

**Revised Ordinance Governing Regulations and
Curriculum**

of

B.Sc.CARDIAC CARE TECHNOLOGY

COURSE - 2019



Rajiv Gandhi University of Health
Sciences,
Karnataka, Bangalore

The Emblem



The Emblem of the Rajiv Gandhi University of Health Sciences is a symbolic expression of the confluence of both Eastern and Western Health Sciences. A central wand with entwined snakes symbolises Greek and Roman Gods of Health called Hermis and Mercury is adapted as symbol of modern medical science. The pot above depicts Amrutha Kalasham of Dhanvanthri the father of all Health Sciences. The wings above it depicts Human Soul called Hamsa (Swan) in Indian philosophy. The rising Sun at the top symbolises knowledge and enlightenment. The two twigs of leaves in western philosophy symbolises Olive branches, which is an expression of Peace, Love and Harmony. In Hindu Philosophy it depicts the Vanaspathi (also called as Oushadi) held in the hands of Dhanvanthri, which are the source of all Medicines. The lamp at the bottom depicts human energy (kundalini). The script “Devahitham Yadayahu” inside the lamp is taken from Upanishath Shanthi Manthram (Bhadram Karnebh i Shrunuyanadev...), which says “May we live the full span of our lives allotted by God in perfect health” which is the motto of the Rajiv Gandhi University of Health Sciences.



ರಾಜೀವ್ ಗಾಂಧಿ ಆರೋಗ್ಯ ವಿಜ್ಞಾನಗಳ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಕರ್ನಾಟಕ, ಬೆಂಗಳೂರು

RAJIV GANDHI UNIVERSITY OF HEALTH SCIENCES, KARNATAKA, BENGALURU
4th T Block, Jayanagar, Bengaluru – 560 041

Ref: ACA/DCD/AHS/B.Sc.CCT/362/2019-20

Date: 28/08/2019

NOTIFICATION

Sub: Revised Ordinance pertaining to Regulation and Curriculum of B.Sc. Cardiac Care Technology.

Ref: 1) Minutes of BOS Allied Health Sciences held on 13/05/2019
2) Proceedings of Faculty meeting held on 15/05/2019
3) Proceedings of AC meeting held on 17/06/2019
4) Proceedings of Syndicate meeting held on 29/06/2019

In exercise of the powers vested under Section 35(2) of RGUHS Act, 1994, the Revised Ordinance pertaining to Regulation and the curriculum of B. Sc. Cardiac Care Technology is notified herewith as per Annexure.

The above Regulation shall be applicable to the students admitted to the said course from the academic year 2019-20 onwards.

By Order,

Sd/-

REGISTRAR

To

The Principals of all affiliated Allied Health Sciences Course colleges of RGUHS, Bangalore.

Copy to :

1. The Principal Secretary to Governor, Raj Bhavan, Bangalore - 560001
2. The Principal Secretary Medical Education, Health & Family Welfare Dept., M S Building, Dr.B.R. Ambedkar Veedhi, Bangalore – 01
3. PA to Vice – Chancellor/PA to Registrar/Registrar (Eva.)/Finance Officer, Rajiv Gandhi University Health Sciences, Bangalore
4. All Officers of the University Examination Branch/ Academic Section.
5. Guard File / Office copy.

REGULATIONS & CURRICULUM FOR BACHELOR OF B.Sc. CARDIAC CARE TECHNOLOGY -2019

1. Eligibility for admission:

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

1. Two year Pre-University examination or equivalent as recognized by Rajiv Gandhi University of Health Sciences with, Physics, Chemistry and Biology as subjects of study.

OR

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

OR

3. Any equivalent examination recognized by the Rajiv Gandhi University of Health Sciences, Bangalore for the above purpose with Physics, Chemistry and Biology as subjects of study.

OR

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

OR

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

6. Lateral entry to second year of B.Sc.Cardiac CareTechnology for candidates who have passed diploma program from the Government Boards and recognized by RGUHS, fulfilling the conditions specified above under Sl. No. 5 and these students are eligible to take admission on lateral entry system only in the same subject studied at diploma level from the academic year 2008-09 vide RGUHS Notification no. AUTH/AHS/317/2008-09 dated:01.08.2008.

Note:

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

2. Duration of the course:

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

3. Medium of instruction:

The medium of instruction and examination shall be in English.

4. Scheme of examination:

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

5. Attendance

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

6. Internal Assessment (IA):

1st Year B.Sc Cardiac Care Technology

Theory - 20 marks

Practicals - 10 marks*. [Lab work- 06 marks and Record-04 marks]

2nd & 3rd year B.Sc Cardiac Care Technology

Theory – 20 Marks

Practicals – 20 Marks

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

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

7. Subject and hours of teaching for Theory and Practicals

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

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

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

Table - I Distribution of Teaching Hours in First Year Subjects

Main subjects

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

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

Subsidiary Subjects

English 25 Hours

Kannada 25 Hours

Health-Care 40 Hours

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

Saturday 9am - 1pm)

Table - II Distribution of Teaching Hours in Second Year Subjects

Main Subjects

Sl. No.	Subject	Theory	Practical No. of Hours	Clinical posting	Total No. of Hours
		No of Hours			
1.	Medicine relevant cardiac care to technology	50	--	--	50
2.	Section A Applied Pathology	30	30	--	120
	Section B Applied Microbiology	30	30		
3.	Applied Pharmacology	50	--	--	50
4.	Introduction to Cardiac care Technology	80	100	650	830
	Total	240	160	650	1050

Subsidiary Subjects:

Sociology 20 Hours

Subsidiary Subjects:

Sociology 20 Hours

Constitution of India 10 Hours

Environmental Science & Health 10 Hours

Table - III Distribution of Teaching Hours in Third Year Subjects

Main Subjects

Sl. No.	Subject	Theory	Practical No. of Hours	Clinical posting	Total No. of Hours
		No of Hours			
1.	Cardiac care Technology – Clinical	50	50	250	350
2.	Cardiac care Technology - Applied	50	50	250	350
3.	Cardiac care Technology – Advanced	50	50	250	350
	Total	150	150	750	1050

Subsidiary Subjects:

Ethics, Database Management 50 Hours

Research & Biostatistics 20 Hours

Computer application 10 Hours

8. Schedule of Examination:

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

9. Scheme of Examination

There shall be three examinations, one each at the end of I, II and III year. The examination for both main and subsidiary subjects for all courses in Allied Health Sciences shall be common in the first year. Distribution of Subjects and marks for First Year, Second year & Third year University theory and practical Examinations are shown in the Table – IV, V & VI.

