



SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH

(A Deemed to be University Declared under Section 3 of UGC Act, 1956)

Comprising Sri Devaraj Urs Medical College

[Constituent Unit of Sri Devaraj Urs Educational Trust for Backward Classes (Regd.)]

TAMAKA, KOLAR-563103, KARNATAKA, INDIA

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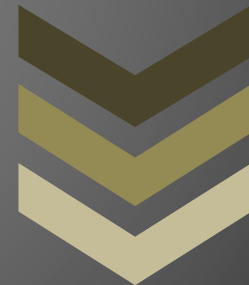
(With effect from 2019-20 batches)

Choice Based Credit System Based Graduate Curriculum for Bachelor of Science in Cardiac Care Technology

Dean
Faculty of Allied Health Sciences
Sri Devaraj Urs Academy of
Higher Education & Research
Tamaka, Kolar-563 101

Based on Approval BOM-41-2016,(Resolution No-XLI-05(3)/16) Dated-19/10/2016 Adopted
during commencement

REGULATIONS GOVERNING THE BACHELOR OF SCIENCE (B.Sc.) DEGREE UNDER CHOICE BASED CREDIT SYSTEM



2016

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION & RESEARCH

(Declared as Deemed - to - be University u/s 3 of the UGC Act

TAMAKA, KOLAR - 563 101. KARNATAKA, INDIA.

Ph:+91- 08152-210604, 210605, 243003, 243009, Fax:08152-243008,

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REGULATIONS GOVERNING

THE BACHELOR OF SCIENCE (B.Sc.)

DEGREE

UNDER CHOICE BASED CREDIT SYSTEM



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**REGULATIONS GOVERNING THE DEGREE OF BACHELOR
OF SCIENCE (B.Sc.)**

**CHOICE BASED CREDIT SYSTEM IN ALLIED HEALTH
SCIENCES**

INTRODUCTION

The University Grants Commission has brought in numerous measures to enhance equity, efficiency and excellence in the higher education system in the country. Consequently, has set considerable effectiveness with noticeable improvements in higher education system. Even though, there existed diversity in the evaluation system in Universities in India and to mitigate tremendous diversity adapted in Universities, UGC issued circular D.O.No. F.1-2/2008 (XI Plan) dated March 2009 and further in its circular D.O.No.F-1-1/2014 dated 12th November 2014 has directed all the Universities in the country to implement the Choice Based Credit system (CBCS) scheme to all the undergraduate and post graduate level degrees Programs mandatorily.

In compliance to the above, Sri Devaraj Urs Academy of Higher Education and research [SDUAHER] has notified with vide No SDUAHER/KLR/ADMN/2063/16-17 dated 20.10.16 and introduced CBCS for undergraduate Programs (B.Sc.) in order to achieve academic excellence, quality improvement and as administrative reforms. Based on this background, SDUAHER has framed REGULATION governing B.Sc. Programs under Faculty of Allied Health Sciences.

This facilitates flexible learning; multifaceted development of students with wide variety of courses viz core, electives in discipline specific, Ability enhancement and open to enhance their knowledge and skills. This qualitative change in the Programs is to the global requirements and aspiration of students and stake holders for mobility both within and across the geographical jurisdiction.

CBCS implementation brings desired uniformity in grading system and method for computing semester grade point average (SGPA) for semester performance and cumulative Grade Point average (CGPA) for overall program performance of students in the examinations.

DEFINITIONS OF KEY WORDS

Applicable to undergraduate, postgraduate level degree, diploma and certificate Programs under the choice based credit system in semester scheme.

1. University: Sri Devaraj Urs Academy of Higher Education and Research Tamaka, Kolar

2. Academic Year consists of two consecutive semesters a) Even semester (scheduled from January to June) b) Odd semester (scheduled between July to December).

3. Semester: Each semester will consists of 15-18 weeks of academic work equivalent to 90 actual teaching days.

4. Choice Based Credit System (CBCS): Provides choice for students to select from the prescribed courses/papers such as core, elective or minor or soft skill courses offered in a Program.

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

6. Program: An educational program leading to award of a Degree, diploma or certificate.

7. Course usually referred to as ‘papers’ is a component of a program. *All courses May not carry the same weight.* The courses should define learning objectives and Learning outcomes. A course may be designed to comprise lectures/ tutorials/laboratory Work/ field work/ outreach activities/ project work/ vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these.

8. Branch: Specialization or discipline of B.Sc. Degree Programs are like Medical Laboratory technology, Imaging technology, optometry, renal dialysis technology, operation theater technology, radiotherapy technology etc.

9. Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P, F and Ab

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

11. **Credit:** Each course shall carry certain number of credits. Credits normally represent the weightage of a course and are a function of teaching, learning and evaluation strategies such as number of contact hours, the course content, teaching methodology, learning expectations, etc. In the proposed Programs, credit is a unit by which course work is measured. Credit determines the number of hours of instructions required per week, generally, one credit is equivalent to one hour of teaching [lecture or tutorial] or 2 hours of practical work /field work per week.

12. **Credit Point:** It is the product of grade point and number of credits for a course.

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

14. **Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative Performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

15. **First Attempt:** A student who has completed all formalities of the semester becomes eligible to attend the examinations and has passed in first sitting; such attempt shall be treated as first attempt.

16 **Transcript or Grade Card or Certificate:** Based on the grades earned, a grade Certificate shall be issued to all the registered students after every semester. The grade Certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

B.Sc. PROGRAMS STRUCTURE

Semester	Program structure
I	Basic medical sciences Common to all disciplines as mandatory core courses (CC), Compulsory foundation course (FC) Discipline specific elective (DSE)
II	Basic medical sciences Common to all disciplines as mandatory core courses (CC), Compulsory foundation course (FC) Discipline specific elective (DSE) Ability enhancement course (AEC)
III	Core courses discipline wise (CCD) Skill enhancement course (SEC)
IV	Core courses discipline wise Ability enhancement course (AEC)
V	Core courses discipline wise (CCD) Skill enhancement course (SEC)
VI	Core courses discipline wise (CCD) Ability enhancement course (AEC)
VII	Internship

In CBCS, UG degree Programs offered in University are structured to have 7 semesters will have credits in the range of 20 to 26 an average of 23 credits per semester and a total of around 120-156 credits per under graduate program.

STRUCTURE OF B.Sc. PROGRAMS UNDER CBCS SCHEME

Semester	Core courses (1-19)	Discipline specific elective (DSE)	Ability enhancement Compulsory Course (AEC)	Skill enhancement courses (SEC)	Open elective (OE)	Foundation course
I	Paper 1 Paper 2 Paper 3 Paper 4	DSE-1 DSE-2 DSE-3 DSE-4	-	-	-	Basic Computer Application
II	Paper-1 Paper 2 Paper 3	DSE-1 DSE-2 DSE-3 DSE-4 DSE-5 DSE-6	Environmental science	-	-	English communication
III	Paper-1 Paper 2 Paper 3	-	-	SEC-1 (SAFE-I)	-	-
IV	Paper 1 Paper 2 Paper 3	-	Constitution of India	-	-	-
V	Paper 1 Paper 2 Paper 3	-	-	SEC-2 Medical Ethics	-	-
VI	Paper 1 Paper 2 Paper 3	-	Quality control	-	-	-
VII	Internship					

Types of courses. 3 types, such as core, elective and foundation

Core courses: This is the course/paper which is to be compulsorily studied by a student as a core requirement to complete the requirement of a program in a said discipline of study.

Foundation Course: 2 kinds:

1. **Compulsory Foundation courses:** mandatory to all disciplines, which based upon the content that leads to Knowledge enhancement.
2. **Elective foundation courses:** are value-based and are aimed at man-making education.

Elective courses:

This can be chosen from a pool of electives listed in University. It is expected to Support to the discipline of study, provide an expanded scope, enable an exposure to some other discipline/domain and nurture student's proficiency/skill.

An elective may be "Discipline centric" or may be chosen from an unrelated discipline. It may be called an "Open Elective."

3. CREDIT STRUCTURE FOR COURSE

Example : SEMESTER-I

courses	Lectures hours /week In a semester	Tutorials hours /week in a semester	Lab work hours /week in a semester	credits	Total credits
Course-I	02	01	02	2:1:1	04
Course-II	02	01	02	2:1:1	04
Course-III	02	01	02	2:1:1	04
Course-IV	02	01	02	2:1:1	04
Compulsory Foundation course	02	-	02	2:0:1	03
Discipline specific Elective	01	-	-	0:0:1	01
				Total	20

Course-1 Anatomy paper-1

Course-II anatomy paper 2

Course-III Physiology paper1

Course-IV Physiology paper2

Compulsory foundation course: Basics in computer applications

Discipline Specific electives (anatomy histological techniques and Physiology PFT and ECG)

REGULATIONS GOVERNING THE DEGREE OF B.Sc. PROGRAMS AS PER CHOICE BASED CREDIT SYSTEM UNDER THE FACULTY OF ALLIED HEALTH SCIENCES

1. TITLE

The undergraduate programs known as Bachelor of Science abbreviated as B.Sc.

B. Sc. Programs are as under

- Bachelor of science in Medical laboratory Technology
- Bachelor of science in Imaging Technology
- Bachelor of Science in Optometry
- Bachelor of Science in operation Theater Technology
- Bachelor of Science in Renal Dialysis technology
- Bachelor of Science in Radiotherapy Technology

2. DURATIONS

The duration of the under graduate Programs shall be three and half years consists of 7 semesters including internship.

3. CALENDAR OF EVENTS

The calendar of events in respect of each program of study shall be fixed by the University from time to time. The examination in all programs of study shall be conducted at the end of each semester.

4 ELIGIBILITY FOR ADMISSION

A Candidate seeking admission to B.Sc. program

Shall have passed two years Pre University examination conducted by the pre University board of Karnataka state, with English as one of the subject and physics, chemistry and biology as optional subjects.

