



YENEPOYA UNIVERSITY

Deralakatte, Mangaluru - 575018

REGULATIONS AND CURRICULUM GOVERNING

UNDERGRADUATE PROGRAM

B.Sc CARDIO VASCULAR TECHNOLOGY

(CURRICULUM - EFFECTIVE FROM 2016-17)

ATTESTED

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Recognized under Sec 3(A) of the UGC Act 1956 as per Notification No. F.9-11/2007-U.3 (A) dated 27th February 2008

"Accredited by NAAC with 'A' Grade"

Ref: No. YU/REG/ACA/27-ACM/2016

25.01.2017

NOTIFICATION

Sub: Starting of (1) B.Sc. Respiratory Care Technology and
(2) B.Sc. Cardiac Care Technology courses during the
Academic year 2016 - 17

Ref: 27th meeting of the Academic Council held on 09.01.2017 (Agenda-8)

The Academic Council at its 27th meeting held on 09.01.2017 vide Agenda – 8 has approved the revised curriculum for the B.Sc. Respiratory Care Technology and B.Sc. Cardiac Care Technology as proposed by the Board of Studies concerned and recommended by the Faculty of Medicine.

The course may be started during the academic year 2016-17 with annual intake of 10 for each programme.


(Dr. G. Shreekumar Menon)
REGISTRAR

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Copy to:

1. Principal – YMC
2. Coordinator, B.Sc. Tech. Courses
3. CoE
4. Academic Section



Recognized under Sec 3(A) of the UGC Act 1956 as per Notification No. F.9-11/2007-U.3 (A) dated 27th February 2008

Ref: No. YU/REG/ACA/ACM-30/2017

04.10.2017

The Principal
Yenepoya Medical College

Sub: Change in nomenclature

Ref: Decision taken at the 30th meeting of the Academic Council held on
20.10.2017, vide Agenda – 20

The change in nomenclature of B.Sc. Cardiac Care Technology to Cardiovascular Technology has approved at the Academic Council meeting held on 20.10.2017. The necessary changes can be made in the regulations of B.Sc. (Tech) course and the final version with the changes made may be submitted back to Vice Chancellor for approval.

(Dr. G. Shreekumar Menon)
REGISTRAR

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Handwritten notes:
18/11/2017

Regulations and Course Curriculum for B.Sc. Cardiovascular Technology

(B. Sc. CVT)

Introduction

B. Sc. in Cardiovascular technology (B.Sc. CVT) is a 4-year undergraduate program including internship offered by Yenepoya College of Allied and Health care professionals.

This course is designed to provide board-based theoretical knowledge and up-to-date technical training that is relevant to current cardiac clinical practice. The areas in which training is provided include electrocardiography, treadmill stress testing, 24-hour ambulatory ECG monitoring, 24hour blood pressure monitoring, Echocardiography and cardiac catheterization laboratory technology. The course includes theory classes, practical “hands on” training and periodic evaluations. Candidates successfully completing the course will be adequately equipped to independently provide technical assistance at any advanced cardiac centre.

Programme Educational Objectives

- This program enables candidates to evolve into a full trained, qualified cardiovascular technologist capable of working independently.
- Following this program, candidates become well-versed in performing and interpreting techniques such as Electrocardiography, Exercise Stress Testing, Echocardiography, Cardiac catheterization, and ultrasound instrumentation.
- Graduate will integrate knowledge and skills of cardiovascular technology to provide healthcare solutions for the benefit of the society.
- Following this program, candidates become well-prepared for working in a team associated with assisting cardiac surgeons and cardiologists in a high-pressure hospital environment.
- Graduate will be cognizant and responsive to the cardiovascular care of the community and possess a commitment to continuously improve knowledge and abilities.

- Graduates will be able to demonstrate leadership qualities and entrepreneur skills by working and communicating effectively in interdisciplinary environment, either independently or in a team.

Programme Outcomes

Upon successful completion of this course, the student will be able to:

- Apply knowledge of human cardiovascular system in the management of cardiovascular related disorders.
- Plan and implement clinical and scientific activities related to the profession of cardiovascular technology.
- Identify and solve complex problems arising during cardiovascular care of the patients.
- Utilize modern tools and techniques in the arena of cardiovascular technology for patient compliance.
- Act efficiently as a leader in various inter-disciplinary and multi-disciplinary health care communities.
- Apply the knowledge and skills to assess societal and legal issues related to cardiovascular care of the patients.
- Understand the impact of the cardiovascular technology in societal and environmental contexts to provide innovative solutions.
- Imbibe ethical practices and moral values in personal and professional endeavors.
- Write, interpret and communicate effectively and scientifically.
- Use modern tools and techniques for the efficient management of cardiovascular diseases.
- Tackle future challenges through lifelong learning.

Programme Highlights

Well-defined academic curriculum crafted to current clinical needs; qualified and eminent faculty members from both clinical and academic research backgrounds; transfer of knowledge through project as well as research-based activities; inter-disciplinary project-based learning; state-of-the-art laboratories; exceptional computing facilities; clinical interaction and hospital-based internships.

Core Modules

Anatomy, Physiology and Biochemistry, Pathology, Microbiology, Systemic Pathology, Applied Microbiology related to clinical features and treatment of cardiovascular diseases and Applied Pharmacology related to Cardiac Technology, Cardiac anatomy and physiology, Basic ECG, Advanced ECG and Holter Monitoring, Cardiac Embryology, Congenital Heart diseases-1, Physics & Instrumentation, Congenital Heart diseases-2, Clinical Cardiology, Cardiac Stress Tests & Nuclear Cardiology, Valvular and Aortic Heart diseases, Applied Echocardiography, Cardiac Pacemakers & Defibrillators Cardiac Cath and Intervention -1. Ischemic, Myo-Pericardial heart diseases & Cardiac Masses, Advanced Echocardiography, Cardiac Cath & Intervention – 2. Clinical Cardiovascular Technology 1 & 2.

Career Avenue

Students will be trained to apply specialized occupational theory, skills and concepts to work independently as qualified cardiovascular technologist and becomes an integral member of the cardiac catheterization and electrophysiology laboratory teams. Graduate of this programme are placed in multispecialty hospitals to assist the Physicians as cardiovascular Technician, Echocardiographer, Cardiac Sonographer, Cardiac electrophysiology specialist etc.

A student aspiring for more knowledge in the same or related domain can opt for higher studies such as MSc in Cardiovascular technology or MSc in Cardiac Technology, MSc in Echocardiography, MSc in Cardiac Catheterization etc.,

Expected skill to be acquired:

A patient's life may depend on the efficiency of the Cardiac Care Technologists. The course has been designed to teach eligible candidates to:

- Understand and acquire knowledge in basic sciences related to cardiovascular diseases.
- Develop effective technical skills in the performance of diagnostic tests like ECG, TMT, ECHO, assist during TEE, Stress Echo and therapeutic catheter-based procedures.

- Ability to learn the indications, risks, and benefits of these procedures and to develop a comprehensive understanding of the role of these procedures in the management of patients with cardiovascular disease.
- Able to identify whether a procedure is appropriate for the patient referred, recognize risks and benefits of planned procedures, provide patients with necessary information to give a valid informed consent to the procedure, and follow patients following the procedure to ensure optimal management of any procedural complications.
- Gain knowledge of established and evolving biomedical, clinical, epidemiological and social-behavioral sciences, as well as the application of this knowledge to patient care.
- Develop commitment to carrying out professional responsibilities and an adherence to ethical principles.
- Demonstrate interpersonal and communication skills that result in the effective exchange of information and teaming with patients, their families, and professional associates.

They are taught to demonstrate knowledge and practice of basic patient care and to coordinate with other members of the team. Protect and uphold the rights of the patient, Ethical and legal issues and responsibilities and to Maintain professional confidentiality.

1. Eligibility for admission:

- Two-year Pre-University examination or equivalent as recognized by Yenepoya University with, Physics, Chemistry and Biology as principal subjects of study and English as one of the subjects of study with not less than 40% of marks.
- Pre-degree course from a recognized university considered as equivalent by Yenepoya University, (two years after ten years of schooling) with Physics, Chemistry and Biology as principal subjects of study.
- Any equivalent examination recognized by the Yenepoya University for the above purpose, with Physics, Chemistry and Biology as principal subjects of study.
- Vocational higher secondary education course conducted by Vocational Higher Secondary Education, with five subjects including Physics, Chemistry, Biology and English in addition to vocational subjects conducted, is considered equivalent to plus –two'[10+2] examinations of Government of Karnataka Pre University Course.

- **Lateral entry:** Candidates with 3 years Diploma from recognized Paramedical board are eligible to take admission to the second year B.Sc. CVT/CCT.(if applicable)

Note:

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 three years followed by six months of internship.