First year examination:

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

Second & Third year examination:

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

Practical examination:

Three practical examinations, at the end 2nd Year and three practical examinations at the end of the 3rd year.

TABLE-IV

Distribution of Subjects and marks for First Year University theory Examination

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

Note: I A = Internal Assessment

*Main Subjects shall have University Examination.

There shall be no University Practical Examination.

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

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

Theory					Practical				
Paper	Subjects	Theory	Viva voice	I.A	Sub Total	Practicals	I.A		Grand Total
i	Section A - Applied Pathology Section B - Applied Microbiology	50 50	30	20	150	40	10	50	200
ii	Introduction to Cardiac care Technology	100	30	20	150	40	10	50	200
iii	Applied Pharmacology	80	--	20	100		No Practical		100
iv	Medicine relevant to technology	80	--	20	100		No Practical		100

Distribution of Subsidiary Subjects and marks for Second Year Examination

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

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

TABLE - VI

Distribution of Subjects and marks for Third Year Examination.

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

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

Distribution of Subsidiary Subjects and marks for Third Year Examination

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

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

10. PASS CRITERIA

10.1. First year examination

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

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

10.2. Second and Third year Examination

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

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

11. Carry over benefit

11.1 First year examination:

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

11.2. Second year examination:

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

12. Declaration of Class:

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

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

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

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

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

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

13. Eligibility for the award of Degree:

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

14. Distribution of Type of Questions and Marks for Various Subjects

THEORY

SUBJECTS HAVING MAXIMUM MARKS = 100		
<i>Type of Questions</i>	<i>No of Questions</i>	<i>Marks For Each Questions</i>
<i>Essay Type</i>	3 (2 x10)	10
<i>Short Essay Type</i>	12 (10x5)	05
<i>Short Answers Type</i>	12(10x 3)	03

SUBJECTS HAVING MAXIMUM MARKS = 80		
<i>Type of Questions</i>	<i>No of Questions</i>	<i>Marks For Each Questions</i>
<i>Essay Type</i>	3 (2x 10)	10
<i>Short Essay Type</i>	8(6 x 5)	05
<i>Short Answers Type</i>	12(10 x 3)	03

SUBJECTS HAVING MAXIMUM MARKS = 60		
<i>Type of Questions</i>	<i>No of Questions</i>	<i>Marks For Each Questions</i>
<i>Essay Type</i>	3(2x10)	10
<i>Short Essay Type</i>	7(5x5)	05
<i>Short Answers Type</i>	7(5x3)	03

SUBJECTS HAVING MAXIMUM MARKS = 50		
<i>Type of Questions</i>	<i>No of Questions</i>	<i>Marks For Each Questions</i>
<i>Essay Type</i>	3(2x10)	10
<i>Short Essay Type</i>	5(3x 5)	05
<i>Short Answers Type</i>	7(5 x 3)	03

INTERNSHIP

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

FIRST YEAR B.SC. CARDIAC CARE 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 vena cava, portal vein, portosystemic anastomosis

Great saphenous vein

Dural venous sinuses

Lymphatic system- cisterna chyli & thoracic duct

Histology of lymphatic tissues

Names of regional lymphatics, axillary and inguinal lymph nodes in brief

Practical:

Demonstration of heart and vessels in the body

Histology of large artery, medium sized artery & vein, large 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, Waldeyer's ring)

Oesophagus, 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, bronchopulmonary 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

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, 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

Sensory organs:

Theory:

Skin: Skin-histology
Appendages of skin
Eye: Parts of eye & lacrimal apparatus
Extra-ocular muscles & nerve supply
Ear: parts of ear- external, middle and inner ear and contents
Practical: Histology of thin and thick skin
Demonstration and histology of eyeball
Histology of cornea & retina

Embryology:

Theory:

Spermatogenesis & oogenesis
Ovulation, fertilization
Fetal circulation
Placenta

INTERNAL ASSESSMENT

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

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

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 QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
Short essay type	10 (attempt 8)	8 x 5	40
Short answer type	12 (attempt 10)	10 x 3	30
To the point answer	07 (attempt 5)	5 x 2	10
GRAND TOTAL			80

Distribution of Marks for University Theory and Practical Exam

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

REFERENCE BOOKS:

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

PHYSIOLOGY

Theory 70 hours

Practical 20hours

Introduction

Composition and function of blood

Red blood cells — Erythropoiesis, stages of differentiation function, count physiological Variation. Haemoglobin —structure, function, concentration physiological variation, White blood cells . types & functions & immunity.

Platelets — Normal count, functions.

Plasma Proteins — Concentration, types, albumin, globulin, Fibrinogen, Prothrombin functions.

Haemostasis — Definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting factors.

Blood Bank

Blood groups — ABO system, Rh system Blood grouping & typing

Crossmatching

Rh system — Rh factor, Rh incompatibility.

Blood transfusion — Indication, universal donor and recipient concept.

Selection criteria of a blood donor. Transfusion reactions

Anticoagulants — Classification, examples and uses

Anaemias : Classification — morphological and etiological. Effects of anemia on body

Blood indices — Colour index, MCH, MCV, MCHC

Erythrocyte sedimentation Rate (ESR) and Packed cell volume

Normal values, Definition. Determination

Lymph

Body fluid compartments, function of lymph

1. Cardiovascular system

Heart ~ Properties of Cardiac muscle

Cardiac cycle-systole, diastole

Cardiac Output — Definition & Normal value

Heart sounds- Normal heart sounds Areas of auscultation, Causes

Blood Pressure — Definition, normal value, Physiological variations, regulation of BP, cardiac shock, hypotension, hypertension. Triple response

Electrocardiogram (ECG) —significance.

2. Digestive System - Physiological anatomy of Gastro intestinal tract

Salivary glands - Functions

Deglutition —stages

Stomach — Functions

Gastric secretion – Composition, function, phases of gastric secretion.

Pancreas — Function, composition of pancreatic juice.

Liver — functions of liver.

Bile composition, bile salts function, Bilirubin metabolism, types of bilirubin, Vandernberg reaction, Jaundice- types, significance.

Gall bladder — functions.

Intestine — small intestine and large intestine.

Digestion and absorption of Carbohydrates, Proteins, Fats, Lipids.

3. Respiratory system

Functions of Respiratory system, Physiological Anatomy of Respiratory system, Respiratory tract,

Respiratory Muscles, Respiratory organ-lungs, Alveoli, Respiratory membrane, stages of respiration.

Mechanism of normal intra pulmonary / pleural pressure, surfactant.

Transportation of Respiratory gases: Transportation of Oxygen: Direction, pressure gradient, Forms of transportation, Oxy-Hb dissociation curve. Quantity of Oxygen transported. CO₂ transport forms, chloride shift.