OR

Shall have passed any other examination conducted by Boards/councils/intermediate examination established by state Government/central Government and recognized as equivalent to two year pre University examination by the Rajiv Gandhi University of health sciences/Association of Indian Universities (AIU) , with English as one of the subjects and physics, chemistry and biology as optional subjects and the candidate shall have passed subjects of English, physics, chemistry and biology individually.

OR

Shall have passed intermediate examination in science of an Indian university/ Boards/council or other recognized examining bodies with physics ,chemistry and biology which shall include a practical test in these subjects and also English as compulsory subject.

the candidate shall have passed subjects of English, physics, chemistry and biology individually.

OR

Candidates with regular three years diploma in respective discipline recognized by Rajiv Gandhi University of health sciences

OR

The minimum marks for the purpose of eligibility shall be forty percent (40%) in optional subjects in case of students belonging to SC/ST and OBC students from Karnataka or as decided by the Government of Karnataka. Provided further that, the student shall have studied and passed English as one of the subjects.

Candidates who have completed diploma or vocational course through correspondence shall not be eligible for Bachelor of Science Programs.

5 LATERAL ENTRY

Candidates passing diploma in concerned discipline and 10+2 or PUC shall be eligible for Lateral entry i.e. admission to II year / semester –III of the B.Sc. Program. However, this will be entertained only if vacancies are available. Applicants should possess minimum of 45 % aggregate marks in PUC (PCMB).

6 ATTENDANCES

Each course comprising theory & Practical and tutorials shall be treated as single unit for the purpose of calculation of attendance. A student shall have to attend a minimum of 75% attendance of the total instruction hours in a course (theory/practical/tutorials) in each semester from the date of commencement of the semester to last working day as notified by the University.

The students shall be informed about their attendance status periodically by the department of Allied health sciences. So that, the students shall be cautioned to make up the shortage. The Department of Allied Health sciences shall submit the list of students who have been eligible to appear examinations and list of detained students due to shortage of attendance by the end of the semester to the Controller of Examinations.

Students lacking in the prescribed attendance and progress in any subject(s) in theory and practical should not be permitted to appear for the examination. Such student shall repeat the course in which he/she is deficient with attendance.

7. MAXIMUM PERIOD FOR COMPLETION OF THE PROGRAMS

The candidate shall complete the program generally within the twice the number of years of the program from the date of commencement of the program i.e. within six years from the date of admission. If the candidate fails to complete the program within the period permitted he/she will be discharged from the University. However, fee to be paid for repeating the semesters.

8. MEDIUM OF INSTRUCTION: The medium of instruction shall be English.

9. TEMPORARY DISCONTINUATION OF THE PROGRAM

A student, who wishes to temporarily discontinue the program and continue the same subsequently, has to obtain prior permission from the University by applying through the head of the department. Such students have to take readmission to the same semester/year in the subsequent session. However, the student shall complete the course as per the maximum period fixed by the University

10. HOURS OF INSTRUCTION PER WEEK

These number of hours of instruction for each course is defined which includes lectures, tutorials, practical and assignments, as specified to individual courses.

11. COURSE PATTERN

The number of credits per semester may vary from 20 to 26, an average of 23 credits per semester and a total of around 120-153 credits for the program. Generally 1 credit per hour of instruction in theory and 1 credit for 2 hours of practical or project work or internship per week.

The courses offered in a program are divided in to core, foundation, and elective courses. The program patterned indicating hours of instruction in all semesters defined under section -3

12. THE SCHEME OF EXAMINATION

There shall be examinations at the end of each semester as per the calendar of events notified by the university.

13. INTERNAL ASSESSMENT

Regular internal assessment examinations should be conducted on each course in a semester.

There should be a minimum of at least 03 internal assessments examinations in each semester, the number of examination on each course is left to the department. An average of the best two internal assessment examinations should be taken in to consideration during calculation of marks of internal assessment.

The weightage given to the internal assessment is 20% out of the total marks assigned to the course.

Student must secure at least 35% of total marks fixed for internal assessment examination of that course to be eligible to appear for the examination

14. REGISTERING FOR THE EXAMINATIONS

Candidate to be eligible to appear for University examination, shall have undergone satisfactorily the semester of the study, shall have to obtain 75% attendance in theory and practical/tutorial jointly to become eligible to appear for examination in the subject/course, Shall secure at least 35% of internal assessment from the total marks fixed for IA in a particular subject in order to become eligible for examination, shall fulfil any other requirement that may be prescribed by the University from time to time.

And shall pass in all the courses of that semester. Such eligible students will be allotted Registration Number.

15. VALUATION OF ANSWERSSCRIPTS

Each written paper shall be valued by one internal examiner and one external examiner. Each practical examination shall be jointly conducted and evaluated by one internal examiner and one external examiner or two external examiners if there are no internal examiners. But not by two internal examiners. If the difference in marks between two valuations is more than 15% of the maximum marks, the Registrar (Evaluation) or his nominee shall check the entries and the total marks assigned by the two valuers. If there is any mistake in totalling, it shall be rectified. While checking the total, if it is observed that any one or more of the answers is not valued by one of the valuers, the Chairman, BOE shall advise internal members of the Board of Examiners to value that answer. After receiving the marks, the Chairman, BOE shall make the necessary corrections. Despite all these corrections, if the difference between the two valuations is still more than 15%, the Chairman, BOE shall arrange for third valuation by examiners from the approved panel of examiners.

In case of two valuations, the average of the two valuations and if there are three valuations, the average of the nearest two valuations shall be taken for declaring results.

16. RESULTS CLASSIFICATION OF SUCCESSFUL CANDIDATES

The results of successful candidates at the end of each semester shall be declared on the basis of Percentage of Aggregate Marks, converted to grade point and alpha – sign grade for each course on the basis of 10 point scale recommended by UGC.

The following table 1 and 2 shows the final results with grade description and grades

Table 1: Final Result/Grades Description

Semester/ Program % of marks	Semester GPA / Program CGPA	Alpha-Sign/ Letter Grade	Result/Class Description
90.0-100	9.00-10.00	O (Outstanding)	Outstanding
80.0-<90.0	8.00-<9.00	A+ (Excellent)	First Class Exemplary
70.0-<80.0	7.00-<8.00	A (Very Good)	First Class Distinction
60.0-<70.0	6.00-<7.00	B+ (Good)	First Class
55.0-<60.0	5.50-<6.00	B (Above Average)	High Second Class
50.0-<55.0	5.00-<5.50	C (Average)	Second Class
40.0-<50.0	4.00-<5.00	P (Pass)	Pass Class
Below 40	Below 4.00	F (Fail)	Fail/ Reappear
Absent	0	Ab (Absent)	

Table 2 point grading system with letter grade

Grade Point	0	0	4	5	6	7	8	9	10
Letter Grade	Ab	F	P	C	B	B+	A	A+	O
	Absent	Fail	Pass	Average	Above average	Good	Very good	Excellent	Outstanding

17. COMPUTATION OF SEMESTER GRADE POINT AVERAGE (SGPA) AND CUMULATIVE GRADE POINT AVERAGE (CGPA)

17.1 Calculation of SGPA

The following procedure to compute the Semester Grade Point Average

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e

$$\text{SGPA (Si)} = \frac{\sum (C_i \times G_i)}{\sum C_i}$$

where C_i is the number of credits of the i th course and G_i is the grade point scored by the student in the i th course.

Note: Grade point denotes the decimal of percentage of marks scored

Example for SGPA (20 Credits)

Papers/courses	P1	P2	P3	P4	P5	Total
Max. marks	100	100	100	100	100	500
% Marks Obtained	77	73	58	76	64	348
Grade Points Earned (GP)	7.7	7.3	5.8	7.6	6.4	-
Credits for the Course(C)	4	4	4	4	4	20
Credit points= GP x C	31	29	23	30	26	139

Semester Aggregate Marks : $348 / 500 = 69.60 \%$

Classification of Result : First Class

Illustration for SGPA

Course /Core paper	Credit	Grade letter As per 10 point scale	Grade point As per 10 point scale	Credit point (Credit X Grade point)
Course 1	04	A	7.7	4X7.7= 31
Course 2	04	B+	7.3	4X7.3=29
Course 3	04	B	5.8	4X5.8=23
Course 4	04	O	7.6	4X7.6=30
Course 5	04	C	6.4	4X6.4=26
	20			139
	SGPA	139/20 = 6.95		

The SGPA shall then be computed by dividing the total credit points of all the courses of a semester of the study by the total credits for the semester.

$$\text{SGPA} = \text{Total credit points} / \text{Total Credits} = 139 / 20 = \mathbf{6.95}$$

Semester Alpha Sign Grade: **B**

17.2 Calculation of CGPA

The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.

$$\mathbf{CGPA = \Sigma(C_i \times S_i) / \Sigma C_i}$$

where S_i is the SGPA of the i th semester and C_i is the total number of credits in that semester.

Example for CGPA

The Cumulative Grade Point Average (CGPA) at the end of the fourth semester shall be calculated as the weighted average of the semester GPW. The CGPA is obtained by dividing the total of GPW of all the four semesters by the total credits for the program.

ILLUSTRATION I

Semester	I	II	III	IV	V	VI	Total
Total Marks per Semester	500	500	500	500	500	500	3000
Total Marks Secured	348	460	466	450	400	400	2524
Semester Alpha Sign Grade	B+	O	O	O	A+	A+	-
SGPA	6.95	8.0	7.77	8.5	7.0	7.0	-
Semester total Credits	20	26	24	24	24	24	142

Aggregate Percentage of Marks = $2524 / 3000 = 84.1\%$

Classification of Result: **Excellent (First class with exemplary)**

Illustration for CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credit 20	Credit 26	Credit 24	Credit 24	Credit 24	Credit 24
SGPA 6.95	SGPA 8.0	SGPA 7.77	SGPA 8.5	SGPA 7.0	SGPA 7.0

$$CGPA = \frac{20(6.95) + 26(8.0) + 24(7.77) + 24(8.5) + 24(7.0) + 24(7.0)}{\text{Total credits of programme } 142}$$

$$CGPA = \frac{139 + 208 + 186.5 + 204 + 168 + 168}{142} = 7.56$$

CGPA 7.56 A (very good) First class with distinction

18. TRANSCRIPT (SCORE CARD /MARKS SHEET) FORMAT

University will issue a transcript format indicating semester performance in terms of score, grade points, SGPA and CGPA. Where the SGPA and CGPA shall be rounded off to 2 decimal places and reported in the Transcripts.