3. Medium of instruction:

The medium of instruction and examination shall be in English.

4. Attendance

Candidates should have attended at least 75% 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 the University, in each of the subjects prescribed for that year, separately in theory and practical, to be eligible to appear for the university examinations. Candidates lacking in prescribed percentage of attendance in any subject, either in theory or practical, in the first appearance, will not be eligible to appear for the University examination in that subject, unless they put in the required attendance, to appear in the subsequent examinations.

5. Internal assessment (IA):

There shall be minimum of three periodical Internal Assessment (IA) tests in theory and practical for each subject spread over evenly in an academic year. The average marks of the best two tests will be calculated and after reducing the marks suitably as specified.

Due to certain reasons if the department/college conducts fourth Internal Assessment the same shall be conducted at least one month before the University Examination. The average marks of the best two tests will be calculated and after reducing the marks suitably as specified.

The marks of IA shall be communicated to the university at least 15 days before the commencement of the University examination. Candidates have to secure 35% marks in the IA in each subject to become eligible to appear in the university examination. The marks of the Internal Assessment must be displayed on the notice board of the respective department/college within a fortnight from the date test is held.

If a candidate is absent for any of the tests due to genuine and satisfactory reasons, such a candidate may be given a re – test, within a fortnight of the test.

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

6. Conduct and discipline:

- 1) Candidates shall conduct themselves within and outside the premises of the Institute in a manner befitting the student of an Institution of national importance.
- 2) As per the order of Honorable Supreme Court of India, **ragging in any form is considered as a criminal offence and is banned. Any form of ragging will be severely dealt with.**
- 3) The following act of omission and/or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures:
 - a) Ragging as defined and described by the Supreme Court/Government
 - b) Lack of courtesy and decorum; indecent behaviour anywhere within or outside the campus.
 - c) Wilful damage or stealthy removal of any property/belongings of the Institute/Hostel or of fellow students/citizens.
 - d) Possession, consumption or distribution of alcoholic drinks or any kind of hallucinogenic drugs.
 - e) Mutilation or unauthorized possession of library books.
 - f) Noisy or unseemly behaviour, disturbing studies of fellow students.

g) Hacking in computer systems (such as entering into other person's domain without prior permission, manipulation and/or damage to the computer hardware and software or any other cybercrime etc.)

h) Plagiarism of any nature.

i) Any other act of gross indiscipline as decided by the Board of Management from time to time.

4) Commensurate with the gravity of offense, the punishment may be: reprimand, fine, expulsion from the hostel, debarment from an examination, disallowing the use of certain facilities of the Institute, rustication for a specific period or even outright expulsion from the institute, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.

7. Graduation requirements:

A candidate shall be declared eligible for the award of the degree if he/she has:

- Fulfilled Degree Requirement.
- No dues to the university, institution, department, hostels, Library, etc.
- No disciplinary action pending against him.

The award of the degree must be recommended by the Board of management.

8. Convocation:

Degrees will be awarded in person for the candidates who have graduated during the preceding academic year. Degrees will be awarded in absentia to such candidates who are unable to attend the convocation. Candidates are required to apply for the convocation along with prescribed fee within the specified date, after having satisfactorily completed all the requirements of the course.

Provisional pass certificate will be issued by the University provided the candidate fulfils requirements mentioned in clause (10) above. The provisional certificate will be issued on submission of an application through the college and will be valid until the convocation.

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	Practical	Total
		No. of hours	No. of hours	No. of hours
1.	Human Anatomy	70	20	90
2.	Physiology	70	20	90
3.	Biochemistry I	70	20	90
4.	Pathology I	70	20	90
5.	Microbiology I	70	20	90
	Total	350	100	450

Sl. No.	Subsidiary Subject	Theory
		No. of hours
1.	English	25
2.	Kannada	25
3.	Healthcare	40
	Clinical /Lab Postings	470

Table - II Distribution of Teaching Hours in Second Year Subjects

Main Subjects					
Sl. No.	Subject	Theory	Practical	Clinical /Lab Posting	Total
		No. of hours	No. of hours	No. of hours	No. of hours
1.	Sec A: Applied Pathology II	30	30	-	120
	Sec B: Applied Microbiology II	30	30	-	120
2.	Introduction to Cardiac Vascular Technology	80	100	650	830
3.	Pharmacology	50	-	-	50
4.	Medicine relevant to Cardiac Vascular Technology	50	-	-	50
	Total	240	160	650	1050

Sl. No.	Subsidiary Subject	Theory
		No. of hours
1.	Sociology	20
2.	Constitution of India	10
3.	Environmental Science & Health	50

Table - III Distribution of Teaching Hours in Third Year Subjects

Main Subjects					
Sl. No.	Subject	Theory	Practical	Clinical /Lab Posting	Total
		No. of hours	No. of hours	No. of hours	No. of hours
1.	Cardio Vascular Technology- Clinical	50	50	250	350
2.	Cardio Vascular Technology-Applied	50	50	250	350
3.	Cardio Vascular Technology- Advanced	50	50	250	350
	Total	150	150	750	1050

Sl. No.	Subsidiary Subject	Theory
		No. of hours
1.	Ethics & Database Management	50
2.	Research & Biostatistics	20
3.	Computer Application	10

Scheme of Examination:

There shall be a University Examination at the end of each academic year.

First Year Examination:

The examination for both main and subsidiary subjects for all courses in Allied Health Sciences shall be common in the first year.

The University examination for 1st year shall consist of theory examinations **ONLY**.

Second- and Third-year Examination:

The University examination for II and III year shall consist of written Examination & Practical.

Evaluation is based on formative evaluation (internal assessment) and summative evaluation (University examination).

For I year

Main Subjects: Anatomy, Physiology, Pathology, Microbiology, Biochemistry.

Subsidiary subjects: English, Kannada, Healthcare

TABLE- IV

Distribution of Subjects and marks for First Year University theory Examination of B.Sc. CVT

A	Main Subjects*	Written Paper		IA 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 –I	3 hours	80	20	100
4	Pathology-I	3 hours	80	20	100
5	Microbiology-I	3 hours	80	20	100

Distribution of Subsidiary Subjects and marks for first Year Examination of BSc.CVT

B	Subsidiary Subjects**	Written Paper		IA Theory	Total
		Duration	Marks	Marks	Marks
1	English	3 hours	80	20	100
2	Kannada	3 hours	80	20	100
3	Healthcare	3 hours	80	20	100

Note: The University Examination for first year shall consist of only theory examination and there shall be no university practical examination.

IA = Internal Assessment

Main Subjects shall have University Examination.

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

TABLE – V**Distribution of Subjects and marks for Second Year Examination of BSc. CVT**

Paper	Subjects	Theory				Practical			Grand Total
		Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
A	Main Subjects								
1	<u>Section A: Applied pathology</u> <u>Section B: Applied microbiology</u>	50 50	30	20	150	40	10	50	250
2	Introduction to Cardiac Vascular technology	100	30	20	150	40	10	50	200
3	Pharmacology	80	--	20	100	No practical			100
4	Medicine relevant to Cardio Vascular Technology	80	--	20	100	No practical			100

Distribution of Subsidiary Subjects and marks for Second Year Examination of B.Sc. CVT

B	Subsidiary Subjects**	Duration	Marks	IA Theory	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

TABLE – VI

Distribution of Subjects and marks for Third Year Examination of B.Sc.CVT

Paper	Subjects	Theory				Practical			Grand Total
		Theory	Viva Voce	IA	Sub Total	Practical's	IA	Sub Total	
A	Main Subjects								
1	Cardiac Care Technology-Clinical	100	30	20	150	120 (40+40+40)	30 (10+10+10)	150	600
2	Cardiac care Technology-Applied	100	30	20	150				
3	Cardiac care Technology -Advanced	100	30	20	150				

Distribution of Subsidiary Subjects and marks for Third Year Examination of B.Sc. CVT

B	Subsidiary Subjects**	Duration	Marks	IA Theory	Total
				Marks	
1	Ethics & Database Management	3 hours	80	20	100
2	Research & Biostatistics	3 hours	80	20	100
3	Computer application	3 hours	80	20	100

Note: Practical – One common practical for all the three papers with equal weightage of marks i.e., 40 practical marks and 10 IA marks each paper.