Spirogram - Lung volumes and capacities. Regulation of respiration what? Why? How? Mechanisms of Regulation, nervous and chemical regulation. Respiratory centre.

Applied Physiology and Respiration : Hypoxia, Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnoea.

4. Endocrine System —

Thyroid gland hormone — Physiological function, regulation of secretion. Disorders — hypo and hyper secretion of hormone with features.

Adrenal gland – Physiological functions of hormones secreted, hypo & hyper secretion of hormones with features.

Pituitary hormones — Anterior and posterior pituitary hormones, function.

Pancreas — Hormones of pancreas. Insulin — secretion, regulation, function and action. Diabetes mellitus — Regulation of blood glucose level.

Parathyroid gland — function, action, regulation of secretion of parathyroid hormone. Calcitonin — function and action

5. Special senses

Vision — structure of eye. Function of different parts.

Structure of retina, Optic pathway, Refractive errors of eye.

Hearing structure and mechanism of hearing

Functions of middle ear.

Taste — Taste buds functions.

Smell physiology, Receptors.

6.Nervous system

Functions of Nervous system, Neuron structure, classification & properties. Neuroglia, conduction of impulses continuous and salutatory and factors affecting. Synapse — structure, types, properties.

Receptors — Definition, enumerate properties. Reflex action — unconditioned properties of reflex action. Spinal cord nerve tracts. Name of the pathway & its function, course not needed.

Pyramidal tracts — Extrapyramidal tracts. Functions of Hypothalamic, disorders. Cerebral cortex lobes and functions, Sensory cortex, Motor cortex, functions of Cerebellum. Basal ganglion-functions. EEG.

Cerebro Spinal Fluid(CSF) : formation, circulation, properties, composition and functions lumbar puncture.

Autonomic Nervous System: Sympathetic and parasympathetic distribution and functions and comparison of functions.

7.Excretory System

Excretory organs

Kidneys: Functions of kidneys structural and functional unit nephron, vasarecta, cortical and juxtamedullary nephrons — Comparison, Juxta Glomerular Apparatus — Structure and function.

Mechanism of Urine formation: Define of GFR, Normal value, factors affecting GFR, Determination. Determination of GFR — sites & mechanism of reabsorption, Na⁺, H₂O, Glucose.

Properties and composition of normal urine, urine output. Abnormal constituents in urine. Mechanism of urine concentration — Current Mechanisms

Micturition, innervation of Bladder, Cystourethrogram. Diuretics: Water, Diuretics, osmotic diuretics, Artificial kidney, Renal function tests — plasma clearance.

8.Reproductive system

Function of Reproductive system, Puberty

Male reproductive system- Functions of testes, spermatogenesis site.

Androgens — Testosterone and functions.

Female reproductive system, Functions of estrogen & progesterone, Ovulation, menstrual cycle. pregnancy test.

9.Muscle nerve physiology

Classification of muscle, structure of skeletal muscle, Sarcomere contractile proteins, Neuromuscular junction. Transmission across, Neuromuscular junction. Excitation contraction coupling. Mechanism of muscle contraction muscle tone, fatigue Rigour mortis.

10.Skin–Functions of skin

Body temperature measurement,Regulation of body Temperature by physical chemical and nervous mechanisms .Role of Hypothalamus, Hypothermia

PRACTICALS – ONLY DEMONSTRATION

- 1.Haemoglobinometry
- 2.White Blood Cell count
- 3.Red Blood Cell count
- 4.Determination of Blood Groups
- 5.Leishman’s staining and Differential WBC count
- 6.Determination of packed cell Volume
- 7.Erythrocyte sedimentation rate [ESR]
- 8.Calculation of Blood indices
- 9.Determination of Clotting Time, Bleeding Time

10. Blood pressure Recording

11. Auscultation for Heart Sounds

12. Artificial Respiration

13. Determination of vital capacity

INTERNAL ASSESSMENT

Theory-average of 2 exams conducted 20

Practicals: record and lab work* 10

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

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 QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
Short essay type	10 (attempt 8)	8 x 5	40
Short answer type	12 (attempt 10)	10 x 3	30
To the point answer	07 (attempt 5)	5 x 2	10
GRAND TOTAL			80

Distribution of Marks for University Theory and Practical Exam

Theory				Practical			Grand total
Theory	Viva	IA	Sub	practical	IA	Sub Total	

	Voce		Total				
80	-	20	100	-			100

REFERENCE BOOKS:

Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism Publishers

Chatterjee (CC) Human Physiology Latest Ed. Vol. 1, Medical Allied Agency

Choudhari (Sujith K) Concise Medical Physiology Latest Ed. New Central Book

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

A K Jain MLT Venkatesh Sudakar

BIOCHEMISTRY

No. Theory classes: 70hours

No. of practical classes: 20 hours

Theory:

No. Theory classes: 70 hours

No. Practical classes: 20 hours

1. Carbohydrate Chemistry [3 hours]

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

2. Lipid Chemistry; [3 hours]

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

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

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

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

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

5. Enzymes; [5 hours]

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

6. Digestion and Absorption [3 Hours] ;

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

7. Carbohydrate Metabolism; [7 Hours];

- Glycolysis ; Aerobic, Anaerobic, Definition , Site and subcellular site , Steps with all the enzymes and coenzymes at each step , mention the regulatory enzymes , Energetics,
- Citric acid cycle; Pyruvate dehydrogenase complex (reaction and coenzymes) , Site and subcellular site , Reactions with all the enzymes and coenzymes ,Regulatory enzymes , Energetics

- Significance of HMP Shunt pathway.
- Hyperglycemic and hypoglycemic hormones
- Blood Glucose Regulation.
- Diabetes mellitus (definition, classification, signs and symptoms)

8. Lipid Metabolism [4 Hours];

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

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

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

10. Vitamins [13 Hours] ;

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

11. Mineral Metabolism [5 Hours];

- Name the macro/ microminerals
- Iron: Sources ,RDA, Functions and Disorders of deficiency and excess
- Calcium and phosphorus: Sources ,RDA, functions, normal serum levels and hormones reulating their levels

12.Nutrition; [4 hours]

- Balanced diet (Definition)
- Caloric value ; Definition , Caloric values of carbohydrates, proteins and fats
- Total daily caloric requirements of an adult male and female,
- RDA (Definition, standard values for nutrients)
- Basal metabolic rate(BMR) ; Definition , Magnitude of BMR in men and women c, Factors affecting BMR
- Thermic effect/ SDA of food (Definition, values for major macronutrients)

13.Carbohydrates, Proteins and fats in Nutrition:[4 hours]

- Carbohydrates ;. Daily dietary requirement. 2. Dietary fibers (Definition, functions, importance and their daily requirements)
- Proteins ;. Daily requirement , Biological value. a. Definition b. Protein used as a standard for this , Protein sources with high and low biological value , Mutual supplementation of proteins (Definition, examples).
- Fats ; Daily requirement , Essential fatty acids (Definition, functions, daily requirement and deficiency manifestations) , Saturated and unsaturated fatty acids (Definition, sources, examples).