19. MINIMUM FOR A PASS

A candidate shall be declared to have passed the UG, if he/she secures at least a CGPA of 4.0 (Course Alpha-Sign Grade C) in the aggregate of both internal assessment and semester end examination marks put together in each unit such as theory papers / practical / project work / dissertation / viva-voce.

However, candidate has to secure minimum of 35% marks in written theory and practical examination separately and 40% as subject aggregate to be declared as pass. Where the subject has no practical, Viva-voce, internal assessment component, passing criteria is 40%.

20. GRACE MARKS

Any student who completes all the courses in a semester, but failed in any one of the course with a shortage of 5 or less than 5 marks, such candidates will be awarded to maximum of 5 grace marks.

21. CARRY OVER PROVISION

In the first year, candidates who fail in a first semester examinations may go to the second semesters and take the examinations. But he/she has to complete the first year courses before enters to 2nd year 3rd semester. However, candidate is allowed to carry subjects of 3rd and 4th semesters to 5th semester. . But before entering for the 6th semester, he/she has to complete all the carried subjects along with 5th semester courses. However a carryover provision restricted to the maximum period offered to a candidate for completion of the program as per the clause 7.0

22. REVALUATION

There is no revaluation permissible in the regulation

23. POWER TO REMOVE DIFFICULTIES:

- i) If any difficulty arises in giving effect to the provisions of these regulations, the Vice-Chancellor may by order make such provisions not inconsistent with the Act, Statutes, Ordinances or other Regulations, as appears to be necessary or expedient to remove the difficulty.
- ii) Every order made under this rule shall be subject to ratification by the Appropriate
a) University Authorities.

PREVIEW ONLY, NOT FOR PRINTING
GRADE CARD

SEMESTER - I B.Sc. IMAGING TECHNOLOGY (C.B.C.S)
January 2018 Examination

Register Number : 17IMT001



Student Name : Abhijith K P
Father's Name : Pramod K Das
Mother's Name : Rekha Pramod

Sl. No.	Subject / Paper		Theory / Practical		I.A. / Viva		Total		Cr. Hrs.	Gr. Pts.	Cr. Pts.	Remarks
			Max.	Sec.	Max.	Sec.	Max.	Sec.				
<u>Core Course</u>												
01	Anatomy-I : General Anatomy, Histology and Embryology	Th.	050	041	025	020	075	061	004	7.6	30.4	Pass
		Pr.	020	012	005	003	025	015				
02	Anatomy-II : Systemic Histology and Gross Anatomy	Th.	050	027	025	020	075	047	004	6.3	25.2	Pass
		Pr.	020	013	005	003	025	016				
03	Physiology-I : Physiological functions of the body	Th.	050	041	025	021	075	062	004	8.5	34.0	Pass
		Pr.	020	018	005	005	025	023				
04	Physiology-II : Physiology of Hormonal and Regulatory function	Th.	050	038	025	021	075	059	004	8.0	32.0	Pass
		Pr.	020	017	005	004	025	021				
<u>Foundation Course</u>												
05	Basic Computer Applications	Th.	050	023	-	-	050	023	003	6.1	18.4	Pass
		Pr.	020	020	-	-	020	020				
<u>Discipline Specific Elective</u>												
06	Physiology (ECG)	Th.	030	028	-	-	030	028	001	9.3	09.3	Pass
Grand Total							500	375	020		149.4	
S.G.P.A : 7.47					Grade : A (Very Good)							

35% in each Theory and Practical Examination and 40% in Subject aggregate.

College / Department : Allied Health Sciences, SDUAHER



Name & Signature
of verifier

Date : 04/04/2018

Controller of Examinations

Percentage of Marks	SGPA/CGPA	Alpha-Sign/Letter Grade	Result/Class Description
90.0-100	9.00-10.00	O (Outstanding)	Outstanding
80.0-<90.0	8.00-<9.00	A+ (Excellent)	First Class Exemplary
70.0-<80.0	7.00-<8.00	A (Very Good)	First Class Distinction
60.0-<70.0	6.00-<7.00	B+ (Good)	First Class
55.0-<60.0	5.50-<6.00	B (Above Average)	High Second Class
50.0-<55.0	5.00-<5.50	C (Average)	Second Class
40.0-<50.0	4.00-<5.00	P (Pass)	Pass Class
Below 40	Below 4.00	F (Fail)	Fail/Reappear
Absent	0	Ab	



SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH

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

BACHELOR OF SCIENCE (B.Sc.)

Cardiac care Technology

2019

SYLLABUS UNDER CHOICE BASED CREDIT SYSTEM

LEARNING OBJECTIVES OF THE CARDIAC CARE TECHNOLOGY

Basic cardiac care Technology

- To understand and get introduced to cardiac care, applied anatomy and physiology,
- Noninvasive - ECG and TMT, noninvasive echocardiography,
- cardiac invasive in adult and pediatric,
- Hardware and biomedical technology in Cath - Lab, clinical.

Basics Cardiac Evaluation and Therapies

- To learn about heart diseases and related disorders.
- Also basics of cardiovascular -Investigations and therapies.

Cardiac Evaluation and Therapies

- To learn about heart diseases and related disorders.
- To learn the concepts of Cardiovascular - investigations and therapies.

Cardiac Evaluation and Therapies

- To learn about optimum use of noninvasive and invasive cardiology techniques,

Echocardiography:

- To learn about the basics of principles, practice and applications of Echocardiography.

Structure of B.Sc. Cardiac care Technology Programme under CBCS scheme

Semester	Core courses (1-21)	Discipline specific elective (DSE)	Ability enhancement Compulsory Course (AEC)	Skill enhancement courses (SEC)	Open elective (OE)	Foundation course
I	1&2.Anatomy –I & II 3&4.Physiology – I & II	DSE-1 DSE-2 DSE-3 DSE-4	-	-	-	Basic Computer Application
II	5. Biochemistry 6. Microbiology 7. Pathology	DSE-1 DSE-2 DSE-3 DSE-4 DSE-5 DSE-6	Environmental science	-	-	English communication
III	8.Applied Pathology and Microbiology 9.Introduction to Cardiac care Technology 10.Applied Pharmacology 11.Medicine Relevant to Cardiac care Technology			SEC-1 (SAFE-I)	-	-
IV	12.Applied Pathology and Microbiology 13.Introduction to Cardiac care Technology 14.Applied Pharmacology 15.Medicine Relevant to Cardiac care Technology		Constitution of India	-	-	-
V	16.Cardiac Care Technology Clinical 17. Cardiac Care Technology Applied 18. Cardiac Care Technology Advanced			SEC-2 Medical Ethics	-	-
VI	19. Cardiac Care Technology Clinical 20. Cardiac Care Technology Applied 21. Cardiac Care Technology Advanced	-	Quality control	-	-	-
VII	Internship					

First semester distribution of hours and credits- CBCS scheme

Subject	Paper & Code	Subjects	Theory		Practical		Tutorials		Total	
			hours	Credits	hours	Credits	hours	Credits	Hours	Credits
CC- Anatomy	Paper-I A101	General Anatomy, Histology & Embryology	30	02	30	01	30	01	90	04
	Paper –II A102	Systemic Histology & Gross anatomy	30	02	30	01	30	01	90	04
CC- Physiology	Paper-I A104	Physiological functions of the body	30	02	30	01	30	01	90	04
	Paper –II A105	Physiology of hormonal and regulatory function	30	02	30	01	30	01	90	04
CF- Compulsory foundation course	1207	Basic computer application	30	02	30	01	-	-	60	03
		Total	170	11	150	05	120	04	440	19
	A108	Discipline specific electives (DSE)	Anatomy*	1 Histology Techniques preparation of slides & stains (01 credit)						01
	A109			2 Museum preparation (01 credit)						
	A110		Physiology *	1 ECG (01 credit)						
	A111			2 Pulmonary function test (01 credit)						
				Grand Total						20

Note: Each student has to choose any one discipline specific elective (DSE) offered during first semester in the core subject.

