML, Hemophilia, neutrophilia, eosinophilia.
    - b. Urine Chart - ARF, CRF, Acute glomerulonephritis.
  3. Estimation of Hemoglobin.  
Estimation Bleeding & Clottingtime.

**PRACTICAL EXAMINATION**

**40 Marks**

There will be a Combined Practical examination for Applied Pathology & Applied Microbiology.

	Hematology Chart	
2	Interpretation of Urine Chart	05
3	Estimation of Hemoglobin	05
4	Estimation of Bleeding time & Clotting time	05
	<b>TOTAL</b>	<b>20</b>





# APPLIED MICROBIOLOGY

## THEORY - 40 HOURS

1. Health care associated infections and Antimicrobial resistance: Infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting like Methicillin Resistant Staphylococcus aureus infections, Infections caused by Clostridium difficile, Vancomycin resistant enterococci etc. Catheter related blood stream infections, Ventilator associated pneumonia, Catheter Related urinary tract infections, Surveillance of emerging resistance and changing flora. The impact and cost attributed to Hospital Associated infection. 6 Hours
  
2. Disease communicable to Healthcare workers in hospital set up and its preventive measure: Occupationally acquired infections in healthcare professionals by respiratory route ( tuberculosis, varicella- zoster, respiratory syncytial virus etc ), blood borne transmission ( HIV, Hepatitis B, Hepatitis C, Cytomegalovirus, Ebola virus etc), oro faecal route ( Salmonella, Hepatitis A etc), direct contact ( Herpes Simplex Virus etc). Preventive measures to combat the spread of these infections by monitoring and control 6 Hours
  
3. Microbiological surveillance and sampling: Required to determine the frequency of potential bacterial pathogens including Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis and also to assess the antimicrobial resistance  
.Sampling: rinse technique, direct surface agar plating technique. 6 Hours  
Importance of sterilization:
  - a. Disinfection of instruments used in patient care: Classification, different methods, advantages and disadvantages of the various methods.  
Disinfection of the patient care unit  
Infection control measures for ICU's 10 Hours

**Sterilization:**

  - a. Rooms: Gaseous sterilization, one atmosphere uniform glow discharge plasma(OAUGDP).
  - b. Equipments: classification of the instruments and appropriate methods of sterilization.
  - c. Central supply department: the four areas and the floor plan for instrument cleaning, high-level disinfecting and sterilizing areas 8 Hours

7. Preparation of materials for autoclaving: Packing of different types of materials, loading, holding time and unloading.

4 Hours

## **PRACTICALS - 30 HOURS**

Principles of autoclaving & quality control of Sterilization.

2. Collection of specimen from outpatient units, inpatient units, minor operation theater and major operation theater for sterility testing.

The various methods employed for sterility testing.

Interpretation of results of sterility testing.

Disinfection of wards, OT and Laboratory.

### **Scheme of Examination Theory**

There shall be one theory paper with 2 section of three hours duration carrying 50

marks each Distribution of type of questions and marks for Applied Microbiology

shall be as given under

SUBJECTS HAVING MAXIMUM MARKS= 50 MARKS		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	1	10
Short Essay	05	05
Short Answer	05	03

1. Long essay- 1 Questions (No choice) 1x10= 10 marks
  2. Short essay- 05 Questions (Choice is in Questions no 3) 05x5= 25 marks
  3. Short answer- 05 Questions (Choice is in Questions no 3) 05x3= 15 marks
- Total= 50**

**PRACTICAL EXAMINATION****40 Marks**

There will be a Combined Practical examination for Applied Pathology & Applied Microbiology.

SL NO	TEST MARKS	
1	Dry heat / Moist heat: Temperature recording charts interpretation	05
2	Dry heat / Moist heat: Colour change indicators interpretation Air sampling culture plates interpretation of Colony forming	05
3	units based on air flow rate and sampling time Interpretation of Sterility of Hemodialysis water	05
4	Distilled water /Deionised water based on growth of colonies in BHI agar to be reported as X CFU/mL	05
	Total	20

## **MEDICINE RELEVANT TO CARDIAC CARE TECHNOLOGY**

### **Cardiovascular System**

Ischemic heart diseases Rheumatic heart disease Congenital heart disease Hypertension  
Aortic Aneurysms Cardiomyopathy Peripheral vascular disease Pulmonary oedema and LV failure