14. Malnutrition : [1 hour]

- Protein energy malnutrition [PEM] (Definition, classification).
- Marasmus and kwashiorkor (Similarities and differences)

15.Renal Function Tests[2 hours]

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

16. Radio active Isotopes [2 hours]

- Definition, clinical applications

- Biological effects of radiations

17. Clinical Biochemistry: [5 hours]

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

B. Buffers • Definition [2 hours]

- Henderson Hasselbalch equation,
- principal buffer systems in the ECF ICF and urine
- Bicarbonate and phosphate buffer systems (pKa value, normal ratio of base/acid in the plasma)
- Acidosis & Alkalosis (Definition, classification, causes and biochemical findings)

C. Normal serum levels and condition where they are altered [2 hour]

- Glucose, Protein, urea, uric acid, and creatinine
- bilirubin, cholesterol
- Serum Electrolytes

ASSIGNMENT TOPICS;

1. Hazards; physical, chemical, Biological ,
2. Arterial blood gas analysis
3. Responsibilities of Health care personnel
4. Biomedical waste management

Total theory hours; 70

PRACTICAL DEMONSTRATION ;20 hours.

- Color Reactions of Carbohydrates & amino acids.
- Precipitation Reactions of proteins
- Colorimetry

- Estimation of Blood glucose folin wu And enzymatic method
- Estimation of Urea by dam method

Internal Assessment

Theory - Average of two exams conducted 20

Practicals: Record & Lab work 10

* There shall be no University Practical Examination and internal assessment marks secured in Practicals 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 QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
Short essay type	10 (attempt 8)	8 x 5	40
Short answer type	12 (attempt 10)	10 x 3	30
To the point answer	07 (attempt 5)	5 x 2	10
GRAND TOTAL			80

Distribution of Marks for University Theory and Practical Exam

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

Text Book References

- Biochemistry –by U Sathyanarayana & U Chakrapani
- Textbook of Medical Biochemistry by D.M Vasudeva & Shrekumari.
- Textbook of Medical Biochemistry- by MN Chatterjea & Rana Shinde

- Textbook of Medical Laboratory technology by Godkar and Godkar.
- Biochemistry- by Pankaja Naik
- Medical Laboratory technology by Ramnik Sood.
- Manipal Manual of Clinical Biochemistry for medical laboratory and M.Sc., students- by Shivananda Nayak B
- Varley's Practical Clinical Biochemistry,

PATHOLOGY

Histo Pathology ,Clinical Pathology, Haematology and Blood Banking

Theory – 70 hours

Practical – 20 hours

THEORY

General pathology -33hrs

1) CELL INJURY-5HRS

Definition, examples & morphology of reversible injury(fatty liver, hyperplasia, hypertrophy,

metaplasia(1 hr)

Definition & pathogenesis of irreversible injury(neurosis, apoptosis)-2hrs

Gangrene – Definition, morphology & differences(1hr)

Pathological calcification & pigments(1hr)

2) INFLAMMATION-(10hr)

Cells in acute & chronic inflammation(1hr)

Acute inflammation – signs, vascular events, cellular events(2hr)

- Morphology of pattern of acute inflammation(1hr)
- Wound healing- primary & secondary healing, stages, factors and complications- 2hrs
- Chronic inflammation – classification, & pathogenesis of TB(1hr)
- Primary tuberculosis, 2□ tuberculosis, miliary TB(1hr)
- Leprosy, classification, laboratory diagnosis & morphology of Tuberculoid leprosy &

Lepromatous leprosy(1hr)

- Syphilis- stages, c/f, laboratory diagnosis of primary, secondary, tertiary & congenital syphilis(1hr)

3) HAEMODYNAMIC DISORDERS(10hr)

- Pathogenesis of thrombosis & fate of thrombosis(2hr)
- Pathogenesis of edema(1hr)
- Renal edema & cardiac edema(1hr)
- Difference between transudate and exudates-1hr
- Classification embolism- sources of emboli, fat embolism(causes & c/f)(2hr)
- Infarction- definition, classification & examples-2hr
- Classification of shock & pathogenesis of cardiac shock(1hr)

4) Classification of autoimmune disease & c/f & laboratory diagnosis of SLE(1hr)

5) NEOPLASIA -7HRS

- Definition & naming of tumours(1hr)
- Differences between benign & malignant neoplasm(1hr)
- Metasis- pathways & examples (1hr)

- Precancerous conditions-(1hr)
- Clinical aspects of neoplasia(1hr)
- Paraneoplastic syndrome & tumour markers (1hr)
- Tumour staging & grading(1hr)

Haematology-21HRS

- Haematopoieses(2hr)

- Normal haemostasis including- coagulation pathway & fibrinolytic system(2hr)
- Definitions & Classifications of anemia(2hr)
- Definition & classification of leukemia(2hr)
- Classification of bleeding disorders(1hr)
- Normal constituents of Blood, their structure and functions-3hours
- Collection of Blood samples and anticoagulants-2hrs
- Hemoglobin estimation, different methods and normal values-2hrs
- Packed cell volume-1hr
- Erythrocyte sedimentation rate-1hr
- Bleeding time. Clotting time, prothrombin time, Activated partial Thromboplastin time-3hrs

BOOD BANKING-7HRS

- Blood group system(1hr)
- Blood grouping(2hrs)
- Blood components and their indications(2hrs)
- Definition and Classification & transfusion reaction(2hr)

Clinical Pathology- Theory-9hours

- Collection & transport of urine sample-1hr
- Physical examination of urine -1hr
- Chemical examination of urine.-2hr
- microscopic examination of urine-1hr
- Examination of Body fluids(pleural & peritoneal fluid)—1hr
- Examination of Cerebrospinal fluid (CSF)-1hr

- Sputum examination-1hr
- Examination of feces-1hr

Practicals

1. Urine analysis- Physical, Chemical, Microscopic
2. Blood grouping and Rh typing
3. Hb estimation , packed cell volume (PCV), Erythrocyte Sedimentation rate (ESR)
4. Bleeding time and Clotting time
5. Histopathology- section cutting and H & E Staining (for BSc MLT only)