First semester B.Sc. in Cardiac Care Technology

	Paper & code	Subject	Theory	Theory IA	Viva voce	Practical	Practical I.A	Grand total	
CC-Anatomy	Paper-I A101	General Anatomy, Histology & Embryology	50	10	-	-	-	60	UNIVERSITY LEVEL EXAM
	Paper –II A102	Systemic Histology & Gross anatomy	50	10	-	-	-	60	
	A103	Anatomy common Practical	-	-	30	40	10	80	
CC-Physiology	Paper-I A104	Physiological functions of the body	50	10	-	-	-	60	
	Paper –II A105	Physiology of hormonal and regulatory function	50	10	-	-	-	60	
	A106	Physiology common Practical	-	-	30	40	10	80	
Compulsory foundation course	A107	Basic computer application	50	-	-	20	-	70	
Discipline specific electives (DSE)	A108	Histology Techniques preparation of slides & stains	30	-	-	-	-	30	
	A109	Museum preparation							
	A110	Electrocardiogram (ECG)							
	A111	Pulmonary Function Test (PFT)							
			280	40	60	100	20	500	

Note: Each student has to choose any one discipline specific elective from the University listed DE

Second semester distribution of hours and credit- CBCS scheme

Subject	Paper & Code	Subjects	Theory		Demonstrations/ assignments		Tutorials		Total	
			hours	Credits	hours	Credits	hours	Credits	Hours	Credits
Core course (CC)	Paper-I B101	Elementary aspects of biochemistry	40	02	40	01	40	02	160	05
	Paper-II B102	Elementary microbiology.	40	02	40	01	40	02	160	05
	Paper-III B103	Basics of general ,systemic, clinical, hematology and histopathological technique	40	02	40	01	40	02	160	05
Compulsory foundation Course (FC)	B104	English for communication	30	02			-	-	30	02
Ability enhancement course (AEC)	B105	Environmental science	30	02	Field visit-	01	-	-	30	03
		Total	180	09	240	07	120	03	540	20
Discipline specific electives (DE)	B106	Biochemistry*		1 Basic aspects of research (01) credit						01
	B107			2 Sample collection, preservation and transportation (01 credit)						
	B108	Microbiology*		1. Sterilization and disinfection (01 credit)						
	B109			2. Antibiotic resistance (01 credit)						
	B110			3. Specimen collection and transportation (01 credit)						
	B111	Pathology*		1.Phlebotomy (01 credit)						
B112	2. Museum Technology (01credit)									
				Grand Total					21	

Note: choose any one elective from DSE during second semester in the subject *

Second semester B.Sc. in Cardiac Care Technology

Subject	Paper/code	Subjects	Theory				Practical			
			Theory	Viva voce	I.A	Sub total	Practical	I.A	Sub total	Grand total
CC Bio chemistry	Paper-I B101	Elementary aspects of biochemistry	80	-	20	100	-	-	-	100
CC Micro biology	Paper-I B102	Elementary microbiology.	80	-	20	100	-	-	-	100
CC Pathology	Paper –I B103	Basics of general ,systemic, clinical, hematology and histopathological technique	80	-	20	100	-	-	-	100
Compulsory foundation course (CF)	B104	English for communication	50	-	-	50		-	-	50
Ability enhancement course (AEC)	B105	Environmental science-	60-	--	20	80	--	-	-	80
Discipline specific electives (DE)	B106	1. Basic aspects of research	30	-	-	30	-	-	-	30
	Biochemistry B107	2.Sample collection, preservation and transportation								
	B108	1.Sterilization and disinfection								
	B109	2.Antibiotic resistance								
	B110	3.Specimen collection and transportation								
	B111	Phlebotomy (01 credit)								
Pathology B112	3.Museum Technology (01credit)									
		Total	380		80	460	-	-	-	460

Note: No practical examinations in semester –II Biochemistry, pathology and microbiology

Third semester B.Sc. in Cardiac Care Technology distribution of hours and credit-

CBCS scheme

Subject	Paper	Subjects	Theory		Practical		Demonstrations/ assignments		Tutorials		Total	
			hours	Credits	hours	Credits	hours	Credits	hours	Credits	Hours	Credits
Core course (CC)	Paper-I C101	Applied Pathology & Applied Microbiology	40	02	40	01	40	01	40	02	160	06
	Paper-II C102	Introduction to Cardiac care Technology	40	02	40	01	40	01	40	02	160	06
	Paper-III C103	Applied Pharmacology	20	01	-	-	-	-	20	01	40	02
	Paper-IV C104	Medicine Relevant to Cardiac care Technology	40	02	-	-	40	01	20	01	100	04
Skill enhancement course (SEC)	C105	Skill Enhancement Course <i>Safe- i</i>	30	03	-	-	-	-	-	-	30	03
		Total	170	10	80	02	120	03	120	06	490	21

Third semester B.Sc. in Cardiac Care Technology

Subject	Paper/code	Subjects	Theory				Practical			Grand total
			Theory	Viva voce	I.A	Sub total	Practical	I.A	Sub total	
Core course (CC)	Paper-I C101	Applied Pathology & Applied Microbiology	100	30	20	150	40	10	50	200
		Section - A Applied Pathology	50	15	10	75	20	5	25	100
		Section –B Applied Microbiology	50	15	10	75	20	5	25	100
	Paper-II C102	Introduction to Cardiac care Technology	100	30	20	150	40	10	50	200
	Paper-III C103	Applied Pharmacology	40		10	50				50
	Paper-IV C104	Medicine Relevant to Cardiac care Technology	80	-	20	100				100
Skill enhancement course (SEC)	C105	Skill Enhancement Course <i>Safe- i</i>	50	-	-	50	-	-	-	50
		Total	370	60	70	500	80	20	100	600

Fourth semester B.Sc. in Cardiac Care Technology distribution of hours and credit-

CBCS scheme

Subject	Paper	Subjects	Theory		Practical		Demonstrations/ assignments		Tutorials		Total	
			hours	Credits	hours	Credits	hours	Credits	hours	Credits	Hours	Credits
Core course (CC)	Paper-I D101	Applied Pathology & Applied Microbiology	40	02	40	01	40	01	40	02	160	06
	Paper-II D102	Introduction to Cardiac care Technology	40	02	40	01	40	01	40	02	160	06
	Paper-III D103	Applied Pharmacology	20	01	-	-	-	-	20	01	40	02
	Paper-IV D104	Medicine Relevant to Cardiac care Technology	40	02	-	-	40	01	20	01	100	04
AECC	D105	Constitution of India	30	03	-	-	-	-	-	-	30	03
		Total	170	10	80	02	120	03	120	06	490	21

Fourth semester B.Sc. in Cardiac Care Technology

Subject	Paper/code	Subjects	Theory				Practical			Grand total
			Theory	Viva voce	I.A	Sub total	Practical	I.A	Sub total	
Core course (CC)	Paper-I D101	Applied Pathology & Applied Microbiology	100	30	20	150	40	10	50	200
		Section - A Applied Pathology	50	15	10	75	20	5	25	100
		Section –B Applied Microbiology	50	15	10	75	20	5	25	100
	Paper-II D102	Introduction to Cardiac care Technology	100	30	20	150	40	10	50	200
	Paper-III D103	Applied Pharmacology	40		10	50				50
	Paper-IV D104	Medicine Relevant to cardiac care Technology	80	-	20	100				100
AECC	D105	Constitution of India	50	-	-	50	-	-	-	50
		Total	370	60	70	500	80	20	100	600

**Fifth semester B.Sc. in Cardiac Care Technology distribution of hours and credit-
CBCS scheme**

Subject	Paper	Subjects	Theory		Practical		Demonstrations/ assignments		Tutorials		Total	
			hours	Credits	hours	Credits	hours	Credits	hours	Credits	Hours	Credits
Core course (CC)	Paper-I E101	Cardiac care Technology – Clinical	40	02	40	01	40	01	40	02	160	06
	Paper-II E102	Cardiac care Technology – Applied	40	02	40	01	40	01	40	02	160	06
	Paper-III E103	Cardiac care Technology – Advanced	40	02	40	01	40	01	40	02	160	06
Skill enhancement course (SEC)	E104	Medical Ethics	30	02	-	-	-	-	-	-	30	02
		Total	150	08	120	03	120	03	120	06	510	20

Fifth semester B.Sc. in Cardiac Care Technology

Subject	Paper/code	Subjects	Theory				Practical			Grand total
			Theory	Viva voce	I.A	Sub total	Practical	I.A	Sub total	
Core course (CC)	Paper-I E101	Cardiac care Technology –Clinical	100	30	20	150	40	10	50	200
	Paper-II E102	Cardiac care Technology – Applied	100	30	20	150	40	10	50	200
	Paper-III E103	Cardiac care Technology – Advanced	100	30	20	150	40	10	50	200
Skill enhancement course (SEC)	E104	Medical Ethics	50	-	-	50	-	-	-	50
		Total	350	90	60	500	120	30	150	650

**Sixth semester B.Sc. in Cardiac Care Technology distribution of hours and credit-
CBCS scheme**

Subject	Paper	Subjects	Theory		Practical		Demonstrations/ assignments		Tutorials		Total	
			hours	Credits	hours	Credits	hours	Credits	hours	Credits	Hours	Credits
Core course (CC)	Paper-I F101	Cardiac care Technology – Clinical	40	02	40	01	40	01	40	02	160	06
	Paper-II F102	Cardiac care Technology – Applied	40	02	40	01	40	01	40	02	160	06
	Paper-III F103	Cardiac care Technology – Advanced	40	02	40	01	40	01	40	02	160	06
Ability enhancement compulsory course	F104	Quality control	30	02	-	-	-	-	-	-	30	02
		Total	150	08	120	03	120	03	120	06	510	20

Sixth Semester B.Sc. in Cardiac Care Technology

Subject	Paper/code	Subjects	Theory				Practical			Grand total
			Theory	Viva voce	I.A	Sub total	Practical	I.A	Sub total	
Core course (CC)	Paper-I F101	Cardiac care Technology –Clinical	100	30	20	150	40	10	50	200
	Paper-II F102	Cardiac care Technology – Applied	100	30	20	150	40	10	50	200
	Paper-III F103	Cardiac care Technology – Advanced	100	30	20	150	40	10	50	200
Ability enhancement compulsory course	F104	Quality control	50	-	-	50	-	-	-	50
		Total	350	90	60	500	120	30	150	650

SEMESTER-I
B.Sc. Allied Health Science Programmes (Cardiac Care Technology)
Syllabus
Subject: Anatomy
Paper-I
Paper Title: (General Anatomy, General Histology, General Embryology)
Credits (Theory 02, Practical 01)

Theory lectures: 30

Unit –1

Introduction human body as a whole

08 hours

Definition of anatomy & its divisions, Terms of location, positions & planes, **Cell** & its organelles, **Basic tissues**- classification with examples, **Epithelium**- definition, classification, describe with examples, functions, **Glands**-classification, describe serous & mucous glands with examples

Unit-2

Locomotion & support

10 hours

Connective Tissue- components and classification, **Cartilages**- types with example & histology, **Bone**- classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, Vertebral column, Invertebral disc. **Joints**-Classification of joints with examples. **Muscular system**-structure & classification of muscular tissue. **Nervous System** Neuron, Classification of CNS,

Unit-3

Cardiovascular system

10 hours

Heart-Size, Location, Chambers, Exterior & Interior, Blood Supply Of Heart, Pericardium Systemic & Pulmonary Circulation, Branches Of Aorta, Common Carotid, Subclavian , Axillary , Brachial , Femoral and Internal Iliac artery, Portal Vein, Great Saphenous vein, Dural Venous Sinuses. **Lymphatic System** Thoracic duct Lymphoid organs- Primary & secondary, Names of regional Lymphatics, Axillary & Inguinal Lymph nodes

Unit-4

General Embryology

02 hours

Spermatogenesis & oogenesis, Ovulation, Fertilization. Placenta.