### **Hematology**

Anaemia  
Bleeding disorders  
Laboratory tests used to diagnose bleeding disorders (in brief)

### **Respiratory System**

Chronic obstructive airway diseases (COPD) Concept of obstructive versus restrictive pulmonary disease PFT and its interpretation

### **Renal System**

#### **ARF & CRF**

End stage renal disease  
Role of dialysis and renal transplantation in its management

### **CNS**

Automatic nervous system  
(Sympathetic & Parasympathetic system)  
Brief mention of CNS disorders & their etiology

### **Others**

DM  
Obesity Pregnancy  
Paediatric Patient (neonate/Infant)  
Elderly patient

### **Scheme of Examination Theory**

There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for Medicine relevant to Cardiac Care Technology shall be as given under.

## **INTRODUCTION TO CARDIAC CARE TECHNOLOGY**

Electrocardiography (ECG)

Basic Principles

a. The Electrocardiographic paper

b. The electrocardiograph

c. The Electrical field of Heart

The leads: Standard limb, Precardial lead, 'V' leads & 'AV' lead Basic ECG deflections

Basic action of electrocardiograph

Normal ECG

The 'P' wave the 'qrs' complex

The genesis of 'qrs' complex T wave; the S-T segment The 'U' wave

Rate & rhythm The Q-T interval

The Electrical axis

Precardial pattern of ECG

5. Chamber enlargement - atrial enlargement, LV hypertrophy & RV hypertrophy

6. Bundle branch block General principles Right  
Bundle branch block Left bundle branch block The  
Hemi blocks (Fascicular block)

### **AV Blocks-basics**

Exercise stress Testing

Exercise

Exercise protocols

Electrocardiography measurements

Exercise testing - Indication and techniques

### III .Echocardiography

1. Principles of Echocardiography
  - Basic principles of ultrasound
  - M-Mode of Echocardiography
  - Two dimensional Echocardiography
  - Doppler Echocardiography; colour flow
  - Transoesophageal Echocardiography
2. Instrumentation
  - Basic pulse Echo system
  - Transducers
  - Pulse generation
  - Echo detection
  - A mode, B-Mode, M-Mode

- Display & recording
3. Echocardiographic Examination
- Selecting transducers
  - Position of the patient
  - Placement of the transducer
  - Setting control
  - M-Mode labelling
  - 2 D Echo
  - Normal variants
  - Terminology
  - Identification of segments

#### 4. Doppler Echocardiography

Introduction to Doppler colour Echocardiography The Doppler principles Doppler ultrasound techniques Colour Doppler flow imaging Clinical application of Doppler Echocardiograph

- a. Physical principles & instrumentation in spectral & colour Doppler flow imaging
- b. Physical principles and Doppler effect. The Doppler Echocardiography system display
- c. Blood flow pattern - Laminar & non-laminar flow
- d. Doppler Echo cardiograph modes
  - Continuous wave Doppler system
  - Pulsed Doppler system
  - High pulse repetition frequency
  - Problems of colour imaging

5. Contrast Echo
  6. Echo measurements of chambers -'ASE' recommendation
- IV. Cathlab
1. Basics:- Machine, Radiation
  2. Generation of X-Ray
  3. Hazards of radiation

#### REFERENCE

Feigenbaum's Echocardiography- Latest edition

The Echo Manual- From the Mayo clinic- Latest edition

Leo Schamroth- An Introduction to Electrocardiography

Marriott's practical Electrocardiography

5. Gross man & Bains cardiac catheterization, Angiography and Intervention

6. Braunwald's Heart Disease: A text book of cardiovascular medicine- Latest edition



## **PRACTICAL EXAMINATION**

40Marks

-Basic knowledge about ultrasound machine, cathlab machine

Basics views in echocardiography

Interpretation of ECG / TMT reports

## **Subsidiary Subject:**

## **SOCIOLOGY**

Teaching Hours: 20 Course

Description:

This course will introduce student to the basic sociology concepts, principles and social process, social institutions [in relation to the individual, family and community and the various social factors affecting the family in rural and urban communities in India will be studied.