Distribution of Type of Questions and Marks for Theory papers of Main subjects:

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION	TOTAL
ESSAY TYPE	3 (To attempt 2)	2 * 10	20
SHORT ESSAY TYPE	8 (To attempt 6)	6 * 5	30
SHORT ANSWER TYPE	12 (To attempt 10)	10 * 3	30
TOTAL MARKS			80

Question paper pattern:

SUBJECTS HAVING MAXIMUM MARKS = 100			
TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION	TOTAL
ESSAY TYPE	3 (2 * 10)	10	20
SHORT ESSAY TYPE	12 (10 * 5)	5	50
SHORT ANSWER TYPE	12 (10 * 3)	3	30

SUBJECTS HAVING MAXIMUM MARKS = 50			
TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION	TOTAL
ESSAY TYPE	3 (2 * 10)	10	20
SHORT ESSAY TYPE	5 (3 * 5)	5	15
SHORT ANSWER TYPE	7 (5 * 3)	3	15

SUBJECTS HAVING MAXIMUM MARKS = 80			
TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS FOR EACH QUESTION	TOTAL
ESSAY TYPE	3 (2 * 10)	10	20
SHORT ESSAY TYPE	8 (6 * 5)	5	30
SHORT ANSWER TYPE	12 (10 * 3)	3	30

Board of Examiners:

Practical examination will be conducted by two examiners out of which one will be external examiner recognized by the University

Criteria for pass:

First year examination.

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.

Second- and Third-year Examination

Main Subjects:

For a pass in theory/ practical, 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.

Declaration of Class:

Class will be awarded only to those candidates who pass the entire examination in the first attempt. Class shall be declared on the basis of the aggregate of marks scored in individual year.

70% and above - First Class with Distinction

60% and above but less than 70% - First class

50% and above but less than 60% - Second class

Carry over benefit:

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 proceeding to the third year.

Second year examination:

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

Supplementary Examination:

For the failed candidates or candidates promoted to II year but having carryover subject(s) shall be given a chance of supplementary exam after minimum two months from the date of University exam.

Internship

Six months internship shall be mandatory after successful completion of third year examination. The respective department shall issue “Internship Completion Certificate”.

Rules for grace marks:

Grace marks up to a maximum of 5 marks may be awarded at the discretion of the university to a student who has failed only in one subject to enable him to pass in the examination in the first attempt.

Re-totalling:

Re-totalling of marks is permitted only for theory papers. The University, on application within the stipulated time and remittance of a prescribed fee, shall permit a re-totalling of marks, for the subject(s) applied. The marks obtained after re-totalling will be the final marks awarded and communicated to the students.

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 award of degree.

Award of Ranks:

Ranks will be awarded on the basis of aggregate marks of I to III year examinations.

Only those candidates who have completed the course in the minimum number of years prescribed (3 years) and who have passed all the 3 years in the first attempt are eligible for the award of ranks.

Maximum period for completion of course:

A candidate shall complete the course within six years from the date of admission, failing which re-registration shall be mandatory.

SYLLABUS

MAIN SUBJECTS

FIRST YEAR B.SC. CARDIOVASCULAR TECHNOLOGY

ANATOMY

No. of theory classes: 70 hours

No. of practical classes: 20 hours

1. Introduction: human body as a whole Theory:

Definition of anatomy and its divisions

Terms of location, positions and planes, Cell and its organelles

- Epithelium-definition, classification, describe with examples, function
- Glands- classification, describe serous & mucous glands with examples
- Basic tissues – classification with examples

Practical: Histology of types of epithelium

Histology of serous, mucous & mixed salivary gland

2. Locomotion and support Theory:

- **Cartilage** – types with example & histology
- **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

Demo of all bones showing parts, radiographs of normal bones & joints

Histology of compact bone (TS & LS)

Demonstration of all muscles of the body

Histology of skeletal (TS & LS), smooth & cardiac muscle

3. Cardiovascular System Theory:

- Heart-size, location, chambers, exterior & interior 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, Peripheral pulse
- Inferior Venacava, 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 & large vein, medium sized artery & vein

Microscopic appearance of large artery, medium sized artery & vein, large vein, pericardium

Histology of lymph node, spleen, tonsil & thymus

Normal chest radiograph showing heart shadows, Normal angiograms

4. Gastro-intestinal system Theory:

- Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Walleye's ring)
- Esophagus, stomach, small and large intestine, liver, gall bladder, pancreas, Radiographs of abdomen

5. Respiratory system Theory

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

Practical: Demonstration of parts of respiratory system.

Normal radiographs of chest

Histology of lung and trachea

6. Peritoneum

Theory: Description in brief

Practical: Demonstration of reflections

7. 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

8. 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

Histology of uterus, fallopian tubes, ovary

Radiographs of pelvis – hysterosalpingogram

9. Endocrine glands Theory:

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

Practical: Demonstration of the glands

Histology of pituitary, thyroid, parathyroid, suprarenal glands

10. 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

11. 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, contents

Practical: Histology of thin and thick skin

Demonstration and histology of eyeball

Histology of cornea & retina

12. Embryology Theory:

- Spermatogenesis & Oogenesis, Ovulation, fertilization
- Fetal circulation

- Placenta

Internal Assessment

Theory - Average of two exams conducted. 20

Practical's: Record & Lab work* 10

* There shall be no University Practical Examination

Internal assessment marks secured in Practical's need not be sent to the University.

Scheme of Examination

Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Anatomy shall be as given under.

Type of Questions	No. of Questions	Marks	Total
Long Essay (LE)	3(To attempt 2)	2 x 10	20
Short Essay (SE)	8 (To attempt 6)	6 x 5	30
Short Answer (SA)	12 (To Attempt 10)	10 x 3	30
Total Marks			80

REFERENCE BOOKS

Anatomy

1. William Davis (P) understanding Human Anatomy and Physiology MC Graw Hill
2. Chourasia –A Text book of Anatomy T.S. Ranganathan – A text book of Human Anatomy
3. Fattana, Human anatomy (Description and applied) Ander's & C P Prism Publishers, Bangalore – 1991
4. ESTER. M. Griscimer, physiology & Anatomy with Practical Considerations, J.P. Lippincott. Philadelphia
5. Bhatnagar Essentials of Human embryology – Revised Edition Orient Blackswan Pvt. Ltd.

SYLLABUS FOR FIRST YEAR BSC CARDIOVASCULAR TECHNOLOGY

PHYSIOLOGY

Theory 70 hours

Practical 20 hours

1. Introduction – General Physiology

- Introduction to physiology
- Homeostasis: Definition, Positive feedback, negative feedback.
- Body Fluid Compartments

2. Blood

- Introduction: Composition and function of blood, Blood Cells: types, Normal Count
- Red blood cells – Definition of Erythropoiesis, stages of differentiation, factors affecting, physiological variation, function
- Hemoglobin –function, concentration, physiological variation
Methods of Estimation, Structure
- White blood cells – different types, function, normal count, differential count, Immunity (in brief)
- Platelets - Origin, normal count, functions, morphology.

- Haemostasis – Definition, steps, clotting factors, mechanism of clotting, disorders of clotting factors.
- Blood groups – ABO system, Rh system-Rh factor, Rh incompatibility., Blood grouping & typing, Cross matching
- Blood transfusion – Indication, universal donor and recipient concept. Selection criteria of a blood donor, transfusion reactions, Anticoagulants – Classification, examples and uses
- Anemias: Definition, Symptoms and signs (brief), Blood indices – Color index, MCH, MCV, MCHC (definition and normal values), Erythrocyte sedimentation Rate (ESR) and Packed cell volume (PCV) – Normal values, Definition, Determination (methods), Classification – morphological and etiological.
- Plasma Proteins –types & concentration, functions of albumin, globulin, Fibrinogen, Prothrombin
- Blood Volume -Normal value, determination of blood volume, regulation of blood volume(brief), functions of lymph

3. Cardiovascular system

- Heart – Physiological Anatomy, Nerve supply, Properties of Cardiac muscle
- Cardiac cycle- definition, systole, diastole, phases, JVP(brief)
- Cardiac Output, stroke volume, EDV (only definitions)
- Heart sounds, Normal heart sounds, Mechanism and features, Areas of auscultation, Intraventricular pressure curves, Significance of heart sounds.
- Blood Pressure – Definition, normal value, clinical measurement of blood pressure, hypotension, hypertension.
- Heart rate - Physiological variations, regulation in brief, radial pulse.
- Electrocardiogram (ECG) –Definition, Normal ECG, Causes of ECG waves, Uses of ECG.
- Cardiac shock – Definition, types, Triple response

4. Digestive System

- Introduction- Physiological anatomy of Gastro intestinal tract (all structures in brief), Functions of digestive system, Functions of Saliva.
- Deglutination –definition and stages
- Stomach – functions
- Gastric secretion – Composition, function, phases of secretion
- Pancreas – functions (exocrine), composition
- Pancreatic juice - composition and regulation, Secretin and CCK-PZ
- Liver – functions, Bile secretion, Composition, function of bile, Bilirubin metabolism, types of bilirubin, Vandenberg reaction,
- Jaundice- types, significance.