PRACTICAL

Experiments

(Credits 01 , Hours 30)

1. Histology of types of epithelium
1. Histology of serous, Mucous & mixed salivary glands
2. Histology of 3 types of cartilages,
3. Demonstration of all bones showing parts, radiographs of normal bones & joints.
4. Histology of compact bone (TS & LS)
5. Histology of skeletal (TS& LS), smooth & cardiac muscle
6. Histology of peripheral nerve
7. Demonstration of heart & vessels in the body,
8. Histology of large, medium sized arteries, & Large vein,
9. Histology of lymph node, Spleen, Tonsil & Thymus
10. Demonstration of embryology models

Syllabus
Subject: Anatomy
Paper-II
Paper Title: (Gross Anatomy, Systemic Histology)
Credits (Theory 02, Practical 01)

Theory lectures: 30

Unit –1

Gastro- Intestinal System

05 hours

Parts of GIT, Oral Cavity(lip, tongue with histology), Tonsil, Dentition, Pharynx, Salivary glands, Waldeyer's ring, Oesophagus, Stomach, Small & large intestine, Liver, Gall Bladder, Spleen and Pancreas. Thoraco abdominal Diaphragm

Unit-2

Peritoneum

02 hours

Describe in brief Peritoneal folds

Unit-3

Respiratory System

03 hours

Parts of Respiratory system , Nose, Nasal cavity, Larynx, Trachea, Pleura, Lungs, Broncho pulmonary Segments

Unit-4

Urinary System

03 hours

Gross Anatomy of Kidney, Ureter, Urinary bladder, male & female urethra,

Unit –5

Reproductive System

04 hours

Male reproductive system - Testis, Vas deferens, epididymis, prostate (gross & histology)

Female reproductive system- Uterus, Fallopian tubes, ovary (gross & histology)

Mammary gland- gross

Unit –6

04 hours

Endocrine glands

Names of all endocrine glands, Pituitary gland, Thyroid gland, Parathyroid gland,Supra renal glands- (gross & Histology)

Unit –7

Neuroanatomy

04 hours

Cerebrum, Cerebellum, midbrain, pons, medulla oblongata, Spinal cord with spinal, Nerves, Meninges, Ventricles & cerebrospinal fluid, Names of basal nuclei, Blood supply of brain, Cranial nerves,

Unit-8

Sensory Organs

05 hours

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

Experiments

(Credits 01 , Hours 30)

1. Demonstration of Gastro intestinal system, Histology of GIT
2. Demonstration of part of Respiratory System. Histology of lung & trachea
3. Demonstration of parts of Urinary system, Histology of kidney, Ureter, Urinary bladder
4. Demonstration of section of male & female pelvis with organs in situ, Histology of testis, Vas deferens, epididymis, prostate, Uterus, Fallopian tube, ovary
5. Demonstration of glands, Histology of pituitary Thyroid, Parathyroid, Suprarenal glands
6. Demonstration of all nerve plexus and palpable nerves in the body.
7. Demonstration of all parts of brain. Histology of Optic nerve, Cerebrum, Cerebellum, Spinal cord.
8. Histology of Thin and Thick Skin, Demonstration of eye ball, Histology of Cornea & Retina.

References

1. William Davis (P) understanding Human anatomy and Physiology MC Graw Hill
2. Chaurasia –A text book of Anatomy T.S Ranganathan –A text book of human Anatomy .
3. Fattana, Human anatomy Description & applied) Saunder's & C P Prism publishers, Bangalore
4. ESTER.M.Grishcimer, physiology & anatomy with practical Considerations J.P. Lippin cott. Philadelphia.
5. Bhatnagar Essentials of Human Embryology –Revised Edition Orient Blackswan Pvt.Ltd.
6. B.D.Chaurasia Human anatomy CBS publishers
7. Patrick W.Tank and Thomas R Gest Atlas of anatomy Lippincot williams and Wilkins
8. Hollinshed Text book of Anatomy Harper and Row Publishers
9. William J Larson Human embryology 3rd edition Churchill Living stone
10. Indebir Singh. Human neuro Anatomy Jaypee brothers
- 11.Halim A Surface and Radiological Anatomy CBS publishers

SEMESTER-I
B.Sc. Allied Health Science Programmes
Syllabus
Subject: Physiology
Paper-I
Paper Title: (Physiological functions of the body)
Credits (Theory 02, Practical 01)

Theory lectures: 30

Unit –1

Blood

10 hours

Composition and functions of blood, Plasma proteins types and function, RBC- formation, function physiological variation, Anemia classification-morphological and etiological effects of anemias on the body, Blood indices –colour index, MCV, MCH, MCHC, ESR normal value PCV normal value, WBC- function, life span, normal value, Immunity, Hemoglobin- functions normal value, Types of Hemoglobin, Jaundice, Platelets morphology normal value and function, Blood groups- basis of blood grouping, clinical importance, blood banking and transfusion, Haemostasis, Definition, normal values of clotting and bleeding time mechanism disorders, Anticoagulants

Unit-2

Renal System

05 hours

Structure and function of nephron, types of nephron, classify nephrons. Steps of urine formation, define GFR, GFR normal value, factors affecting GFR. Micturition reflex. Diuretics Water diuresis and osmotic diuresis, define role of kidney in regulation of Blood pressure.

Unit-3

Digestive System

05 hours

Basic structure of Digestive system, Composition and functions of Salivary secretion, Gastric secretion, Pancreatic secretion, Intestinal secretion, Bile & Gastro-intestinal movements

Unit-4

Cardiovascular System

05 hours

List the Properties of cardiac muscle, conducting system of heart. List the events of Cardiac cycle & Heart sounds. Define Cardiac output and give normal value. Effect of exercise on heart. List the mechanism of Regulation blood pressure. Electrocardiogram-physiological basis and applications. Defined shock signs and symptoms of hypovolemic shock

Unit-5

Respiratory System

05 hours

Functional anatomy, Mechanics of normal respiration, functions of surfactants and lung function test, Lung volumes and capacities, definitions of Hypoxia, cyanosis, dyspnea, asphyxia, artificial respiration, partial pressure of oxygen and carbon dioxide in arterial and venous blood.

PRACTICAL

Experiments

(Credits 01 , Hours 30)

Hematology Experiments

1. Estimation of Hemoglobin
2. Bleeding time
3. Clotting time
4. PCV
5. ESR
6. Preparation of Peripheral smear.

Syllabus
Subject: Physiology
Paper-II
Paper Title: (Physiology of hormonal and regulatory function)
Credits (Theory 02, Practical 01)

Theory lectures: 30

Unit –1

Muscle And Nerve Physiology

02 hours

Structure and functions of a neuron and neuroglia. Transmission of nerve impulse, Structure and transmission across neuro-muscular junction, Myasthenia gravis, Types of muscle fibers, Rigor mortis

Unit-2

Endocrinology

09 hours

Definition, classification of endocrine hormones, Estimation and assessment of Hormones, function of Pituitary hormone, Thyroid hormone, Parathyroid hormone, Adrenal hormone, Pancreatic hormones. List the disease associated with hyper secretion and hypo secretion.

Unit-3

Reproductive System

05 hours

Male reproductive system: Functions of testis, list the step of Spermatogenesis & factors influencing it. **Female reproductive system:** function of ovary, Ovulation tests, define menstrual cycle, give the average duration, name the hormones influencing menstrual cycle. Physiological changes during pregnancy, Pregnancy diagnostic tests. Define contraception. Describe contraceptive methods in males and females.

Unit-4

Central Nervous System

09 hours

Organization of nervous system, define synapse, synapse receptor, action potential, list sensory nerves and sensations that carry, list the motor tracts, comment on sensation of spinal cord. Higher functions- memory learning speech, Cerebro spinal fluid formation, composition and functions. Lumbar puncture. Reflex arc, functions of cortex, cerebellum, hypothalamus, basal ganglia. Limbic system- components of anterior nervous system and action of heart.

Unit-5

Special Senses

05 hours

List the special senses and their receptor, visual pathway, Colour vision, refractive errors Visual reflexes-pupillary and light reflex. structure of the middle ear and inner ear, Mechanism of hearing, Pathway of taste, primary taste sensations, receptor for smell.