Introduction

Meaning - Definition and scope of sociology Its relation to Anthropology, Psychology, Social Psychology  
Methods of Sociological investigations - Case study, social survey, questionnaire, interview and opinion poll  
methods. Importance of its study with special reference to healthcare professionals Social Factors in Health and  
Disease: Meaning of social factors  
Role of social factors in health and disease

Socialization:

Meaning and nature of socialization

Primary, Secondary and Anticipatory socialization Agencies of socialization Social Groups:

Concepts of social groups, influence of formal and informal groups on health and sickness. The role of primary group and secondary groups in the hospital and rehabilitation setup.

## Family:

The family, meaning and definitions Function softy pes of family Changing family patterns Influence of family on individual's health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their importance to physiotherapy

## Community:

Rural community: Meaning and features-Health hazards to rural communities, health hazards to tribal community.

Urban community-Meaning and features-Health hazard so furbanities Culture and

## Health:

Concept of Health Concept of culture Culture and Health Culture and Health Disorders

## Social Change:

Meaning of social changes Factors of social changes Human adaptation and social change Social change and stress Social change and deviance Social change and health programme The role of social planning in the improvement of health and rehabilitation Social Problems of disabled: Consequences of the following social problem sinrelation to sickness and disability remedies to prevent the seproblems Population explosion Poverty and unemployment Beggary Juvenile delinquency Prostitution Alcoholism

Problems of women in employment Social Security:

Social Security and social legislation in relation to the disabled Social Work:

Meaning of Social Work

The role of a Medical Social Worker

## **INDIAN CONSTITUTION**

Prescribed for the First Year students of all degree classes Unit-I: Meaning of the team 'Constitution' making of the Indian Constitution 1946-1940.

Unit-II: The democratic institutions created by the constitution Bicameral system of Legislature at the Centre and in the States.

Unit-III: Fundamental Rights and Duties their content and significance.

Unit - IV: Directive Principles of States Policies the need to balance Fundamental Rights with Directive Principles.

Unit - V: Special Rights created in the Constitution for: Dalits, Back wards, Women and Children and the Religious and Linguistic Minorities.

Unit-VI: Doctrine of Separation of Powers legislative, Executive and Judicial and their functioning in India.

Unit- VII: The Election Commission and State Public Service commissions. Unit- VIII: Method of amending the Constitution.

Unit - IX: Enforcing rights through Writs:

Unit - X: Constitution and Sustainable Development in India.

Books:

1. J.C. Johari: The Constitution of India- A Politico-Legal Study-Sterling Publication, Pvt. Ltd. New Delhi.
2. J.N. Pandey: Constitution Law of India, Allahbad, Central Law Agency, 1998.
3. Granville Austin: The Indian Constitution-Corner Stone of a Nation-Oxford, New Delhi, 2000.

## **ENVIRONMENT SCIENCE & HEALTH**

Introduction to Environment and Health

Sources, health hazards and control of environmental pollution Water

The concept of safe and wholesome water. The requirements of sanitary sources of water. Understanding the methods of purification of water on small scale and large scale. Various biological standards, including WHO guidelines for third world countries. Concept and methods for assessing quality of water.

Domestic refuse, sullage, human excreta and sewage their effects on environment and health, methods and issues related to their disposal.

Awareness of standard so of housing and the effect of poor housing on health. Role of arthropods in the causation of diseases, mode of transmission of arthropods borne diseases, methods of control

Recommended Books

## **REFERENCES:**

Environment Science & Health

1. Text Book of Environmental Studies for undergraduate courses By Erach Bharucha Reprinted in 2006, Orient Longman Private Limited/Universities Press India Pvt. Ltd.
2. English Kannada Encyclopedia Dictionary, Orient Longman PVT Ltd.

Course Contents Third Year Main Subjects

Paper- I Cardiac Care Technology - Clinical

1. Echo in rheumatic heart disease-Echo in mitral stenosis, mitral incompetence, aortic stenosis, aortic incompetence, Tricuspid valve diseases, pulmonary hypertension. Post AVR, post MVR. Prosthetic valve malfunction, LA/LAA clot
2. Echo in congenital heart disease-Echo in ASD, VSD, PDA pulmonary stenosis, aortic stenosis, contraction of aorta, TOF. Dextrocardia.
3. Echo in ischemic heart disease-Echo in acute myocardial infarction, old myocardial infarction and other ischemic heart disease related conditions, LV aneurysm, VSR, Ischemic MR