INTERNAL ASSESSMENT

Theory-average of 2 exams conducted 20

Practicals: record and lab work* 10

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

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 I shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
Short essay type	10 (attempt 8)	8 x 5	40
Short answer type	12 (attempt 10)	10 x 3	30
To the point answer	07 (attempt 5)	5 x 2	10
GRAND TOTAL			80

Distribution of Marks for University Theory and Practical Exam

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

REFERENCE BOOKS:

1. Culling Histopathology techniques
2. Bancroft Histopathology techniques
3. Koss- Cytology
4. Winifred Diagnostic cytopathology
5. Orell Cytopathology
6. Todd and Sanford- clinical diagnosis by Laboratory Medicine
7. Dacie and Lewis- Practical Hematology
8. Ramnik SOOD. Lab technology, Methods and interpretation, 4 th edition JP Bros New Delhi,
1996

Microbiology I

Theory: 70 Hours

Practicals: 20 Hours

1. Introduction (8hrs)
 - Introduction to Microbiology 1
 - History of Microbiology 1
 - Classification of microorganisms 1

- Microscopy 2
- Morphology of bacterial cell 3
- 2. Growth and nutrition (3 hrs)
 - Nutrition, growth and multiplication of bacteria, culture media and culture methods
- 3. Sterilization and disinfection (3hrs)
 - Principles and use of equipments of sterilization, chemicals used in disinfection
- 4. Biomedical waste management principle and practice (2 hrs)
- 5. Immunology (20 hrs)
 - Immunity 2
 - Vaccines, Immunization schedule 1
 - Antigen, antibody 3
 - Definition of antigen and antibody
 - List the types of antigens and antibodies
 - Antigen antibody reactions 3
 - Immune system 4
 - Brief introduction of primary and secondary lymphoid organs
 - Lymphocytes; T cell, B cell functions
 - Phagocytic cells
 - Hypersensitivity 3
 - Classification
 - Types with examples
 - Autoimmunity 2
 - Mechanisms

- Examples of autoimmune diseases
- Transplantation immunology 2
- Classification of transplants
- Types of grafts
- Graft versus host reaction

6. Infection (5hrs)

- Definition, types and modes of transmission 2
- Hospital acquired infections 1
- causative agents
- modes of transmission
- Prophylaxis
- Antibiotics 1
- Antimicrobial susceptibility testing 1

7. Systematic bacteriology (8hrs)

- General symptoms & causative agents of infections of the Respiratory tract, gastrointestinal tract, central nervous system, skin and soft tissue, urinary tract infections, blood borne diseases, STDs, PUO and their laboratory diagnosis.

8. Virology (8 hrs)

- Introduction to virology, morphology and classification, replication, viral culture.
- List of medically important viruses and diseases (AIDS, Hepatitis, Rabies, Polio, Arboviral diseases) and their laboratory diagnosis.

9. Parasitology (8hrs)

- Introduction to Parasitology , Classification.

- Lab diagnosis of parasitic infections
- List of medically important parasites and diseases (*E.histolytica*, *Giardia lamblia*, *Plasmodium*, *T. saginata*, *T. solium*, *Echinococcus granulosus*, *Ascaris*, *Ancylostoma*, *W.bancrofti*, *Leishmania donovani*) and their laboratory diagnosis.

10. Mycology (7hrs)

- Introduction to Mycology,classification
- List of medically important fungi and diseases (*Candidiasis*, *Cryptococcosis*, *Dermatophytes*, *Aspergillosis* and *Mucor mycosis*) and their laboratory diagnosis.

Practicals:

20 Hours

1. Compound Microscope.
2. Demonstration and sterilization of equipments - Hot Air oven, Autoclave, Bacterial filters.
3. 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 staphylococcus Antibiotic susceptibility test
4. Anaerobic culture methods.
5. Gram stain
6. Acid Fast staining
7. Demonstration of common serological tests - Widal, VRDL, ELISA.
8. Stool examination
9. Biomedical waste management.
10. Universal precautions

INTERNAL ASSESSMENT

Theory-average of 2 exams conducted 20

Practicals: record and lab work* 10

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

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 I shall be as given under.

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-TOTAL
Short essay type	10 (attempt 8)	8 x 5	40
Short answer type	12 (attempt 10)	10 x 3	30
To the point answer	07 (attempt 5)	5 x 2	10
GRAND TOTAL			80

Distribution of Marks for University Theory and Practical Exam

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

Reference Books-

1. Ananthanarayana & Panikar Medical Microbiology- University Press
2. Robert Cruickshank- Medical Microbiology- The Practice of Medical Microbiology
3. Chatterjee- Parasitology- Interpretation to Clinical Medicine
4. Rippon- Medical Mycology
5. Emmons- Medical Mycology
6. Basic Laboratory methods in Parasitology, J P Bros, New Delhi

7. Basic Laboratory procedures in clinical bacteriology, J P Bros, New Delhi
8. Medical Parasitology- Ajit Damle
9. Introduction to medical microbiology- Ananthanarayana- Orient Longman Pvt. Ltd

SUBSIDIARY SUBJECTS

COURSE OUTLINE

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

BEHAVIOURAL OBJECTIVES:

The student at the end of training is able to

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

UNIT - I : INTRODUCTION :

Study Techniques

Organisation of effective note taking and logical processes of analysis and synthesis

Use of the dictionary Enlargement of vocabulary Effective diction

UNIT - II : APPLIED GRAMMAR :

Correct usage

The structure of sentences The structure of paragraphs Enlargements of Vocabulary

UNIT - III : WRITTEN COMPOSITION :

Precise writing and 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. Shasikumar and P V Dhanija. Pub. By: Tata Mcgraw Hill, New Delhi
5. Journalism Made Simple D Wainwright
6. Writers Basic Bookself Series, Writers Digest series
7. Interviewing by Joan Clayton Platkon
8. Penguin Book of Interviews.

HEALTH CARE

Teaching Hours : 40

Teaching Hours : 40

Introduction to Health

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

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

Introduction to Nursing

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

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

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

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

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

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

First Aid:

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

Reference Books:

Preventive and Social Medicine by J.Park

Text Book of P & SM by Park and Park

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

Scheme of Examination

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

No Practical or Viva voce examination

This is a subsidiary subject, examination to be conducted by respective colleges. Marks

required for a pass is 35%

SECOND YEAR B.SC CARDIAC CARE TECHNOLOGY

APPLIED PHARMACOLOGY

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

- I. Autonomic nerves system.
 - Anatomy & functional organisation.
 - List of drugs acting on ANS including dose, route of administration, indications, contra indications and adverse effects.