- Gall bladder – functions
- Small intestine – Functions, Digestion, absorption, movements (in brief).
- Large intestine – Functions, Defecation reflex

5. Respiratory system

- Introduction - Functions of Respiratory system, Physiological Anatomy of Respiratory system, Respiratory tract
- Respiratory organs - lungs, alveoli, respiratory membrane
- Mechanism of breathing – Inspiration, Expiration, muscles involved, mechanism
- Surfactant- Composition, functions, Intra pulmonary pleural pressure, surface tension
- Transportation of Oxygen: Forms of transport, Oxygen Hemoglobin curve.
- Lung volumes and capacities – Spirogram, Definitions and Normal Volumes
- Regulation of respiration - nervous and chemical regulation, Respiratory Centre. Herring Breuer reflexes.
- Hypoxia – Definition, Classification, Description (in brief)
- Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnea (Definition only)

6. Endocrine System

- Introduction - Definition, Classification of Endocrine glands & their hormones
- Hypothalamus-pituitary Axis
- Pituitary hormones – Anterior and posterior pituitary hormones, functions of Growth hormone
- Thyroid gland – Thyroid hormones, Physiological function, regulation of secretion, Physiological Anatomy.
- Disorders – hypo and hyper secretion of hormone
- Adrenal cortex – functions of cortisol and Aldosterone, physiological anatomy
- Adrenal medulla – Functions of Adrenaline and nor adrenaline
- Pancreas (endocrine) – Hormones of pancreas, abnormalities(brief)
- Insulin – functions, Regulation of blood glucose level, Diabetes mellitus
- Regulation of calcium metabolism, hormones involved, actions of PTH, Calcitonin, Vit.D3, Tetany

7. Special senses

- Vision – Function of different parts (brief), Optic pathway, Dark adaptation, Color vision, structure of eye, structure of retina.
- Hearing -functions of middle ear, functions of inner ear, mechanism of hearing (brief)
- Chemical senses: Taste – types, receptors.
- Smell - physiology, receptors.

8. Nervous system

- Introduction – Parts of CNS and PNS, Functions of Nervous system
- Neuron - definition, structure, Neuroglia
- Nerve fiber - classification, conduction of impulses, continuous and salutatory
- Synapse – definition, structure, types, properties (brief)
- Receptors – Definition, classification, properties (brief)
- Reflex action – Definition, reflex arc, examples
- Pyramidal tracts

Extrapyramidal tracts, functions of medulla, pons, hypothalamic disorders. Cerebral cortex lobes and functions, sensory cortex, motor cortex, cerebellum, functions of cerebellum.

- Babinski's sign, Tone, Posture (definition)
- Spinal Cord nerve tracts – Diagram and functions, Lateral spine-thalamic tract, Dorsal column pyramidal tract
- UMN and LMN lesion, Hemiplegia, Stroke (brief)
- Functions of - Cerebral cortex, Cerebellum, Hypothalamus, Basal ganglia
- EEG, Parkinsonism
- Cerebra-Spinal Fluid(CSF) – site of formation, circulation (brief), functions, lumbar puncture
- Autonomic Nervous System - Sympathetic and parasympathetic distribution and functions (brief)

9. Excretory System

- Introduction-Functions of kidneys, composition of urine, nephron, cortical and juxtamedullary nephrons – Comparison, vasa recta,
- Juxta Glomerular Apparatus – Structure and function.
- Mechanism of Urine formation
- GFR-Definition, Normal Values, factors affecting GFR, Measurement (Creatinine, Inulin Clearance)
- Tubular reabsorption, TMG, Tubular secretion (brief)
- Mechanism of urine concentration - Counter – Current Mechanisms, Role of ADH, Diuresis, Diuretics
- Micturition, Innervation of Bladder, Cystometrogram.

10. Reproductive system

- Introduction- Function of Reproductive system, changes during Puberty, sex differentiation
- **Male reproductive system**- Functions of testes
- Spermatogenesis –definition, site, stages, factors influencing, Endocrine functions of testes
- Androgens – Testosterone functions.

- **Female reproductive system-** menstrual cycle-definition, changes, ovulation
- Functions of progesterone and estrogen, Hormonal regulation
- Physiological changes during pregnancy, Lactation (brief), milk ejection reflex.

11. Muscle nerve physiology

- Introduction, Classification and structure of muscle, Sarcomere
- Neuromuscular junction, Transmission across Neuromuscular junction.
- Excitation contraction coupling. Mechanism of muscle contraction, Rigor mortis
- Contractile proteins, fatigue

12. Skin and Body temperature

- Structure and function of skin, Sweat glands
- Body temperature - Physiological variation,
- Regulatory mechanisms – Mechanisms activated by heat and cold
- Role of hypothalamus, Fever, Body temperature measurement, Hypothermia

Internal Assessment

Theory: Average of two exams conducted. 20

* There shall be no University Practical Examination and internal assessment marks secured in Practical's need not be sent to the University.

Scheme of Examination

Theory

There shall be one theory paper of three hours duration carrying 80 marks.

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

Type of Questions	No. of Questions	Marks	Sub-total
Long Essay (LE)	3(To attempt 2)	2 x 10	20
Short Essay (SE)	8 (To attempt 6)	6 x 5	30
Short Answer (SA)	12 (To Attempt 10)	10 x 3	30
Total Marks			80

NO PRACTICAL 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. Choudhary (Sujith K) Concise Medical Physiology Latest Ed. New Central Book,
4. Gannon (William F) Review of Medical Physiology. Latest Ed Appleton.

SYLLABUS FOR FIRST YEAR BSC CARDIOVASCULAR TECHNOLOGY

BIOCHEMISTRY I

No. Theory classes: 70 hours

No. of practical classes: 20 hours

Theory:

1. Introduction and scope of Biochemistry

2. Specimen collection:

- Pre-analytical variables
- Collection of blood
- Collection of CSF & other fluids
- Urine collection
- Use of preservatives
- Anticoagulants

3. Introduction to Laboratory apparatus

- Pipettes- different types (Graduated, volumetric, Pasteur, Automatic etc.,)
- Calibration of glass pipettes
- Burettes, Beakers, Petri dishes, depression plates
- Flasks - different types (Volumetric, round bottomed, Erle-Meyer conical etc.,)
- Funnels – different types (Conical, Buchner etc.,)
- Bottles – Reagent bottles – graduated and common, Wash bottles – different types, Specimen bottles etc.,

4. Measuring cylinders, Porcelain dish

- Tubes – Test tubes, centrifuge tubes, test tube draining rack
- Tripod stand, Wire gauze, Bunsen burner
- Cuvettes, significance of cuvettes in colorimeter, cuvettes for visible and UV range, Cuvette holders Racks
- Bottle, Test tube, Pipette, Desiccator, Stop watch, timers, scissors
- Dispensers – reagent and sample
- Maintenance of lab glass ware and apparatus, Glass and plastic ware in Laboratory
- Use of glass - significance of boro silicate glass, care and cleaning of glass ware,

different cleaning solutions of glass

- care and cleaning of plastic ware, different cleaning solution

5. Instruments (Theory and demonstration) Diagrams to be drawn

- Use, care and maintenance of – water bath, Oven & Incubators, Water Distillation plant, water deionizers, refrigerators, cold box, deep freezers, reflux condenser, centrifuge, balances, colorimeter, spectrophotometer, pH meter and electrodes
- Centrifuge - Definition, Principle, Svedberg unit, centrifugal force, centrifugal field, RPM, Conversion of G to RPM and vice versa, Different types of centrifuges
- Manual balances: Single pan, double pan, triple balance, direct read out electrical balances. Guideline to be followed and precautions to be taken while weighing
- Weighing different types of chemicals, liquids, hygroscopic compounds etc.
- Colorimeter and spectrophotometer, pH meter, electrodes, salt bridge solution – Principles, parts, types, guidelines to be followed and precautions to be taken while using.