PRACTICAL

Experiments

(Credits 01, Hours 30)

Clinical Physiology

1. Pulse
2. Blood pressure
3. Spirometry
4. Pulmonary function tests
5. Electro Cardio Gram (ECG)
6. General physical examination

Reference Books Physiology

1. Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism publishers
2. Chatterjee(CC) Human Physiology Latest Ed. Vol-1, Medical Allied Agency
3. Choudhari (Sujith K) Concise Medical Physiology Latest Ed. New Central Book,
4. Ganong (William F) Review of Medical Physiology. Latest Ed . Appleton
5. Pal G.K. Text book of Medical physiology Avichal publishing company
6. Campbell FJM Clinical physiology ELBS
7. Schmidt R.F. and Thews G Human physiology Springer verlong
8. Parvathi Pal A text book of practical physiology

SEMESTER-II

Papers

1. Elementary aspects of Biochemistry
2. Elementary Microbiology
3. Basics of General ,Systemic, Clinical, hematology and histopathological technique
4. English for Communication
5. Environmental Science
6. Discipline Specific Electives (DSE)
 - a. Basic aspects of research
 - b. Sample collection, preservation and transportation
 - c. Sterilization
 - d. disinfection
 - e. Antibiotic resistance
 - f. Phlebotomy
 - g. Museum Technology

Second semester distribution of hours and credit- CBCS scheme

Subject	Paper	Subjects	Theory		Demonstrations/ assignments		Tutorials		Total	
			hours	Credits	hours	Credits	hours	Credits	Hours	Credits
Core course (CC)	Paper-I B101	Elementary aspects of biochemistry	40	02	40	01	40	02	160	05
	Paper-I B102	Elementary microbiology.	40	02	40	01	40	02	160	05
	Paper-1 B103	Basics of general ,systemic, clinical, hematology and histopathological technique	40	02	40	01	40	02	160	05
Compulsory foundation Course (FC)		English for communication	30	02			-	-	30	02
Ability enhancement course (AEC)		Environmental science	30	02	Field visit-	01	-	-	30	03
		Total	180	09	240	07	120	03	540	20
Discipline specific electives (DE)		Biochemistry*	1 Basic aspects of research				(01) credit		01	
			2 Sample collection, preservation and transportation				(01 credit)			
	Microbiology*	1. Sterilization and disinfection				(01 credit)				
		2. Antibiotic resistance				(01 credit)				
		3. Specimen collection and transportation				(01 credit)				
	Pathology*	1.Phlebotomy				(01 credit)				
2. Museum Technology (01credit)										
			Grand Total						21	

Note: choose any one elective from DSE during second semester in the subject *

Second semester distribution of marks- CBCS scheme

Subject	Paper/code	Subjects	Theory				Practical			
			Theory	Viva voce	I.A	Sub total	Practical	I.A	Sub total	Grand total
CC Bio chemistry	Paper-I B101	Elementary aspects of biochemistry	80	-	20	100	-	-	-	100
CC Micro biology	Paper-I B102	Elementary microbiology.	80	-	20	100	-	-	-	100
CC Pathology	Paper –I B103	Basics of general ,systemic, clinical, hematology and histopathological technique	80	-	20	100	-	-	-	100
Compulsory foundation course (CF)		English for communication	50	-	-	50		-	-	50
Ability enhancement course (AEC)		Environmental science-	60-	--	20	80	--	-	-	80
Discipline specific electives (DE)	Biochemistry	1. Basic aspects of research	30	-	-	30	-	-	-	30
		2.Sample collection, preservation and transportation								
		1.Sterilization and disinfection								
		2.Antibiotic resistance								
		3.Specimen collection and transportation								
	Pathology	Phlebotomy (01 credit)								
3.Museum Technology (01credit)										
		Total	380		80	460	-	-	-	460

Note: No practical examinations in semester –II Biochemistry, pathology and microbiology

DETAILS OF THE COURSES

I. CORE COURSES- BIOCHEMISTRY

1. Elementary aspects of Biochemistry.

Discipline specific elective biochemistry

1. Basics aspects of Research
2. Sample collection, preservation and transportation

II CORE COURSES – MICROBIOLOGY

1. Elementary Microbiology.

Discipline specific elective Microbiology

1. Sterilization and Disinfection
2. Antibiotic resistance
3. Specimen collection and transportation

Ability enhancement course

1. Environmental Science

Compulsory foundation course

1. English Communication

III CORE COURSES – PATHOLOGY

1. Basics of general, systemic, clinical, hematology and histopathological technique

Discipline specific elective Pathology

1. Phlebotomy (01 credit)
2. Museum Technology (01credit)

SECOND SEMESTER PROGRAMME STRUCTURE

Semester	Course Opted	Course Name	Credits
second semester	Core courses- Biochemistry	1. Elementary aspects of Biochemistry	05
	Discipline specific elective – Biochemistry	1. Basics aspects of research	01
		2. Sample collection, preservation and transportation	
	Core courses – Microbiology	1. Elementary Microbiology.	05
	Discipline specific elective Microbiology	1. Sterilization and Disinfection	01
		2. Antibiotic resistance	
		3. Specimen collection and transportation	
	Ability enhancement course	1. Environmental science	03
Compulsory foundation course	1. English communication	02	
Core courses pathology	1. Basics of general, Systemic, Clinical, hematology and histopathological technique	05	
Discipline specific elective Pathology	1. Phlebotomy (01 credit) 2. Museum Technology (01credit)	01	

Note: choose any one elective from DSE during second semester in the subject *

SEMESTER-II
B.Sc. Allied Health Science Programmes Syllabus
Subject: Biochemistry
Paper-I
Paper Title: (Elementary aspects of Biochemistry)

Credits (Theory 02, Demonstration 01)

Theory lectures: 40

Unit –I

04hour

Laboratory hazards and its prevention

Common laboratory accidents and ways for its prevention. First Aid in the Clinical laboratory, Laboratory precautions, storage and handling of dangerous chemicals, safety measures. Conventional and SI Units

Unit-2

02

hours

Definition of Atomic weight, Molecular weight and Equivalent weight of elements and compounds

Unit-3

05 hours

Normality, Molarity, Molality – definition and preparation of solutions with examples

Unit 4

Acids and Bases

06hour

Definition. Properties, theories, Classification, examples of strong and weak acids. Basic concepts of Acid base reaction, Ionization of water, pH- definition, Henderson's Hassel Bach's equation, its applications and measurement.

Unit-5

02hour

Indicators

Definition, concepts, mechanisms of an indicator, use and its limitations, Commonly used indicators and their pH range. Ideal pH indicators used in different titrations. Universal indicators

Unit-6:

04hour

Buffers

Definition, mechanism of action, various types of buffers with example and applications, Preparation of Buffer solutions using pH meter

Unit-7**02hour**

Normal values and its interpretations

Unit 8**06hour****Biophysics**

Various grades of chemicals, reagents and water. Biomedical waste management Waste disposal in the laboratory. Medico legal aspects of laboratory technicians and laboratory ethics

Unit-9**05hour**

Specimen collection preservation and transportation-blood urine and other body fluids.

Unit 10**04hours****Quality control**

Definition, types, IQAS and EQAS. Calculation of mean, standard deviation and percentage of coefficient of variation.

SEMESTER-II
B.Sc. Allied Health Science Programmes
Syllabus
Subject: Biochemistry
Paper-I
Paper Title: (1.Elementary aspects of biochemistry)

Demonstrations **(01 credit)**

Unit-1 **08 hours**

Introduction to laboratory apparatus

Pipettes, Types Calibration

Burettes, beakers, petri dishes, depression plates, funnels

Flask, Bottles, Measuring cylinders, test tubes, centrifuge tubes, dispensers, tripod stand, wire gauze, Bunsen burner, desiccator, stop watch (Types - reagent bottles, wash bottles , specimen bottles)

Cuvettes (Types, precautions, uses and limitations)

Maintenance of glassware and apparatus, Significance of borosilicate glass, Care and cleaning of glass ware and plastic ware, Different cleaning solution

Unit-2 **12 hours**

Introduction to instruments

Water bath, Oven, Incubators, Water distillation plant and water deionizers (Use, care and maintenance)

Refrigerators, Cold box, Deep freezers Reflex condenser (Use, care and maintenance)

Centrifuges (Types, Principle, procedure, RPM, Use, care and maintenance, limitations)

Laboratory balances (Types, Use, care and maintenance, procedure for weighing different chemicals)

pH meter (Principle, procedure, types of electrodes use, care, maintenance)

Unit-3 **4 hour**

Dilutions, Reagent dilution techniques, calculating the dilution of a solution (Preparation of 0.1 N NaCl, 1 N Hcl etc.)

Unit –4 **4 hour**

Stock solution, working standard, saturated and super saturated solutions

Preparation of glucose, urea etc. Volumetric flask- uses, limitations in preparing standard solutions

Unit-5**4 hour**

Preparations of normal solutions Preparation of molar solutions, % solutions, v/v, w/v solutions
Conversion of % solution into molar solutions
(Preparation of 1 N Na₂CO₃, 1 N NaOH, 0.1 N HCl etc)

Unit-6**02 hours**

Titration of simple acid using a base
Demo- Titration of oxalic acid using NaOH

Unit-7**02 hours**

Normal values & interpretations –
(Normal reference range)

Reference Books Biochemistry

1. Varley – Clinical chemistry
2. TEITZ – Clinical chemistry
3. Kaplan – Clinical chemistry
4. Ramakrishna(S) Prasanna(KG), Rajna ® Text book of Medical Biochemistry Latest Ed Orient longman Bombay
5. Vasudevan (DM) Sreekumari(S) Text book of Biochemistry for Medical students , LatestEdn
6. DAS (Debajyothi) Biochemistry Latest ED Academic, Publishers, Calcutta
7. Rajagopal G & Ramakrishna –Practical Biochemistry for Medical Students oriental Blackswan Pvt. Ltd.
8. Shivarjshankara Y.M Practical Biochemistry
9. Murray R.K harpers Biochemistry Mc graw Hill
10. Pankaj Naik Biochemistry Jaypee publication..

SEMESTER-II
B.Sc. Allied Health Science Programmes Syllabus
Subject: Microbiology
Paper Title: (Elementary Microbiology)
Credits (Theory 02, Demonstration 01)

Theory lectures: 40

Unit-1

05 hour

Bacterial cell*: Anatomy, labeled diagram,

Antibiotics* : Commonly used antibiotics, target sites , misuse of antibiotics
Penicillin, Ceftriaxone, ceftazidime, ciprofloxacin, streptomycin, Erythromycin

Unit-2

06 hour

Sterilization & Disinfectants* :

- Define sterilization and disinfection
- Enumerate the different physical methods of sterilization
- Diagram of Autoclave , principle , articles to be sterilized
- Diagram of Hot Air oven, principle , articles to be sterilized
- Enumerate the commonly used chemical disinfectants & their uses.
Phenol, Aldehydes, halogens, Ethylene oxide, detergents, antiseptics
- Describe disinfection of operation theatre

Unit-3

03 hour

Infection :

Types: acute, chronic , Primary, reinfection, secondary, cross, nosocomial, iatrogenic,
subclinical, latent, atypical Source and modes of transmission with examples.