- II. Cardiovascular drugs- Enumerate the mode of action, side effects And therapeutic uses of the following drugs.
 - a. Antihypertensive
 - 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. Antihistamines and antiemetics-

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

VI. CNS stimulants and depressants

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

VII. Pharmacological protection of organs during CPB

VIII. Inhalational gases and 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 ANATOMY & PHYSIOLOGY RELATED TO DIALYSIS TECHNOLOGY PAPER 1 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)	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

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.
4. Experimental Pharmacology for Under Graduates, Prabhakar, , Orient Longman PVT Ltd.

APPLIED PATHOLOGY

I. CARDIOVASCULAR SYSTEM

- Atherosclerosis- Definition, risk factors, briefly Pathogenesis & morphology, clinical significance and prevention.
- Hypertension- Definition, types and briefly Pathogenesis and effects of Hypertension.
- Aneurysms - Definition, classification, Pathology and complications.
- Pathophysiology of Heart failure.
- Cardiac hypertrophy - causes, Pathophysiology & Progression to Heart Failure.
- Ischaemic heart diseases- Definition, Types. Briefly Pathophysiology, Pathology & Complications of various types of IHD.
- Valvular Heart diseases- causes, Pathology & complication. Complications of artificial valves.
- Cardiomyopathy - Definition, Types, causes and significance.
- Pericardial effusion- causes, effects and diagnosis.
- Congenital heart diseases - Basic defect and effects of important types of congenital heart diseases.

II. HAEMATOLOGY

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

III. RESPIRATORY SYSTEM

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

IV. RENAL SYSTEM

- Clinical manifestations of renal diseases. Briefly causes, mechanism, effects and laboratory diagnosis of ARF & CRS. Briefly Glomerulonephritis and Pyelonephritis.
- 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

There shall be one theory paper with 2 section of three hours duration carrying 50 marks each. Distribution of type of questions and marks for Applied Pathology shall be as given under.

SL NO	TESTS	MARKS
1	Interpretation of	05

<i>TYPE OF QUESTION</i>	<i>NO. OF QUESTIONS</i>	<i>MARKS</i>	<i>SUBTOTAL</i>
<i>LONG ESSAY</i>	<i>3 (To attempt 2)</i>	<i>2x 10</i>	<i>20</i>
<i>SHORT ESSAY</i>	<i>5 (To attempt 3)</i>	<i>3x 5</i>	<i>15</i>
<i>SHORT ANSWER</i>	<i>7 (To attempt 5)</i>	<i>5x3</i>	<i>15</i>
<i>TOTAL MARKS</i>			<i>50</i>

PRACTICAL EXAMINATION

40 Marks

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

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

APPLIED MICROBIOLOGY

THEORY - 40 HOURS

1. Health care associated infections and Antimicrobial resistance: Infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting like Methicillin Resistant Staphylococcus aureus infections, Infections caused by Clostridium difficile, Vancomycin resistant enterococci etc. Catheter related blood stream infections, Ventilator associated pneumonia, Catheter Related urinary tract infections, Surveillance of emerging resistance and changing flora. The impact and cost attributed to Hospital Associated infection.

6 Hours

2. Disease communicable to Healthcare workers in hospital set up and its preventive measure: Occupationally acquired infections in healthcare professionals by respiratory route (tuberculosis, varicella-zoster, respiratory syncytial virus etc), blood borne transmission (HIV, Hepatitis B, Hepatitis C, Cytomegalovirus, Ebola virus etc), oro faecal route (Salmonella, Hepatitis A etc), direct contact (Herpes Simplex Virus etc). Preventive measures to combat the spread of these infections by monitoring and control

6 Hours

3. Microbiological surveillance and sampling: Required to determine the frequency of potential bacterial pathogens including Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis and also to assess the antimicrobial resistance

<i>TYPE OF QUESTION</i>	<i>NO. OF QUESTIONS</i>	<i>MARKS</i>	<i>SUBTOTAL</i>
<i>LONG ESSAY</i>	3 (To attempt 2)	2x 10	20
<i>SHORT ESSAY</i>	5 (To attempt 3)	3x 5	15
<i>SHORT ANSWER</i>	7 (To attempt 5)	5x3	15
<i>TOTAL MARKS</i>			50

PRACTICAL EXAMINATION

40 Marks

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

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

Scheme of examination theory

There shall be one theory paper of three hours duration carrying 50 marks. Distribution of type of questions and marks for applied aspects of pathology & microbiology

TYPE OF QUESTION	NUMBER OF QUESTIONS	MARKS	SUB-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 exam: 80 marks

MEDICINE RELEVANT TO CARDIAC CARE TECHNOLOGY

Cardiovascular System

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

Hematology

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

Respiratory System

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

Renal System

ARF & CRF

End stage renal disease

Role of dialysis and renal transplantation in its management

CNS

Automatic nervous system

(Sympathetic & Parasympathetic system)

Brief mention of CNS disorders & their etiology

Others

DM

Obesity Pregnancy

Paediatric Patient (neonate/Infant)

Elderly patient

Scheme of Examination Theory

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

Distribution of type of questions and marks for Medicine relevant to Cardiac Care

Technology shall be as given under.

<i>TYPE OF QUESTION</i>	<i>NO. OF QUESTIONS</i>	<i>MARKS</i>	<i>SUBTOTAL</i>
<i>LONG ESSAY</i>	3 (To attempt 2)	2x 10	20
<i>SHORT ESSAY</i>	8 (To attempt 6)	6x 5	30
<i>SHORT ANSWER</i>	12 (To attempt 10)	10x3	30
<i>TOTAL MARKS</i>			80

NO PRACTICAL EXAMINATION

INTRODUCTION TO CARDIAC CARE TECHNOLOGY

I. Electrocardiography (ECG)

1. Basic Principles

The Electrocardiographic paper The electrocardiograph

The Electrical field of Heart

The leads: Standard limb, Precardial lead, 'V' leads & '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 S-T segment The 'U' wave

Rate & rhythm The Q-T interval

3. The Electrical axis

4. Precardial pattern of ECG

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

6. Bundle branch block General principles

Right Bundle branch block Left bundle branch block

The Hemi blocks (Fascicular block)

7. AV Blocks-basics

II. Exercise stress Testing

1. Exercise

2. Exercise protocols

3. Electrocardiography measurements

4. Exercise testing - Indication and techniques

III .Echocardiography

1. Principles of Echocardiography

- Basic principles of ultrasound
- M-Mode of Echocardiography
- Two dimensional Echocardiography
- Doppler Echocardiography; colour flow
- Transoesophageal Echocardiography

2. Instrumentation

- Basic pulse Echo system
- Transducers
- Pulse generation
- Echo detection
- A mode, B-Mode, M-Mode
- Display & recording