4. Echo in other vascular disease- Echo in various types of cardio myopathy infective endocarditis diseases of aorta, mitral valve prolapse, myxoma and other cardio vascular diseases.
  5. Assessment of Cardiac function- measurements of all cardiac chambers and assessment of cardiac function (Diastolic, Systolic)
  6. Echo in pericardial disease- pericardial effusion, cardiac tamponade, constrictive pericarditis
  7. Cardiac catheterisation laboratory- general details of cardiac catheterisation equipment, how to handle the machine, common problems one may come across and how to overcome it, radiation hazards
  8. Radiation physics- basics, generation of radiations, effect on patients/staffs
  9. Materials used in the cathlab- all catheters, balloons, guidewires, pacemakers contrast material and other material used in the cardiac catheterisation laboratory and sterilization of all these materials
  10. Right heart catheterisation- procedure, cath position, oxymetry at various levels, angiogram done and its interpretation
  11. Left heart catheterisation - procedure, cath position, oxymetry at various levels, angiogram done and its interpretation
  12. Coronary angiogram- procedure, materials used, type and amount of dye used, indications and contraindications, various pictures recorded in various angles and gross interpretation.
- Peripheral angiogram- procedure, indication and contraindication

## REFERENCE

1. Feigenbaum's Echocardiography- Latest edition
2. The Echo Manual- From the Mayo clinic- Latest edition
3. Leo Schamroth- An Introduction to Electrocardiography
4. Marriott's practical Electrocardiography
5. Grossman & Baim's cardiac catheterization, Angiography and Intervention
6. Braunwald's Heart Disease: A textbook of cardiovascular medicine- Latest edition

Practical exam: 80 marks

One common practical for all the papers with equal weightage of marks i.e. 40 practical marks for each paper.

Paper - II Cardiac Care Technology - Applied

1. Interpretation of normal ECG
  1. ECG in myocardial infarction- definition of myocardial infarction, diagnosis of myocardial infarction, ECG criteria for myocardial infarction, ECG in anterior wall, inferior wall, true posterior wall and sub endocardial infarction and RV infarction
  2. ECG in rheumatic heart disease- definition of rheumatic heart disease, valvular involvement in rheumatic heart disease, ECG in mitral stenosis, mitral incompetence, aortic stenosis and aortic incompetence
  3. ECG in hypertension- definition of hypertension, how to record blood pressure, ECG in hypertension
  4. ECG in congenital heart disease- common congenital heart disease ASD, VSD, PDA, pulmonary stenosis, aortic stenosis, coarctation of aorta, TOF, definition of all these conditions, ECG changes in all these conditions
  5. ECG in other conditions- ECG in various types of cardiomyopathy, myxoedema, pericardial effusion, acute pericarditis and other vascular diseases. Bundle branch block, WPW syndrome, dextrocardia
  6. Trans esophageal echocardiogram - indications, procedure, usefulness and complications one may encounter and its management
    - Stress Echo- procedure and indications
    - Foetal echocardiogram - Procedure, basic interp
    - Contrast echocardiogram- procedure and usefulness of contrast echocardiogram
    - Myocardial contrast echo- Basic knowledge

7. Peripheral Doppler - Procedure and usefulness of peripheral Doppler
8. Coronary angioplasty - procedure, materials used, complication one may encounter and how to manage it  
Peripheral angioplasty - materials used and procedure. Angioplasty of coarctation of aorta
9. Rota ablation/FFR/IVUS/OCT - Basic knowledge
10. IABP - Uses, basic principle, indication, contraindication, complications

#### **REFERENCE**

1. Feigenbaum's Echocardiography - Latest edition
- The Echo Manual - From the Mayo Clinic - Latest edition
3. Leo Schamroth - An Introduction to Electrocardiography
4. Marriott's practical Electrocardiography
- Grossman & Baim's cardiac catheterization, Angiography and Intervention
- Braunwald's Heart Disease: A text book of cardiovascular medicine - Latest edition

## **Practical exam: 80 marks**

One common practical for all the papers with equal weightage of marks i.e. 40 practical marks for each paper.