6. Safety of measurements

7. Conventional and SI units

8. Atomic structure

- Dalton's theory, Properties of electrons, protons, neutrons, and nucleus
- Rutherford's model of atomic structure
- Bohr's model of atomic structure, orbit and orbital, Quantum numbers, Heisenberg's uncertainly principle
- Electronic configuration – Aufbau principle, Pauli's exclusion principle, etc.
- Valency and bonds – different types of strong and weak bonds in detail with examples
- Theory & Practical's for all the following under this section -
Molecular weight, equivalent weight of elements and compounds, normality, molarity
- Preparation of molar solutions (mole/liter solution) eg: 1 M NaCl, 0.15 M NaCl, 1 M NaOH, 0.1 M HCl, 0.1 M H₂SO₄ etc.,
- Preparation of normal solutions. e.g., 1N Na₂CO₃, 0.1N Oxalic acid, 0.1 N HCl, 0.1N H₂SO₄, 0.66 N H₂SO₄ etc.,
- Percent solutions. Preparation of different solutions – v/v, w/v (solids, liquids and acids), Conversion of a percent solution into a molar solution

9. Dilutions

- Diluting solutions: e.g., Preparation of 0.1 N NaCl from 1 N NaCl and from 2 NaCl etc.,
- Preparing working standard from stock standard

- Body fluid dilutions, Reagent dilution techniques, calculating the dilution of a solution, body fluid, reagent etc.,
- Saturated and supersaturated solutions.
- Standard solutions. Technique for preparation of standard solutions e.g.: Glucose, urea, etc., Significance of volumetric flask in preparing standard solutions.
- Volumetric flasks of different sizes, Preparation of standard solutions of deliquescent compounds (CaCl_2 , K_2CO_3 , NaOH etc.,)
- Preparation of standards using conventional and SI units, Acids, bases, salts and indicators.

10. Acids and Bases

- Definition, physical and chemical properties with examples.
- Arrhenius concept of acids and bases
- Lowery – Bronsted theory of acids and bases, classification of acids and bases
- Differences between acid and alkali, acidity and basicity, monophotonic and poly protonic acids and bases.
- Concepts of acid base reaction, hydrogen ion concentration, Ionization of water, buffer, pH value of a solution
- Preparation of buffer solutions using pH meter
- Salts - Definition, classification; Water of crystallization – definition and different types, deliquescent and hygroscopic salts

11. Acid- base indicators:

- **Theory** – Definition, concept, mechanism of dissociation of an indicator, color change of an indicator in acidic and basic conditions, use of standard buffer solution and indicators for pH determinations, preparation and its application, list of commonly used indicators and their pH range, suitable pH indicators used in different titrations, universal indicators
- **Practical's**– Titration of a simple acid and a base (Preparation of standard solution of oxalic acid, using this solution finding out the normality of a sodium hydroxide solution. Acid to be titrated using this base) Calculation of normality of an acid or a base after titration, measurement of hydrogen ion concentration

12. Quality control

- Accuracy
- Precision
- Specificity
- Sensitivity
- Limits of error allowable in laboratory
- Percentage error
- Normal values and Interpretations

13. Special Investigations:

- Serum Electrophoresis - Immunoglobulins, Drugs: Digitoxin, Theophylline's
- Regulation of Acid Base status, Henderson Hasselback Equations, Buffers of the fluid, pH Regulation, Disturbance in acid Base Balance Anion Gap,
- Metabolic acidosis, Metabolic alkalosis, Respiratory acidosis, Respiratory alkalosis
- Basic Principles and estimation of Blood Gases and pH, Basic principles and estimation of Electrolytes, Water Balance, Sodium regulation, Bicarbonate buffers

Nutrition, Nutritional support with special emphasis on parental nutrition, Calorific Value, Nitrogen Balance, Respiratory Quotient, Basal metabolic rate, Dietary Fibers, Nutritional importance of lipids, carbohydrates and proteins Vitamins

- **PRACTICALS**

Analysis of Normal Urine

Composition of urine

Procedure for routine screening

Urinary screening for inborn errors of metabolism

Common renal disease

Urinary calculus

Urine examination for detection of abnormal constituents

Interpretation and Diagnosis through charts

Liver Function tests

Lipid Profile

Renal Function test

Cardiac markers

Blood gas and Electrolytes

Estimation of Blood sugar, Blood Urea and electrolytes

Demonstration of Strips

Demonstration of Glucometer

Internal Assessment

Theory - Average of two exams conducted. 20

practical's: Record & Lab work* 10

* There shall be no University Practical Examination and internal assessment marks secured in practical's need not be sent to the University.

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Biochemistry shall be as given under.

Type of Questions	No. of Questions	Marks	Sub-total
Long Essay (LE)	3(To attempt 2)	2 x 10	20
Short Essay (SE)	8 (To attempt 6)	6 x 5	30
Short Answer (SA)	12 (To Attempt 10)	10 x 3	30
Total Marks			80

NO PRACTICAL EXAMINATION

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 –1980.
5. Vasudevan (DM) Sreekumari (S) Text book of Biochemistry for Medical student, Latest Ed
6. Das (Debajyothi) Biochemistry Latest ED Academic, Publishers, Culcutta – 1992.
7. Rajagopal G & Ramakrishna – 1983. Practical Biochemistry for Medical Students. Oriental Blackswan Pvt. Ltd.

SYLLABUS FOR FIRST YEAR BSC CARDIOVASCULAR TECHNOLOGY

PATHOLOGYI

Theory – 70 hours

Practical – 20 hours

Theory

Histopathology, Clinical Pathology, Haematology and Blood Banking

1. Histopathology - Theory

- Introduction to Histopathology
- Receiving of Specimen in the laboratory
- Grossing Techniques
- Mounting Techniques – various Mountains
- Maintenance of records and filing of the slides
- Use & care of Microscope
- Various Fixatives, Mode of action, Preparation and Indication.
- Bio-Medical waste management
- Section Cutting
- Tissue processing for routine paraffin sections
- Decalcification of Tissues.
- Staining of tissues - H& E Staining
- Bio-Medical waste management

2. Clinical Pathology -Theory

- Introduction to Clinical Pathology
- Collection, Transport, Preservation, and Processing of various clinical specimens
- Urine Examination – Collection and Preservation of urine.
Physical, chemical, Microscopic Examination
- Examination of body fluids.
- Examination of cerebrospinal fluid (CSF)
- Sputum Examination.
- Examination of faces

3. Hematology – Theory

- Introduction to Hematology
- Normal constituents of Blood, their structure and function.
- Collection of Blood samples
- Various Anticoagulants used in Hematology
- Various instruments and glassware used in Hematology, Preparation and use of glassware
- Laboratory safety guidelines
- SI units and conventional units in Hospital Laboratory

- Hb, PCV, ESR
- Normal Haemostasis
- Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Thromboplastin Time

4. Blood Bank

- Introduction
- Blood grouping and Rh Types
- Cross matching

PRACTICALS

- Urine Examination.
 - Physical
 - Chemical
 - Microscopic
- Blood Grouping, Rh typing.
- Hb Estimation, Packed Cell Volume [PCV], Erythrocyte Sedimentation rate [ESR]
- Bleeding Time, Clotting Time.
- Histopathology – Section cutting and H &E Staining. [For BSc MLT only]

Internal Assessment

Theory - Average of two exams conducted. 20

Practical's: Record & Lab work* 10

* There shall be no University Practical Examination and internal assessment marks secured in Practical's need not be sent to the University.

Scheme of Examination

Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Pathology shall be as given under.

Type of Questions	No. of Questions	Marks	Sub-total
Long Essay (LE)	3(To attempt 2)	2 x 10	20
Short Essay (SE)	8 (To attempt 6)	6 x 5	30
Short Answer (SA)	12 (To Attempt 10)	10 x 3	30
Total Marks			80

NO PRACTICAL EXAMINATION

REFERENCE BOOKS

Pathology –

1. Culling Histopathology techniques
2. Bancroft Histopathology techniques
3. Koss – cytology

4. Winifred Greg – Diagnostic cytopathology
5. Orel – Cyto Pathology
6. Todd & Sanford Clinical Diagnosis by laboratory method
7. Dacia & Lewis – Practical Haematology
8. Ramanic Sood, Laboratory Technology (Methods and interpretation) 4th Ed. J.P. Bros, New Delhi –1996)
9. Satish Gupta Short text book of Medical Laboratory for technician J.P. Bros, New Delhi – 1998
10. Sachdev K.N. Clinical Pathology and Bacteriology 8th Ed, J.P. Bros, New Delhi-1991.
11. Krishna - Text book of Pathology, Orient Longman PVT Ltd.

SYLLABUS FOR FIRST YEAR BSC CARDIOVASCULAR TECHNOLOGY

Microbiology I

Objective: - This course introduces the principles of Microbiology with emphasis on applied aspects of Microbiology of infectious diseases particularly in the following areas Principles & practice of sterilization methods.

Collection and dispatch of specimens for routine microbiological investigations. Interpretation of commonly done bacteriological and serological investigations. Control of Hospital infections

Biomedical waste management

Immunization schedule

Theory- 70 hours

Practical's -20 hours

Theory

1. Morphology

Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria.