Types of infectious diseases : outbreak, endemic, epidemic , pandemic,

Unit-4

02 hour

Immunity :

Antigen & its properties

Humoral immunity: classes of immunoglobulins and its biological role

Primary Immune response :

Secondary Immune response / Booster response

Vaccines:

Killed : DPT, IPV

Live : BCG, OPV, MMR

Cell mediated immunity : cells involved , biological role

Unit-5**04 hour****Hypersensitivity***

Describe the clinical picture of anaphylaxis and mechanisms of anaphylaxis with clinical importance. Contact dermatitis: mechanism with examples

Unit-6**02 hours****Bacterial infections / diseases: ***

Draw a map of human body and mark the different lesions/ diseases caused by the following bacteria :

- Mycobacterium tuberculosis
- Vibrio cholera
- Salmonella typhi
- Leptospira
- Treponema pallidum
- Corynebacterium diphtheria
- Staphylococcus ,
- Streptococcus,
- Pneumococcus
- E. coli
- Klebsiella ,
- Pseudomonas

Describe the modes of transmission, cardinal clinical manifestations & samples to be collected in the above infections

Unit-7**08 hours****Viral infections / diseases:***

Draw a map of human body and mark the different lesions/ diseases caused by the following Viruses :

- Hepatitis A, B ,C viruses ,
- Rabies ,
- HIV
- Arboviruses – Dengue , chikungunya ,
- Measles , Mumps ,
- Influenza ,
- Herpes, Chicken pox

Describe the modes of transmission , cardinal clinical manifestations & samples to be collected in the above infections

Unit-8**02 hour****Fungal infections / diseases :***

Draw a map of human body and mark the lesions / diseases caused by opportunistic fungus

- Candida,
- Cryptococcus,
- Aspergillus,
- Penicillium,
- Mucor ,
- Rhizopus

Describe the modes of transmission , cardinal clinical manifestations & samples to be collected in the above infections

Unit-9**04 hours****Parasitic infections / diseases :***

Draw a map of human body and mark the lesions / diseases caused by the following parasites :

- Entamoeba
- Plasmodium
- Leishmania
- Trichomonas,
- Giardia ,
- Helminths : Hook worm , Round worm , Pork Tape worm , Beef Tape worm, Dog Tape worm , Pin worm , Filarial worms

Describe the modes of transmission , cardinal clinical manifestations & samples to be collected in the above infections

Describe the preventive & control measures against the helminths

Unit-10**04 hours****Bio safety**

Describe the standard precautions to be followed in the work place

Describe the hand hygiene technique

Describe the segregation and appropriate color coded containers for biomedical waste

Describe the post exposure prophylaxis against HIV, Hepatitis B and Rabies

Describe blood spill management

Note: * these chapters can be asked for long essay

Electives:

- Sterilization and Disinfectants
- Antibiotic Resistance
- Specimen collection and transportation

Reference Books Microbiology

1. Ananthanarayana & Panikar Text book of Medical Microbiology Universities press
2. Text book of Microbiology by C.P.Baveja
3. Chatterjee- Parasitology – Interpretation to clinical medicine.
4. Basic laboratory methods in Parasitology, 1st Ed, J.P.boros, New Delhi-199.
5. Basic laboratory procedures in clinical bacteriology 1st Ed, JP.Brothers, New Delhi.
6. Practical microbiology methods for LAB Technicians.
7. Bhatia R : Essentials of medical Microbiology Jay pee New delhi
8. Vandepitte J Basic laboratory procedures in clinical bacteriology Jay pee publications
9. Colle JG Practical Medical Microbiology USA
10. Chatterjee K D parasitology Chatterjee medical publishers

SEMESTER-II

B.Sc. Allied Health Science Programmes Syllabus

Subject: Pathology

Paper-I Paper Title: (Basics of Hematology, clinical pathology and histopathological techniques)

Credits (Theory 02, Demonstration 01)

Theory lectures 40

Unit-1

(Basics in General Pathology)

Cell injury: agents causing cell injury, cellular adaptations (hypertrophy, atrophy, hyperplasia, metaplasia) reversible and irreversible injury.

Inflammation: cardinal signs of inflammation, acute and chronic inflammation. Laboratory tests in inflammation.

Hemodynamics: edema, thromboembolism, shock

Neoplasia: definition of neoplasm, differences between benign and malignant tumors, carcinogenesis

Infections: tuberculosis, leprosy Environmental pollution

Unit-2

(Basics in systemic pathology)

Cardio vascular system (CVS): Atherosclerosis and its complication, hypertensive heart disease, Myocardial infarction.

Leucocytes: causes for leukocytosis and leucopenia, leukemia

Respiratory system; Pneumonia, Lung cancer

GIT: peptic ulcer, gastric cancer

Liver: viral hepatitis, Gall stones

Kidney: UTI Urinary stones

Breast: Fibroadenoma, breast carcinoma

CNS: meningitis

Unit –3

(Basics of hematology and blood banking)

Blood collection, hemoglobin, ESR,PT/aPTT

RBC's: Definition of anemia,iron deficiency anaemia and megaloblastic anaemia

Blood grouping and Rh typing

Unit-4

(Clinical Pathology)

Urine examinations

Collection and transport of various clinical specimens

Unit-5 (Techniques in pathology)

Basics in tissue processing, FNAC, staining techniques.

DEMONSTRATIONS

Hemoglobin estimation.

Erythrocytes sedimentation Rate (ESR)

Urine examination

H&E staining

Blood grouping

Rh typing

Reference Books Pathology

1. Culling Histopathology techniques
2. Bancroft Histopathology techniques
3. Koss – cytology
4. Winifred Greg – Diagnostic cytopathology
5. Orell – Cyto Pathology
6. Todd & Sanford Clinical Diagnosis by laboratory method
7. Dacie & Lewis – Practical Haematology
8. Ramanic Sood, Laboratory Technology (Methods and interpretation)
4th Ed. J.P. Bros, New Delhi
9. Satish Gupta Short text book of Medical Laboratory for technician J.P. Bros,
New Delhi
10. Sachdev K.N. Clinical Pathology and Bacteriology 8th Ed, J.P. Bros, New Delhi-
11. Krishna - Text book of Pathology, Orient Longman PVT Ltd.

SEMESTER-III

Papers

1. Applied Pathology & Microbiology
2. Introduction to Cardiac care Technology
3. Applied Pharmacology
4. Medicine Relevant to Cardiac care Technology
5. Skill Enhancement Course

SAFE -I

SEMESTER-III
B.Sc. in Cardiac Care Technology programme Syllabus
Paper 1 Subject: Applied Pathology & Microbiology
Credits (Theory 02, Practical 01, Demonstration 01)

APPLIED PATHOLOGY

I. 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.

Applied Microbiology

APPLIED MICROBIOLOGY

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.

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.

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

SEMESTER-III
B.Sc. in Cardiac Care Technology programme Syllabus
Paper II Subject: Introduction to Cardiac Care Technology
Credits (Theory 02, Practical 01, Demonstration 01)

Introduction to Cardiac Care technology

I. Electrocardiography (ECG)

1. Basic Principles

The Electrocardiographic paper

The Electrocardiograph

The Electrical field of Heart

The leads: Standard limb, Precordial lead, 'V' lead & 'AV' lead

Basic ECG deflections

Basic action of electrocardiograph

2. Normal EG

The 'P' wave

The 'qrs' complex

The genesis of 'qrs' complex

T wave; the S-T segment

The 'U' wave

Rate & rhythm

So called rotation of the heart – The Q-T interval

3. The Electrical axis

4. Precordial pattern of ECG

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

6. Sundle branch block

General principles

Right Bundle branch block

Left bundle branch block

The Hemi blocks (Fasicular block)

II. Exercise stress Testing

1. Exercise

2. Exercise protocols

3. Electrocardiography measurements

4. Exercise testing – Indication and techniques

SEMESTER-III
B.Sc. in Cardiac Care Technology programme Syllabus
Paper III Subject: Applied Pharmacology
Credits (Theory 02, Practical 01, Demonstration 01)

APPLIED PHARMACOLOGY

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

I. 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.

a. Antihypertensives

- Beta Adrenergic antagonists
- Alpha Adrenergic antagonists
- Peripheral Vasodilators
- Calcium channel blockers

b. Antiarrhythmic drugs

c. Cardiac glycosides

d. Sympathetic and nonsympathetic inotropic agents.

e. Coronary vasodilators.

f. Antianginal and anti failure agents

g. Lipid lowering & anti atherosclerotic drugs.

h. Drugs used in Haemostasis – anticoagulants Thrombolytics and antithrombolytics.

i. Cardioplegic drugs- History, Principles and types of cardioplegia.

j. Primary solutions – History, principles & types.

k. 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 opioid analgesics

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

SEMESTER-III
B.Sc. in Cardiac Care Technology programme Syllabus
Paper IV Subject: Medicine Relevant to Cardiac Care Technology
Credits (Theory 02, Practical 01, Demonstration 01)

Medicine Relevant To Cardiac Care Technology

Cardiovascular System

Ischaemic heart diseases

Rheumatic heart disease

Congenital heart disease

Hypertension

Aortic Aneurysms

Cardiomyopathy

Peripheral vascular disease

Pulmonary edema 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

SEMESTER-IV

Papers

1. Applied Pathology & Microbiology
2. Introduction to Cardiac care Technology
3. Applied Pharmacology
4. Medicine Relevant to Cardiac care Technology

SEMESTER-IV
B.Sc. in Cardiac Care Technology programme Syllabus
Paper I Subject: Applied Pathology & Microbiology
Credits (Theory 02, Practical 01, Demonstration 01)

APPLIED PATHOLOGY

I. 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 edema.
- Pleural effusion – causes, effects and diagnosis.

II. RENAL SYSTEM

- Clinical manifestations of renal diseases. Briefly causes, mechanism, effects and laboratory diagnosis of ARF & CRS. Briefly Glomerulonephritis and Pyelonephritis.
- End stage 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.
4. Estimation Bleeding & Clotting time.