### **Paper -III Cardiac Care Technology - Advanced**

1. Cardiac Monitoring - definition, purpose of cardiac monitoring, how to Recognise various arrhythmias how to set up a intensive coronary care unit and usefulness of ICCU
2. Interpretation of TMT report - criteria for TMT positive test contraindication for TMT conditions where TMT is not useful, complications that may occur in TMT room and its management
3. Use of defibrillator- indications, how to use the defibrillator, complications during the procedure and its management

Management of cardiac arrest - definition, causes external cardiac massage, artificial respiration and other drugs and procedures used in the management of Cardiac arrest (ACLS, BLS) Myocardial perfusion scan - procedures and usefulness of myocardial perfusion scan

Cardiac arrhythmias - *bradyarrhythmia and tachy arrhythmias and ECG diagnosis of all rhythm disturbances.*

Electrolyte disturbances - ECG in hypokalemia, hyperkalemia etc.

Holter monitoring - procedure and usefulness

4. Valvoplasties- procedure, indications, complications and treatment of balloons, mitral valvuloplasty, balloon aortic valvuloplasty balloon pulmonary valvuloplasty and balloon tricuspid valvuloplasty.

Coil closure and device closure of PDA - procedure, indications and materials used for coil and device closure of PDA

5. Device closure of ASD - procedure, indications and materials used for device closure of ASD

Device closure of VSD - procedure, indications and materials used for device closure of VSD

Electrophysiological studies - basic knowledge of EP studies mapping and ablation

6. Oxymetry - handling of the instrument and usefulness of the instrument, normal and abnormal values.
7. Pressure recording- handling of the instrument and pressures in various chambers, normal and abnormal values.
8. Temporary and permanent pacing - materials used, procedure, complications one may encounter and management. Implantable Cardioverter defibrillator device

CD recording and storage- recording and storage of all the procedures over CD

Procedure during pregnancy- precautions to be followed.

9. Nuclear Cardiology - instrumentation, radiopharmaceuticals, patient imaging techniques.

Cardiac drugs

Septal ablation therapy- indication, procedure, complications

Advanced echo- 3D, Speckle tracking- Basic knowledge

## **REFERENCE**

Feigenbaum's Echocardiography- Latest edition

1. The Echo Manual- From the Mayo clinic- Latest edition 3. Leo Schamroth- An Introduction to Electrocardiography 4. Marriott's
2. *practical Electrocardiography*
3. *Gross man & Baims cardiac catheterization, Angiography and Intervention*
4. *Braunwald's Heart Disease: A text book of cardiovascular medicine- Latest edition*



**PRACTICALEXAMINATION**

**40 Marks each paper**

***ECHO evaluation of Case with complete diagnosis Spotters***

***Interpretation of ECG/ TMT reports***

## Subsidiary subjects

### BIO STATISTICS

Time Allotted: 20 Hours

#### Course Description:

Introduction to basic statistical concepts: methods of statistical analysis; and interpretation of data

#### Behavioural Objectives:

Understands statistical terms.

Possesses knowledge and skill in the use of basic statistical and research methodology.

#### Unit - I : Introduction

Meaning, definition, characteristics of statistics. Importance of the study of statistics.

Branches of statistics.

Statistics and health science including nursing. Parameters and estimates.

Descriptive and inferential statistics. Variables and their types.

Measurement scales

#### Unit - II: Tabulation of Data

Raw data, the array, frequency distribution. Basic principles of graphical representation.

Types of diagrams - histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, ogive. Normal probability curve.

#### Unit - III : Measure of Central Tendency

Need for measures of central tendency

Definition and calculation of mean - ungrouped and grouped

Meaning, interpretation and calculation of median ungrouped and grouped. Meaning and calculation of mode.

Comparison of the mean, and mode.

Guidelines for the use of various measures of central tendency.

#### Unit - IV : Measure of Variability

Need for measure of dispersion. The range, the average deviation. The variance and standard deviation.

Calculation of variance and standard deviation ungrouped and grouped. Properties and uses of

variance and SO

### **Unit - V : Probability and Standard Distributions.**

Meaning of probability of standard distribution. The Binominal distribution.

The normal distribution.

Divergence from normality - skewness, kurtosis.

### **Unit - VI : Sampling Techniques**

Need for sampling - Criteria for good samples. Application of sampling in Community.

Procedures of sampling and sampling designs errors. Sampling variation and tests of significance.

### **Unit - VII : Health Indicator**

Importance of health Indicator.