2. Growth and nutrition

Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.

3. Sterilisation and Disinfection

Principles and use of equipment's of sterilization namely Hot Air oven, Autoclave and serum inspissate. Pasteurization, Antiseptic and disinfectants. Antimicrobial sensitivity test

4. Immunology

Immunity Vaccines, Types of Vaccine and immunization schedule

Principles and interpretation of commonly done serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA. Rapid tests for HIV and HbsAg (Technical details to be avoided)

5. Systematic Bacteriology

Morphology, cultivation, diseases caused, laboratory diagnosis including specimen collection of the following bacteria (*the classification, antigenic structure and pathogenicity are not to be taught*)

Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, Esch. coli, Klebsiella, Proteus, Vibrio cholerae, Pseudomonas & Spirochetes

6. Parasitology

Morphology, life cycle, laboratory diagnosis of following parasites

E. histolytica, Plasmodium, Tape worms, Intestinal nematodes

7. Mycology

Morphology, diseases caused and lab diagnosis of following fungi.

Candida, Cryptococcus, Dermatophytes, opportunistic fungi.

8. Virology

General properties of viruses, diseases caused, lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV, Rabies and Poliomyelitis.

9. Hospital infection Causative agents, transmission methods, investigation, prevention and control Hospital infection.

10. Principles and practice Biomedical waste management

Practical

20 hours

- Compound Microscope.
- Demonstration and sterilization of equipment's – Hot Air oven, Autoclave, Bacterial filters.
- Demonstration of commonly used culture media, Nutrient broth, Nutrient agar, Blood agar, Chocolate agar, Macconkey medium, LJ media, Robertson Cooked meat media, Potassium tellurite media with growth, Mac with LF & NLF, NA with staph Antibiotic susceptibility test
- Demonstration of common serological tests – Widal,VDRL, ELISA. Grams stain, Acid Fast staining, Stool exam for Helminthic ova
- Visit to hospital for demonstration of Biomedical waste management. Anaerobic culture methods.

Internal Assessment

Theory - Average of two exams conducted. 20

Practical's: Record & Lab work* 10

* There shall be no University Practical Examination and internal assessment marks secured in Practical's need not be sent to the University.

Scheme of Examination

Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Microbiology shall be as given under.

Type of Questions	No. of Questions	Marks	Sub-total
Long Essay (LE)	3(To attempt 2)	2 x 10	20
Short Essay (SE)	8 (To attempt 6)	6 x 5	30
Short Answer (SA)	12 (To Attempt 10)	10 x 3	30
Total Marks			80

NO PRACTICAL EXAMINATION

REFERENCE BOOKS

Microbiology

1. Anathanarayana & Panikar Medical Microbiology – Revised 8th Edition
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, 1st Ed, J P Bros, New Delhi
– 199
7. Basic laboratory procedures in clinical bacteriology, 1st Ed, J P
Brothers, New Delhi
8. Medical Parasitology – Ajit Damle

SYLLABUS FOR FIRST YEAR BSC CARDIOVASCULAR TECHNOLOGY

SUBSIDIARY SUBJECTS

1 ENGLISH

Theory: 25 Hours

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 dictation

UNIT - II: APPLIED GRAMMAR:

Correct usage

The structure of sentences

The structure of paragraphs

Enlargements of Vocabulary

UNIT - III: WRITTEN COMPOSITION:

Precise writing and summarising

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. Shashikumar and P V Dhamija. Pub. By: Tata McGraw Hill, New Delhi
5. Journalism Made Simple D Wainwright
6. Writers Basic Bookshelf Series, Writers Digest series
7. Interviewing by Joan Clayton Platoon
8. Penguin Book of Interviews.

2 HEALTHCARE

Theory: 40 Hours

Introduction to Health

- Definition of Health, Determinants of Health, Health Indicators of India,
- Health Team Concept.
- National Health Policy
- National Health Programs Briefly Objectives and scope) Population of India and Family welfare program 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, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep.
- Bed making
- 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:

1. Preventive and Social Medicine by Jarak

ಕನ್ನಡ : ಒಂದು

ಪಠ್ಯ ಕ್ರಮದ ರೂಪರೇಖೆ

- ಸ್ಥಾನ : ಬಿ.ಎಸ್.ಸಿ. (ಅಲ್ಟಿಮ್ ಹೆಲ್ತ್ ಸೈನ್ಸ್ ಕೋರ್ಸ್) ಮೊದಲ ವರ್ಷ
ಸಮಯ : ೨೫ ಘಂಟೆಗಳು (ಇಪ್ಪತ್ತೈದು ಘಂಟೆಗಳು)
ಪಠ್ಯಕ್ರಮದ ವಿವರಣೆ : ವಿದ್ಯಾರ್ಥಿ / ವಿದ್ಯಾರ್ಥಿನಿಯರು ದಿನ ನಿತ್ಯ ಸಂಪರ್ಕಿಸಬಹುದಾದ ಜನಸಾಮಾನ್ಯರೊಡನೆ ಶುಶ್ರೂಷೆಗೆ ಸಂಬಂಧಿಸಿದಂತೆ ಕನ್ನಡದಲ್ಲಿ ಸಂಭಾಷಣೆ ಮಾಡಲು ಹಾಗೂ ತಿಳುವಳಿಕೆ ನೀಡಲು ಸಹಕಾರವಾಗುವಂತೆ ಪಠ್ಯಕ್ರಮದ ಮಾದರಿಯನ್ನು ಅಳವಡಿಸುವುದು.
ಉದ್ದೇಶ : ೧) ದಿನ ಬಳಕೆಯ ವ್ಯವಹಾರದಲ್ಲಿ ಶುಶ್ರೂಷಣೆಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಕನ್ನಡ ಭಾಷೆಗೆ ಅಳವಡಿಕೆ.
೨) ಕನ್ನಡೇತರರಿಗೆ ಕನ್ನಡ ಭಾಷೆಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

ಪಠ್ಯಕ್ರಮದ ವಿವರಣೆ

- ಘಟಕ ಒಂದು : ೧) ಅಕ್ಷರಮಾಲೆ, ಸ್ವರಗಳು, ವ್ಯಂಜನಗಳು.
೨) ಪದ, ಪದಪೊಂಜ, ವಾಕ್ಯರಚನೆ, ಪತ್ರಲೇಖನ, ಪ್ರಬಂಧರಚನೆ.
ಘಟಕ ಎರಡು : ಶುಶ್ರೂಷಣಾ ಪದಗಳು (ಇಂಗ್ಲಿಷ್‌ನಿಂದ ಕನ್ನಡಕ್ಕೆ ಶುಶ್ರೂಷ ಸಾಮಾನ್ಯ ಬಳಕೆಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ).
ಘಟಕ ಮೂರು : ರೋಗಿ ಹಾಗೂ ಶುಶ್ರೂಷಕರ ಮಧ್ಯೆ ಸಾಮಾನ್ಯವಾಗಿ ನಡೆಯುವ ಸಂಭಾಷಣೆ.
೧) ಪ್ರಶ್ನೆಗಳಿಗೆ ಸಲಹೆ ಕೊಡುವ ವಾಕ್ಯಗಳು.
೨) ವೈದ್ಯರೊಂದಿಗೆ ಹಾಗೂ ಇತರ ಸಹಚರರೊಂದಿಗೆ ವ್ಯವಹರಿಸಲು, ಸಂಭಾಷಣೆ ನಡೆಸಲು ಬೇಕಾದ ವಾಕ್ಯಗಳು.