3. Echocardiographic Examination

- Selecting transducers
- Position of the patient
- Placement of the transducer
- Setting control
- M-Mode labelling
- 2 D Echo
- Normal variants
- Terminology
- Identification of segments

4. Doppler Echocardiography

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

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

5. Contrast Echo

6. Echo measurements of chambers - 'ASE' recommendation

IV. Cathlab

1. Basics:- Machine, Radiation
2. Generation of X-Ray
3. Hazards of radiation

REFERENCE

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

SCHEME OF EXAMINATION HEORY

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

<i>TYPE OF QUESTION</i>	<i>NO. OF QUESTIONS</i>	<i>MARKS</i>	<i>SUBTOTAL</i>
<i>LONG ESSAY</i>	<i>3 (To attempt 2)</i>	<i>2x 10</i>	<i>20</i>
<i>SHORT ESSAY</i>	<i>12 (To attempt 10)</i>	<i>10x 5</i>	<i>50</i>
<i>SHORT ANSWER</i>	<i>12 (To attempt 10)</i>	<i>10x3</i>	<i>30</i>
<i>TOTAL MARKS</i>			<i>100</i>

PRACTICALEXAMINATION

40Marks

- Basic knowledge about ultrasound machine, cathlab machine*
- *Basics views in echocardiography*
- *Interpretation of ECG / TMT reports*

VIVA

30 MARKS

Subsidiary Subject:

Subsidiary Subjects

SOCIOLOGY

Teaching Hours: 20

Course Description:

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

Introduction

Meaning - Definition and scope of sociology

Its relation to Anthropology, Psychology, Social Psychology

Methods of Sociological investigations - Case study, social survey, questionnaire, interview and opinion poll methods.

Importance of its study with special reference to 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 programme
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

INDIAN CONSTITUTION

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

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

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

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

Unit - V: Special Rights created in the Constitution for: Dalits, 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, Allahbad, Central Law Agency, 1998.
3. Granville Austin: The Indian Constitution - Corner Stone of a Nation-Oxford, New Delhi, 2000.

ENVIRONMENT SCIENCE & HEALTH

Introduction to Environment and Health

Sources, health hazards and control of environmental pollution Water

The concept of safe and wholesome water. The requirements of sanitary sources of water.

Understanding the methods of purification of water on small scale and large scale. Various biological standards, including WHO guidelines for third world countries. Concept and methods for assessing quality of water.

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

Awareness of 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

REFERENCES:

Environment Science & Health

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

Course Contents Third Year

Main Subjects

Paper-I Cardiac Care Technology - Clinical

1. Echo in rheumatic heart disease - Echo in mitral stenosis, mitral incompetence, aortic stenosis, aortic incompetence, Tricuspid valve diseases, pulmonary hypertension. Post AVR, post MVR. Prosthetic valve malfunction, LA/LAA clot

2. Echo in congenital heart disease - Echo in ASD, VSD, PDA pulmonary stenosis, aortic stenosis, contraction of aorta, TOF. Dextrocardia.
3. Echo in ischemic heart disease - Echo in acute myocardial infarction, old myocardial infarction and other ischemic heart disease related conditions, LV aneurysm, VSR, Ischemic MR
4. Echo in other cardiovascular disease- Echo in various types of cardio myopathy infective endocarditis diseases of aorta, mitral valve prolapse, myxoma and other cardio vascular diseases.
5. Assessment of Cardiac function- measurements of all cardiac chambers and assessment of cardiac function(Diastolic, Systolic)
6. Echo in pericardial disease- pericardial effusion, cardiac tamponade, constructive pericarditis
7. Cardiac catheterisation laboratory - general details of cardiac catheterisation equipment, how to handle the machine, common problems one may come across and how to over come it, radiation hazards
8. Radiation physics- basics, generation of radiations, effect on patients/ staffs
9. Materials used in the cathlab- all catheters, balloons, guidewires, pacemakers contrast material and other material used in the cardiac catheterisation laboratory and sterilization of all these materials
10. Right heart catheterisation - procedure, cath position, oxymetry at various levels, angiogram done and its interpretation
11. Left heart catheterisation - procedure, cath position, oxymetry at various levels, angiogram done and its interpretation
12. Coronary angiogram - procedure, materials used, type and amount dye used, indications and contraindications, various pictures recorded in various angles and gross interpretation.

13. Peripheral angiogram - procedure, indication and contraindication

REFERENCE

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

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 applied dialysis technology paper i 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)	12 (To attempt 10)	10 X 5	50
SHORT ANSWER (SA)	12 (To attempt 10)	10 X 3	30
TOTAL MARKS			100

Practical exam: 80 marks

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

Paper -II Cardiac Care Technology - Applied

1. Interpretation of normal ECG
2. 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
3. ECG in rheumatic heart disease - definition of rheumatic heart disease, valvular involvement in rheumatic heart disease, ECG in mitral stenosis, mitral incompetence, aortic stenosis and aortic incompetence

4. ECG in hypertension- definition of hypertension, how to record blood pressure, ECG in hypertension
5. 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
6. 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
7. Trans esophageal echocardiogram - indications, procedure, usefulness and complications one may encounter and its management
8. Stress Echo- procedure and indications
9. Foetal echocardiogram - Procedure, basic interpretation
10. Contrast echocardiogram - procedure and usefulness of contrast echocardiogram
11. Myocardial contrast echo- Basic knowledge
12. Peripheral Doppler - Procedure and usefulness of peripheral Doppler
13. Coronary angioplasty-procedure, materials used, complication one may encounter and how to manage it
14. Peripheral angioplasty - materials used and procedure. Angioplasty of coarctation of aorta
15. Rota ablation/ FFR/ IVUS/OCT- Basic knowledge
16. IABP- Uses, basic principle, indication, contraindication, complications

REFERENCE

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

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 applied dialysis technology paper i 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)	12 (To attempt 10)	10 X 5	50
SHORT ANSWER (SA)	12 (To attempt 10)	10 X 3	30
TOTAL MARKS			100

Practical exam: 80 marks

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

Paper -III Cardiac Care Technology - Advanced

1. Cardiac Monitoring - definition, purpose of cardiac monitoring, how to Recognise various arrhythmias how to set up a intensive coronary care unit and usefulness of ICCU
2. Interpretation of TMT report - criteria for TMT positive test contraindication for TMT conditions where TMT is not useful, complications that may occur in TMT room and its management
3. Use of defibrillator- indications, how to use the defibrillator, complications during the procedure and its management
4. Management of cardiac arrest - definition, causes external cardiac massage, artificial respiration and other drugs and procedures used in the management of Cardiac arrest(ACLS, BLS)
5. Myocardial perfusion scan - procedures and usefulness of myocardial perfusion scan
6. Cardiac arrhythmias - **bradyarrhythmia and tachy arrhythmias and ECG diagnosis of all rhythm disturbances.**
7. Electrolyte disturbances - ECG in hypokalemia, hyperkalemia etc.
8. Holter monitoring - procedure and usefulness