Indicators of population, morbidity, mortality, health services. Calculation of rates and rations of health.

### **Recommended Books.**

B.K. Mahajan & M. Gupta (1995) Text Book of Preventive & Social Medicine, 2002, 17th Edition Jaypee Brothers.

## **BASICS IN COMPUTER APPLICATIONS**

The course enables the students to understand the fundamentals of computer and its applications.

### **Introduction to Data processing :**

Features of computers, Advantages of using computers. Getting data into / out of computers. Role of computers. What is Data processing? Application areas of computers involved in Data processing. Common activities in processing. Types of Data processing, Characteristics of information. What are Hardware and Software?

### **Hardware Concepts :**

Architecture of computers, Classification of computers, Concept of damage. Types of storage devices. Characteristics of disks, tapes, Terminals, Printers, Network. Applications of networking concept of PC System care, Floppy care, Data care.

### **Concept of Software.**

Classification of software : System software. Application of software. Operating system.

Computer system. Computer virus. Precautions against viruses. Dealing with viruses.

Computers in medical electronics Basic Anatomy of Computers Principles of programming

Computer application - principles in scientific research ; work processing, medicine, libraries, museum , education, information system. Data processing

Computers in physical therapy - principles in EMG, Exercise testing equipment, Laser.

Scheme of Examination for MEDICAL ELECTRONICS including COMPUTER APPLICATIONS One Written (Theory) paper: Maximum Marks: -80 marks. No Practical or Viva voce examination

## SECTION III

### CLINICAL TRAINING

#### Content and purpose

The clinical component has been designed to complement the academic program and runs throughout the course. The placement have to be designed so that the students will be able to observe the practical application of the academic course wherever possible. Content can be tailored to meet either National or Local needs as is deemed to be most appropriate.

#### 1st year: Introduction to the Hospital Setting

##### The purpose of this phase is:

- i. For the students to become familiar with some of the practical applications of the academic course
- ii. To introduce the wider hospital setting
- iii. To help the students to identify the various disciplines within a hospital, their role and the importance of cooperation.
- iv. To introduce patients in a clinical setting and begin to acquire basic communication skills.

#### 2nd year: Skills Necessary to work in a Hospital

To be completed very early in the training. The following procedures will be demonstrated to the students who will be expected to observe or participate as appropriate.

##### General procedures to be observed when patients attend for appointment:

- Lifting and moving techniques.
- Administration of bedpans, vomit bowls, etc.,
- Care and management of drugs in the hospital setting.

##### Correct procedures when dealing with patients with infectious diseases

- University precautions.

##### Correct procedures when dealing with immuno-compromised patients:

- Hygiene practices
- Simple dressings
- Sterile procedures
- Oxygen administration

**Care of patients with:**

Breathing difficulties  
Terminal illness  
Mental impairment  
Physical disability  
Special care of the geriatric and paediatric patient  
Stoma care  
Handling of patients with bone metastases  
Care of the patient following an anaesthetic  
Care of lines in the incubated patient  
Communication skills with patients and relatives  
Terminally ill and Hospice

**2nd & 3rd year: Skills Related to working in a department**

Introduction to the department. Time will be spent on each unit within the department. The purpose of this phase is to:

**In the department:**

- i. Familiarize the students with the different units within the department and the procedures carried out on each unit.
- ii. Enable the student to recognize and relate to the basic terminology introduced in the academic program.
- iii. Help to establish a sense of identity within the student group and to understand the role of the Technology in the management of various cases.

Introduce the students to the staff of the department.

Help the student to understand team roles.

Familiarize the students with written QA programs within the department.

**Equipment's and Integration:**

Begin to become competent in the manipulation of the equipment.

Be able to communicate effectively with patients.

Begin to integrate into the department as part in specific and multidisciplinary teams.

- iv. Begin to empathize with patients and to appreciate their own feelings in the clinical situation.  
Being able to handle and achieve proficiency in mould room techniques.

## **Safety & Precautions in Practice:**

Identifying the functions of various equipment and safe handling.