ಅಧ್ಯಯನಕ್ಕೆ ಶಿಫಾರಸ್ಸು ಮಾಡಲಾಗಿರುವ ಗ್ರಂಥಗಳು

೧. ಕನ್ನಡ ವ್ಯಾಕರಣ (೮, ೯ ಮತ್ತು ೧೦ನೇ ತರಗತಿಗಳಿಗೆ ಕರ್ನಾಟಕ ಸರ್ಕಾರ, ಪಠ್ಯಪುಸ್ತಕಗಳ ಇಲಾಖೆ)
೨. ವ್ಯವಹಾರಿಕ ಕನ್ನಡ : ಎಚ್‌ಸೈ
೩. ಪತ್ರ ಲೇಖನ : ಕನ್ನಡ ಸಾಹಿತ್ಯ ಪರಿಷತ್ತು
೪. ಲೇಖನಕಲೆ : ಎನ್. ಪ್ರಹ್ಲಾದ ರಾವ್
೫. ಆಹಾರ ಮತ್ತು ಇತರ ಪ್ರಬಂಧಗಳು : ಡಾ|| ಪಿ ಎಸ್ ಶಂಕರ್
೬. ವೈದ್ಯ ಪದಗಳ ಹುಟ್ಟು ರಚನೆ : ಡಾ|| ಡಿ ಎಸ್ ಶಿವಪ್ಪ

SYLLABUS FOR SECOND YEAR BSC CARDIOVASCULAR TECHNOLOGY

Applied Pathology and Applied Microbiology

APPLIED PATHOLOGY

Theory : 30hrs

Practical : 30 hrs

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.
- Ischemic 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:

- Anemia - Definition, morphological types and diagnosis of anemia. Brief concept about Hemolytic anemia and polycythemia
- Leukocyte disorders- Briefly leukemia, 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 edema
- 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
- 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

Scheme of Examination Theory

Theory

There shall be one theory paper of three hours duration carrying 50 marks. Distribution of type of questions and marks for Applied Pathology shall be as given under

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2 x 10	20
SHORT ESSAY (SE)	5 (To attempt 3)	3 x 5	15
SHORT ANSWER (SA)	7 (To attempt 5)	5 x 3	15
TOTAL MARKS			50

PRACTICAL EXAMINATION

40 Marks

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

Sl. No.	Tests	Marks
01	Interpretation of Haematology Chart	05
02	Interpretation of Urine Chart	05
03	Estimation of Haemoglobin	05
04	Estimation of Bleeding time & Clotting time	05
	Total	20

SYLLABUS FOR SECOND YEAR BSC CARDIOVASCULAR TECHNOLOGY

Applied Microbiology

Theory: 30 hrs

Practical: 30 hrs

Unit 1: Health care associated infections and antimicrobial resistance

- Drug resistant pathogens (Source of infection, modes of transmission, disease caused in brief): Methicillin resistant *Staphylococcus aureus*, *Clostridium difficile*, Vancomycin resistant enterococci
- Hospital acquired infections (Definitions, criteria for diagnosis in brief and causative agents): catheter related blood stream infections, ventilator associated pneumonia, catheter related urinary tract infections, surgical site infections
- Disease communicable to healthcare workers in hospital setup and preventive measures to combat the spread of these infections by monitoring and control: Respiratory route (tuberculosis, varicella-zoster, respiratory syncytial virus etc.), Bloodborne transmission (HIV, hepatitis B, hepatitis C, cytomegalovirus, Ebolavirus etc.), orofecal route (salmonella, hepatitis A etc.), direct contact (Herpes simplex virus etc.),
- Microbiological surveillance: To know the hospital flora and to assess the antimicrobial resistance, sampling technique, direct surface agar plating technique
- Discovery of viruses.

UNIT 2: Sterilization and Disinfection

- **Sterilization:** Definition, Classification of methods, Principles of Dry heat, moist heat,
- In detail autoclaving Preparation of materials for autoclaving: packing of different types of materials, loading, holding time and unloading.
- Disinfection, antiseptics: 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.
- Sterilization –applied aspects: Rooms: gaseous sterilization, one atmosphere uniform glow discharge plasma (OAUGDP). b) Equipment's: classification of the instruments and appropriate methods of sterilization. Central supply department: the four areas and the floor plan for instrument cleaning, high-level disinfecting and sterilizing areas.

PRACTICALS (30hours)

- Principles of autoclaving & quality control of sterilization: Definition, Classification of methods, Principles of Dry heat, moist heat, In detail autoclaving Preparation of materials for autoclaving: packing of different types of materials, loading, holding time and unloading. Dry heat/Moist heat: Temperature recording charts interpretation, Color change indicators interpretation (10 hours)
- Disinfection of wards, OT and laboratory: 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.
- Collection of specimens for sterility testing: Collection of specimens from outpatient units, inpatient units, minor operation theatre and major operation theatre for sterility testing, Air sampling culture plates interpretation of colony forming units based on airflow rate and sampling time
- Methods employed for sterility testing & Interpretation of results of sterility testing: Rooms: gaseous sterilization, one atmosphere uniform glow discharge plasma (OAUGDP).
- Equipment's: classification of the instruments and appropriate methods of sterilization.
- Central supply department: the four areas and the floor plan for instrument cleaning, high-level disinfecting and sterilizing areas. Interpretation of sterility of hemodialysis water/distilled water/de ionized water, based on growth of colonies in BHI Agar to be reported as XCFU/unit

Scheme of examination

Internal Assessment- There shall be two IA Exams, each one with theory paper of 50 Marks and the marks of the best one (reduced to 10) is taken as final marks.

Internal assessment practical's- There shall be two practical exams of 10 marks each and the marks of the best one (reduced to 5) is taken as final marks

University Examination

Theory: There shall be one theory paper of two hours duration carrying 50 marks. Distribution of type of questions and marks shall be as given under.

Type of Questions	No of Questions	Marks for Each Questions	Total
Long Essay	3(2X10)	10	20
Short Essay	5(3X5)	5	15
Short Answers	7(5X3)	3	15
TOTAL			50

Practicals:

Sl. No.	Tests	Marks
1	Dry heat/Moist heat: Temperature recording charts interpretation	05
2	Dry heat/Moist heat: Colour change indicators interpretation	05
3	Air sampling culture plates interpretation of colony forming units based on air flow rate and sampling time	05
4	Interpretation of sterility of haemodialysis water/distilled water/deionised water, based on growth of colonies in BHI Agar to be reported as XCFU/unit	05
Total		20

Distribution of subjects and marks are as follows

S u b	Theory				Practical			Grand Total
	Theory	Viva Voce	IA	Sub Total	Practical's	IA	Sub Total	
Section A: Applied pathology	50	15	10	150	20	05	50	200
Section B: Applied microbiology	50	15	10		20	05		

Reference Books:

1. Ananthan Narayana & Panikkar Medical Microbiology - University Press
2. Text book of Medical Microbiology for MLT students – C P Baweja
3. Hospital Infection Control Manual, YMCH

SYLLABUS FOR SECOND YEAR BSC CARDIO VASCULAR TECHNOLOGY

INTRODUCTION TO CARDIO VASCULAR TECHNOLOGY

Theory: 80hrs

Practical: 100 hrs

1. Electro cardiography

- 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 ECG

- The 'p' wave
- The 'QRS' complex
- The genesis of 'QRS' complex
- T wave
- The ST Segment
- 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. Bundle branch block

- General principles

- Right bundle branch block
- Left bundle branch block
- The hemiblocks(Fascicular block)

II. 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: color flow
- Transesophageal 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
- 2D echo
- Normal variants
- Terminology
- Identification of segments

4. Doppler Echocardiography

a. Introduction to Doppler colour echocardiography

- The Doppler principles
- Doppler ultrasound techniques
- Color Doppler flow imaging
- Clinical application of Doppler Echocardiograph

b. Physical principles & instrumentation in spectral & colour, 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

SYLLABUS FOR SECOND YEAR BSC CARDIOVASCULAR TECHNOLOGY

Applied Pharmacology

Theory: 50 Hrs

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

I. Autonomic nervous system.

- Anatomy & functional organisation.

- List of drugs acting on ANS including dose, route of administration, indications, contraindications 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 non-sympathetic 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. Anti-histamines 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 emergency drugs.

IX. 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.

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

Preparation, dose and routes of administration.

XI. Diuretics

- Renal physiology
- Side of action of diuretics
- 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:

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.

Scheme of Examination

Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for applied Pharmacology shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY (LE)	3 (To attempt 2)	2x10	20
SHORT ESSAY (SE)	8 (To attempt 6)	6x5	30
SHORT ANSWER (SA)	12 (To attempt 10)	10x3	30
TOTAL MARKS			80

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

SYLLABUS FOR SECOND YEAR BSC CARDIO VASCULAR TECHNOLOGY

MEDICINE RELEVANT TO CARDIO VASCULAR TECHNOLOGY

Theory: 50 hrs

Cardiovascular System

Ischemic heart diseases, Rheumatic heart disease, Congenital heart disease Hypertension

Aortic Aneurysm

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

ARDS/ Pump Lung Syndrome

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, Difference with respect to anatomy, physiology, pharmacodynamics and pharmacokinetics in a neonate/pediatric, obese, pregnant and elderly patient from normal Adult population

Scheme of Examination Theory

There shall be one theory paper of three hours duration carrying 80 marks. Distribution of type of questions and marks for Medicine relevant to Perfusion Technology shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
LONG ESSAY(LE)	3(Toattempt2)	2x10	20
SHORT ESSAY(SE)	10(Toattempt8)	8x5	40
SHORT ANSWER(SA)	12(Toattempt10)	10x2	20
TOTAL MARKS			80

NO PRACTICAL EXAMINATION

SYLLABUS FOR SECOND YEAR BSC CARDIO VASCULAR TECHNOLOGY

SUBSIDIARY SUBJECTS

1 SOCIOLOGY

Theory: 20 Hours

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 health care 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 groups and secondary groups in the hospital and rehabilitation setup.