APPLIED MICROBIOLOGY

1. Importance of sterilization:

- a. Disinfection of instruments used in patient care: Classification, different methods, advantages and disadvantages of the various methods.
- b. Disinfection of the patient care unit
- c. Infection control measures for ICU's 10 Hours

2. 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
6. Preparation of materials for autoclaving: Packing of different types of materials, loading, holding time and unloading. 4 Hours

PRACTICALS- 30 HOURS

1. 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.
3. The various methods employed for sterility testing.
4. Interpretation of results of sterility testing.
5. Disinfection of wards, OT and Laboratory.

Scheme of Examination

Theory

There shall be one theory paper of three hours duration carrying 50 marks.

Distribution of type of questions and marks for Applied Microbiology shall be as given under.

SEMESTER-IV
B.Sc. in Cardiac Care Technology programme Syllabus
Paper II Subject: Introduction to Cardiac Care Technology
Credits (Theory 02, Practical 01, Demonstration 01)

Echocardiography

1. Principles of Echocardiography

- Basic principles of ultrasound
- M-Mode of Echocardiography
- Two dimensional Echocardiography
- Doppler Echocardiography; color 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

a. Introduction to Doppler color Echocardiography

The Doppler principles

Doppler ultrasound techniques

Color Doppler flow imaging

Clinical application of Doppler Echocardiograph

b. Physical principles & instrumentation in spectral & color

Doppler flow imaging

c. Physical principles and Doppler effect. The Doppler
Echocardiography system display

d. Blood flow pattern – Laminar & non-laminar flow

e. Doppler Echo cardiograph modes

- Continuous wave Doppler system
- Pulsed Doppler system
- High pulse repetition frequency
- Problems of color imaging

5. Contrast Echo

6. Echo measurements- 'ASE' recommendation

SEMESTER-IV
B.Sc. in Cardiac Care Technology programme Syllabus
Paper III Subject: Applied Pharmacology
Credits (Theory 02, Practical 01, Demonstration 01)

I. Inhalational gases and emergency drugs.

II. Pharmacotherapy of respiratory disorders

- Introduction – Modulators of bronchial smooth muscle tone and pulmonary vascular smooth muscle tone

- Pharmacotherapy of bronchial asthma
- Pharmacotherapy of cough
- Mucokinetic and mucolytic agents
- Use of bland aerosols in respiratory care.

III. Corticosteroids – Classification, mechanism of action, adverse effects and complications. Preparation, dose and routes of administration.

IV. Diuretics

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

V. 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.

VI. 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.

Demonstration

1. 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 Pharmaco therapeutics, 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.

3. Laurence and Bennet, Clinical Pharmacology, ELBS Edition, 9th Edition.

SEMESTER-IV
B.Sc. in Cardiac Care Technology programme Syllabus
Paper IV Subject: Medicine Relevant to Cardiac Care Technology
Credits (Theory 02, Practical 01, Demonstration 01)

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

SEMESTER-V

Papers

1. Cardiac Care Technology-Clinical
2. Cardiac Care Technology – Applied
3. Cardiac Care Technology-Advanced

SEMESTER-V
B.Sc. in Cardiac Care Technology programme Syllabus
Paper I Subject: Cardiac Care Technology- Clinical
Credits (Theory 02, Practical 01, Demonstration 01)

Paper-I Cardiac Care Technology – Clinical

1. Interpretation of Normal ECG and Basic abnormalities of ECG in RHD, IHD & CHD
2. Echo in rheumatic heart disease – Echo in mitral stenosis, mitral incompetence, aortic stenosis, aortic incompetence, pulmonary hypertension. Post AVR, post MVR. Prosthetic valve malfunction, LA clot.
3. Echo in congenital heart disease – Echo in ASD, VSD, PDA pulmonary stenosis, aortic stenosis, coarctation of aorta, TOF. dextrocardia.
4. Echo in ischemic heart disease – Echo in acute myocardial infarction, old myocardial infarction and other ischemic heart disease related conditions, LV aneurysm
5. Echo in other cardiovascular disease- Echo in various types of cardio myopathy infective endocarditis diseases of aorta, mitral valve prolapse, myxoma and other cardio vascular diseases.
6. Assessment of Cardiac function- measurements of all cardiac chambers and assessment of cardiac function

SEMESTER-V
B.Sc. in Cardiac Care Technology programme Syllabus
Paper II Subject: Cardiac Care Technology- Applied
Credits (Theory 02, Practical 01, Demonstration 01)

Paper –II Cardiac Care Technology – Applied

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 incompetenace
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 pericardities 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

SEMESTER-V
B.Sc. in Cardiac Care Technology programme Syllabus
Paper III Subject: Cardiac Care Technology- Advanced
Credits (Theory 02, Practical 01, Demonstration 01)

Paper –III Cardiac Care Technology – Advanced

1. Cardiac monitoring – definition, purpose of cardiac monitoring, how to Recognize 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
4. Management of cardiac arrest – definition, causes external cardiac massage, artificial respiration and other drugs and procedures used in the management of Cardiac arrest
5. Myocardial perfusion scan – procedures and usefulness of myocardial perfusion scan
6. Cardiac arrhythmias – bradyarrhythmia and tachy arrhythmias and ECG diagnosis of all rhythm disturbances. Sinus arrhythmia, APC, FPC, VPC, VF, VT, AF, SVT, IOHB, IIOHB, complete heart block
7. Electrolyte disturbances – ECG in hypokelemia, hyperkelemia etc.,.
8. Holter monitoring – procedure and usefulness
9. Valvoplasties- procedure, indications, complications and treatment of ballons, mitral valvuloplasty, ballon aortic valvuloplasty ballon pulmonary valvuloplasty and balloon tricuspid valvuloplasty.
10. Coil closure and device closure of PDA – procedure, indications and materials used for coil and device closure of PDA

SEMESTER-VI

Papers

1. Cardiac Care Technology-Clinical
2. Cardiac Care Technology – Applied
3. Cardiac Care Technology-Advanced

SEMESTER-VI
B.Sc. in Cardiac Care Technology programme Syllabus
Paper II Subject: Cardiac Care Technology- Clinical
Credits (Theory 02, Practical 01, Demonstration 01)

Paper-I Cardiac Care Technology – Clinical

1. Echo in pericardial disease- pericardial effusion, cardiac tamponade, constrictive pericarditis
2. 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
3. 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
4. Right heart catheterisation – procedure, cath position, oxymetry at various levels, angiogram done and its interpretation
5. Left heart catheterisation – procedure, cath position, oxymetry at various levels, angiogram done and its interpretation
6. Coronary angiogram – procedure, materials used, type and amount dye used, indications and contraindications, various pictures recorded in various angles and gross interpretation.
7. Peripheral angiogram – procedure, indication and contraindication

PRACTICAL EXAMINATION

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

SEMESTER-VI
B.Sc. in Cardiac Care Technology programme Syllabus
Paper II Subject: Cardiac Care Technology- Applied
Credits (Theory 02, Practical 01, Demonstration 01)

Paper-II Cardiac Care Technology – Clinical

1. Stress Echo- procedure and indications
2. Peripheral Doppler – Procedure and usefulness of peripheral Doppler
3. Coronary angioplasty–procedure, materials used, complication one may encounter and how to manage it
4. Peripheral angioplasty – materials used and procedure. Angioplasty of contraction of aorta
5. Fetal echocardiogram – Procedure, basic interpretation
6. Contrast echocardiogram – procedure and usefulness of contrast echocardiogram
7. Myocardial contrast echo- Basic knowledge

PRACTICAL EXAMINATION

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

SEMESTER-VI
B.Sc. in Cardiac Care Technology programme Syllabus
Paper III Subject: Cardiac Care Technology- Advanced
Credits (Theory 02, Practical 01, Demonstration 01)

Paper III Subject: Cardiac Care Technology- Advanced

1. Device closure of ASD – procedure, indications and materials used for device closure of ASD
2. Device closure of VSD – procedure, indications and materials used for device closure of VSD
3. Electrophysiological studies – basic knowledge of EP studies mapping and ablation
4. Oxymetry – handling of the instrument and usefulness of the instrument, normal and abnormal values.
5. pressure recording- handling of the instrument and pressures in various chambers, normal and abnormal values
6. Temporary and permanent pacing – materials used, procedure, complications one may encounter and management. Implantable Cardioverter defibrillator devices
7. CD recording and storage- recording and storage of all the procedures over CD
8. Procedure during pregnancy- precautions to be followed.
9. Nuclear Cardiology – instrumentation, radiopharmaceuticals, patient imaging techniques.

PRACTICAL EXAMINATION

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

Distribution of Type, Number and marks of Questions for Various Subjects

THEORY

Subjects having maximum marks = 100			Total
Type of question	Number of questions	Marks for Each question	
Essay type	02 (no choice)	10	20
Short essay type	12 (Answer any 10)	5	50
Short answer type	12 (Answer any 10)	3	30

Subjects having maximum marks = 80			Total
Type of question	Number of questions	Marks for Each question	
Essay type	02 (no choice)	10	20
Short essay type	8 (Answer any 6)	5	30
Short answer type	12 (Answer any 10)	3	30

Subjects having maximum marks = 50			Total
Type of question	Number of questions	Marks for Each question	
Essay type	02 (no choice)	10	20
Short essay type	5 (Answer any 3)	5	15
Short answer type	7 (Answer any 5)	3	15

Subjects having maximum marks = 40			Total
Type of question	Number of questions	Marks for Each question	
Essay type	01	10	10
Short essay type	4 (Answer any 3)	5	15
Short answer type	6 (Answer any 5)	3	15

-End-