1. Identifying the functions on a control panel, indicating their purpose and safely using these when appropriate.
2. Safely using the accessory equipment in the correct context.
3. Correctly and safely using equipment related to patient immobilization.
4. Demonstrating the correct procedure for various techniques

## **To Achieve Clinical Competence**

**The purpose of this phase is for the students to:**

- i. Demonstrate competence in the manipulation of equipment.
- ii. Demonstrate an ability to anticipate the physical and psychological needs of the patient and respond to them.
- iii. Demonstrate the ability to communicate with ease with other staff involved in the multidisciplinary treatment of the patient.
- iv. Increasingly participate as a team member in all aspects of the patient's management.
- v. Demonstrate competence in simulator procedures.
- vi. Acquire basic computer skills.
- vii. Participate in the development / revision of formal written quality assurance procedures / programme.
- viii. Set up a patient on their first visit.

**To achieve final competency substantial time will be spent:**

- i. Setting up multi field techniques under supervision.
- ii. Participating in the quality control procedures in the department in accordance with the protocols.
- iii. Simulating and localizing a target volume.
- iv. Discussing the role of local rules and outline those in place in the different departments.

## **Graded Responsibility (structured training schedule)**

**I year:** Theory classes, observation in treatment planning and treatment execution.

**II year:** Theory classes, participation in OPD, mould room techniques, treatment planning, treatment execution under the supervision of consultant, senior technologist, project work.

**III year:** Theory classes, participation in OPD, Treatment planning and execution under supervision of consultant & Senior Technologist. Submission of Project Work, Mould Room Techniques, Quality Assurance.

## **Rotation posting**

Students may be posted to other relevant departments or other centres with better and latest equipment's for a minimum period of 1 to 2 months, for completion of training in recent advance in the specialty. The student on completion of the training shall submit a report duly signed by the concerned department to the HOD.

## **Monitoring Learning Progress**

It is essential to monitor the learning progress of each candidate through continuous appraisal and regular assessment. It not only also helps teachers to evaluate students but also students to evaluate themselves. The monitoring be done by the staff of the department based on participation of students in various teaching / learning activities. It may be structured and assessment be done using sample checklist provided (Assessment forms).

### **The learning out comes to be assessed should included:**

Personal Attitudes  
Acquisition of knowledge  
Clinical and operative skills  
Teaching skills

**Candidate should be encouraged to participate in teaching activities, seminars and literature reviews.**

### **Periodic tests :**

The departments may conduct periodic tests (Internal Assessment), the tests may include written papers, practical with viva voce.

Work diary / Log, Personal Attitudes.

### **The essential items are:**

Caring attitudes  
Initiative  
Organizational ability  
Potential to cope with stressful situations and undertake responsibility  
Trust worthiness and reliability  
To understand and communicate intelligibly with patients and other

To behave in manner which establishes professional relationships with patients and colleagues Ability to work in team

- A critical enquiring approach to the acquisition of knowledge the methods used mainly consist of observation. It is appreciated that these items require a degree subjective assessment by the guide, supervisors and peers.



## **Acquisition of Knowledge :**

The methods used comprise of 'Log Book' which records participation in various teaching / learning activities by the students. The number of activities attended and the number in which presentations are made are to be recorded. The log book should periodically be validated by the supervisors, some of the activities are listed.

The list is not complete. Institutions may include additional activities, if so, desired.

### **1. Technical skills**

Day to day work: Skills on the machines should be assessed periodically. The assessment should include the candidates' sincerity and punctuality, analytical ability and communication skills.

Clinical and procedural skills: The candidate should be given graded responsibility to enable learning by apprenticeship. The performance is assessed by the guide by direct observation. Particulars are recorded by the student in the log book.

### **2. Teaching Skills:**

#### **Book:**

Every candidate shall maintain a work diary and record his / her participation in the training programs conducted by the department such as practical, literature reviews, seminars, etc. Special mention may be made of the presentations, by the candidate as well as details of practical or laboratory procedures, if any conducted by the candidate.

### **3. Records:**

Records, log books, project report and marks obtained in tests will be maintained by the Head of the Department and will be made available to the University as indicated. The record books maintained by the student should be submitted to the Head of the Department 6 months prior to completion of the course and the head of the department makes a certification of the of the academic progress an assessment of student performance throughout the said course shall be made by the HOD.

The log book is a record of the important activities of the candidates during his training internal assessment should be based on the evaluation of the log book collectively, log books are a tool for the evaluation of the training programme of the institution by external agencies. The record includes academic activities as well as the presentations and procedures carried out by the candidate.