9. Valvoplasties- procedure, indications, complications and treatment of balloons, mitral valvuloplasty, balloon aortic valvuloplasty balloon pulmonary valvuloplasty and balloon tricuspid valvuloplasty.
10. Coil closure and device closure of PDA - procedure, indications and materials used for coil and device closure of PDA
11. Device closure of ASD - procedure, indications and materials used for device closure of ASD
12. Device closure of VSD - procedure, indications and materials used for device closure of VSD
13. Electrophysiological studies - basic knowledge of EP studies mapping and ablation
14. Oxymetry - 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, complications one may encounter and management. Implantable Cardioverter defibrillator device
17. CD recording and storage- recording and storage of all the procedures over CD
18. Procedure during pregnancy- precautions to be followed.
19. Nuclear Cardiology - instrumentation, radiopharmaceuticals, patient imaging techniques.
20. *Cardiac drugs*
21. *Septal ablation therapy- indication, procedure, complications*
22. *Advanced echo- 3D, Speckle tracking- Basic knowledge*

REFERENCE

1. *Feigenbaum's Echocardiography- Latest edition*
2. *The Echo Manual- From the Mayo clinic- Latest edition*
3. *Leo Schamroth- An Introduction to Electrocardiography*
4. *Marriott's*

practical Electrocardiography

5. *Gross man & Baim's cardiac catheterization, Angiography and Intervention*

6. *Braunwald's Heart Disease: A textbook of cardiovascular medicine- Latest edition*

Scheme of Examination HEORY

There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for Paper -III Cardiac Care Technology - Advanced shall be as given under.

<i>TYPE OF QUESTION</i>	<i>NO. OF QUESTIONS</i>	<i>MARKS</i>	<i>SUBTOTAL</i>
<i>LONG ESSAY</i>	<i>3 (To attempt 2)</i>	<i>2x 10</i>	<i>20</i>
<i>SHORT ESSAY</i>	<i>12 (To attempt 10)</i>	<i>10x 5</i>	<i>50</i>
<i>SHORT ANSWER</i>	<i>12 (To attempt 10)</i>	<i>10x3</i>	<i>30</i>
<i>TOTAL MARKS</i>			<i>100</i>

One common practical for all papers with equal weight age of marks. 40 practical marks for each paper and 30 marks viva for each paper

PRACTICAL EXAMINATION

40 Marks each paper

- ***ECHO evaluation of Case with complete diagnosis***
- ***Spotters***
- ***Interpretation of ECG/ TMT reports***

VIVA

30 Marks each paper

Subsidiary subjects

BIO STATISTICS

Time Allotted: 20 Hours

Course Description:

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

Behavioural Objectives:

Understands statistical terms.

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

Unit - I : Introduction

Meaning, definition, characteristics of statistics.

Importance of the study of statistics.

Branches of statistics.

Statistics and health science including nursing.

Parameters and estimates.

Descriptive and inferential statistics.

Variables and their types.

Measurement scales

Unit - II: Tabulation of Data

Raw data, the array, frequency distribution.

Basic principles of graphical representation.

Types of diagrams - histograms, frequency polygons, smooth frequency polygon,

cumulative frequency curve, ogive.

Normal probability curve.

Unit - III : Measure of Central Tendency

Need for measures of central tendency

Definition and calculation of mean - ungrouped and grouped

Meaning, interpretation and calculation of median ungrouped and grouped.

Meaning and calculation of mode.

Comparison of the mean, and mode.

Guidelines for the use of various measures of central tendency.

Unit - IV : Measure of Variability

Need for measure of dispersion.

The range, the average deviation.

The variance and standard deviation.

Calculation of variance and standard deviation ungrouped and grouped.

Properties and uses of variance and SD

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 ratios of health.

Recommended Books.

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

BASICS IN COMPUTER APPLICATIONS

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

Introduction to Data processing :

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

Hardware Concepts :

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

Concept of Software.

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

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

Computers in medical electronics Basic Anatomy of Computers Principles of programming

Computer application - principles in scientific research ; work processing, medicine, libraries,

museum , education, information system. Data processing

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

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

N SECTION *III*

CLINICAL TRAINING

Content and purpose

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

1st year: Introduction to the Hospital Setting

The purpose of this phase is:

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

2nd year: Skills Necessary to work in a Hospital

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

General procedures to be observed when patients attend for appointment:

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

Correct procedures when dealing with patients with infectious diseases

- University precautions.

Correct procedures when dealing with immuno-compromised patients:

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

Care of patients with:

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

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

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

In the department:

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

Equipment's and Integration:

- i. Begin to become competent in the manipulation of the equipment.
- ii. Be able to communicate effectively with patients.
- iii. Begin to integrate into the department as part in specific and multidisciplinary teams.
- iv. Begin to empathize with patients and to appreciate their own feelings in the clinical situation.
- v. Being able to handle and achieve proficiency in mould room techniques.

Safety & Precautions in Practice:

- i. Identifying the functions of various equipment and safe handling.

- ii. Identifying the functions on a control panel, indicating their purpose and safely using these when appropriate.
- iii. Safely using the accessory equipment in the correct context.
- iv. Correctly and safely using equipment related to patient immobilization.
- v. Demonstrating the correct procedure for various techniques

To Achieve Clinical Competence

The purpose of this phase is for the students to:

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

To achieve final competency substantial time will be spent:

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

Graded Responsibility (structured training schedule)

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

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

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

Rotation posting

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

Monitoring Learning Progress

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

The learning out comes to be assessed should included:

- i. Personal Attitudes
- ii. Acquisition of knowledge
- iii. Clinical and operative skills
- iv. Teaching skills

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

1. Periodic tests :

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

Work diary / Log, Personal Attitudes.

The essential items are:

- Caring attitudes
- Initiative
- Organizational ability
- Potential to cope with stressful situations and undertake responsibility
- Trust worthiness and reliability
- To understand and communicate intelligibly with patients and other
- To behave in manner which establishes professional relationships with patients and colleagues
- Ability to work in team
- A critical enquiring approach to the acquisition of knowledge the methods used mainly consist of observation. It is appreciated that these items require a degree subjective assessment by the guide, supervisors and peers.

3. Acquisition of Knowledge :

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

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

4. Technical skills

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

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

5. Teaching Skills:

Book:

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

6. Records:

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

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