- **Family:**

- The family, meaning and definitions, Functions of types 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 hazards of urbanities
- 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 program
The role of social planning in the improvement of health and rehabilitation

• **Social Problems of disabled:**

Consequences of the following social problems in relation to sickness and disability
remedies to prevent these problems
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

Reference Books:

1. Sachdeva & Vidyabhushan, Introduction to the study of sociology
2. Indrani T.K., Text book of sociology for graduates' nurses & Physiotherapy students, JP Brothers, New Delhi 10

Scheme of Examination for Sociology
One Written (Theory) paper: Maximum Marks: –80 marks.
No Practical or Viva voce examination

2 CONSTITUTION OF INDIA

Theory: 10 Hours

Unit-I: Meaning of the term 'Constitution'. Making of the Indian Constitution 1946-1950.

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, Backwards, 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, Allahabad, Central Law Agency, 1998.
3. Granville Austin: The Indian Constitution – Corner Stone of a Nation-Oxford, New Delhi, 2000.

3 ENVIRONMENTAL SCIENCE AND HEALTH

Theory: 50 Hours

Introduction to Environment and Health

- Sources, health hazards and control of environmental pollution of 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 standards 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.

1. Text Book of Environmental Studies for under graduate courses By Erich Bharuch Reprinted in 2006, Orient Longman Private Limited /Universities Press India Pvt. Ltd.

SYLLABUS FOR THIRD YEAR BSC CARDIO VASCULAR TECHNOLOGY

PAPER-I CARDIO VASCULAR TECHNOLOGY –CLINICAL

Theory: 50 hrs

Practical: 50 hrs

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
3. Echo in congenital heart disease-ECHO in ASD, VSD, PDA pulmonary stenosis, aortic stenosis, contraction 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, disease of aorta, mitral valve prolapsed, myxoma and other cardio vascular diseases.
6. Assessment of cardiac function- measurements of all cardiac chambers and assessment of cardiac function.
7. Echo in pericardial disease- pericardial effusion, cardiac tamponade, constructive pericarditis
8. 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
9. Materials used in the Cath lab- 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, oximetry at various levels, Angio's done and its interpretation
11. Left heart catheterisation- procedure, Cath position, oximetry at various levels, Angio's 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

14. Peripheral angiogram- procedure, indication and contraindication

Scheme of Examination

Theory

There shall be one paper of three hours duration carrying 100 marks.

Type of Question	Number of Questions	Marks	Sub- total
Long essay	3(To attempt 2)	2×10	20
Short Essay	12 (To attempt 10)	10×5	50
Short Answer	12(To attempt 10)	10×3	30
Total Marks			100

PRACTICAL EXAMINATION

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

SYLLABUS FOR THIRD YEAR B.SC. CARDIO VASCULAR TECHNOLOGY

PAPER – II–CARDIO VASCULAR TECHNOLOGY- APPLIED

Theory: 50 hrs

Practical: 50hrs

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 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 Oesophageal echocardiogram- indications, procedures, usefulness, and complications one may encounter and its management

7. Stress Echo- procedures and indications

8. Peripheral Doppler- procedure and usefulness of peripheral Doppler

9. Coronary angioplasty –procedure, materials used, complication one may encounter and how to manage it.

10. Peripheral angioplasty- materials used and procedure. Angioplasty of coarctation of aorta

11. Fetal echocardiogram- procedure, basic interpretation

12. Contrast echocardiogram- procedure and usefulness of contrast echocardiogram

13. Myocardial contrast echo- Basic knowledge

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 paper-II Cardiac Care Technology-Applied shall be as given under.

Type of questions	Number of questions	Marks	Sub total
Long Essay	3(To attempt 2)	2×10	20
Short essay	12 (To attempt 10)	10×5	50
Short Answer	12(To attempt 10)	10×3	30
Total marks			100

PRACTICAL EXAMINATION

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

SYLLABUS FOR THIRD YEAR BSC. CARDIO VASCULAR TECHNOLOGY

PAPER-III CARDIOVASCULAR TECHNOLOGY -ADVANCED

Theory: 50 hours

Practical: 50 hours

1. Cardiac Monitoring – Definition, purpose of cardiac monitoring, how to recognize various arrhythmias, how to setup intensive coronary care unit and usefulness of ICCU
2. Interpretation of TMT report- criteria for TMT positive test contraindication for TMT positive conditions, where TMT is not useful, complications that may occur in TMT room and its management
3. Use of defibrillator- Indication's, 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 procedure used in management of cardiac arrest
5. Myocardial perfusion scan- procedure and usefulness of Myocardial perfusion scan
6. Cardiac arrhythmias – bradyarrhythmia's and tachyarrhythmias and diagnosis of all rhythm disturbances. Sinus arrhythmia, APC, FPC, VPC, VF, VT, AF, SVT, IOHB, IIOHB, CHB
7. Electrolyte disturbance-ECG in hypokalemia, hyperkalemia etc.
8. Holter monitoring-procedure and usefulness
9. Valvuloplasty's -procedure, indication contraindication and treatment of balloons, mitral valvuloplasty, balloon aortic valvuloplasty, balloon pulmonary valvuloplasty, balloon tricuspid valvuloplasty
10. Coil closure and device closure of PDA-Procedure, indications and materials used for coil and device closure of PDA
11. Device closure of ASD-Procedure, indications and materials used for coil and device closure of ASD
12. Device closure of VSD-Procedure, indications and materials used for coil and device closure of VSD
13. EP studies- basic knowledge of EP studies, mapping and ablation

14. Oximetry- handling of the instrument and usefulness of the instrument, normal and abnormal values
15. Pressure recording- handling of the instrument and pressures in various chambers, normal and abnormal values
16. Temporary and permanent pacing- materials used, procedure, complication one may encounter and management Implantable cardioverter defibrillator devices
17. CD recording and storage- recording and storage of all procedure over CD
18. Procedure during pregnancy- precaution to be followed
19. Nuclear Cardiology-instrumentation, radiopharmaceuticals, patient imaging technique

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 paper-III Cardio Vascular Technology - Advanced shall be given as given under.

Type of Question	No. of Questions	Marks for each	Total
Long Essay (LE)	3 (To attempt 2)	2 x 10	20
Short Essay (SE)	12 (To attempt 10)	10 x 5	50
Short Answer (SA)	12 (To Attempt 10)	10 x 3	30
Total Marks			100

PRACTICAL EXAMINATION

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

SYLLABUS FOR THIRD YEAR BSC CARDIO VASCULAR TECHNOLOGY

SUBSIDIARY SUBJECTS

1. ETHICS & DATABASE MANAGEMENT

Theory: 50 hours

1. Introduction

Medical ethics is a systematic effort to work within the ethos of medicine, which has traditionally been service to sick.

2. Objectives

Identify underlying ethical issues and problems in medical practice.

3. Course contents (Syllabus)

a. Introduction to medical ethics

What is ethics, what are values and norms, freedom and personal responsibility?

b. Definition of medical ethics

Major principles of medical ethics.

c. Perspective of medical ethics

The Hippocratic oath, The Declaration of Helsinki, The WHO Declaration of Geneva, International code of Medical Ethics (1993), Medical Council of India Code of Ethics (2002).

d. Ethics of the individual

Truth and confidentiality, the concept of disease, health and healing, the right to health.

e. The ethics of human life

Prenatal sex determination.

f. The family and society in medical ethics

Euthanasia, cancer and terminal care.

g. Death and dying

Use of life-support systems, the right to die with dignity, suicide – the ethical outlook.

h. Professional Ethics

Contract and confidentiality, malpractice and negligence.

4. Teaching/Learning Experience

a. Increasing the awareness and knowledge of students of the value.

Dimensions of interactions with the patients, colleagues, relations and public.

b. Fostering the development of skills of analysis, decision making and judgment.

c. Making the students aware of the need to respect the rights of the patient.

d. Duties and responsibilities of the technologists.

Scheme of Examination for Ethics & Database Management

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

No Practical or Viva voce examination

2. BIO STATISTICS & RESEARCH

Theory: 20 Hours

Course Description:

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

Behavioral 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.

Scheme of Examination for MEDICAL ELECTRONICS including COMPUTER APPLICATIONS

One Written (Theory) paper: Maximum Marks: –80 marks.
No Practical or Viva voce examination

3 BASICS IN COMPUTER APPLICATIONS

Theory: 10 hours

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 Bio Statistics & Research

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

No Practical or Viva voce examination