REVISED ORDINANCE GOVERNING REGULATIONS AND CURRICULUM OF

BACHELOR OF RESPIRATORY 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 Shanth i 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.MLT/367/2019-20 **Date: 28/08/2019**

NOTIFICATION

Sub: Revised Ordinance pertaining to Regulation and Curriculum of Bachelor of Medical Laboratory 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 Bachelor of Medical Laboratory 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.

REVISED ORDINANCE GOVERNING REGULATIONS & CURRICULUM OF BACHELOR OF MEDICAL LABORATORY TECHNOLOGY - 2019

1. Eligibility for admission:

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

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

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

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

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

Candidates with two years diploma from a recognized Government Board in MLT 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 MLT

should have studied Physics, Biology and Chemistry as subjects during the tenure of the course.

Lateral entry to second year of B.Sc.MLT 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:

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

Duration of the course:

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

Medium of instruction:

The medium of instruction and examination shall be in English.

Scheme of examination:

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

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

Internal Assessment (IA):

1st Year B.Sc. RCT

Theory - 20 marks
Practicals - 10 marks*. [Lab work- 06 marks and Record-04 marks]

2nd & 3rd year B.Sc. RCT
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.

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 I	70	20	90
4	Pathology I (Clinical Pathology, Haematology & 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 Saturday's students shall work in hospitals in the respective speciality 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 No. of Hours	Practical No. of Hours	Clinical posting	Total No. of Hours
1.	Medicine relevant to Respiratory technology	50	--	--	50
2.	Section A Applied Pathology Section B Applied Microbiology	30 30	30 30	--	120
3.	Pharmacology	50	--	--	50
4.	Introduction to Respiratory Technology	80	100	650	830
	Total	240	160	650	1050

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 No. of Hours	Practical No. of Hours	Clinical posting	Total No. of Hours
1.	Respiratory Technology - Clinical	50	50	250	350
2.	Respiratory Technology - Applied	50	50	250	350
3.	Respiratory 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

9. 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.

10. 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 Examination & Practical.

Written Examinations consists of

- 05 papers in the 1st year
- 03 papers in the 2nd Year
- 03 papers in the 3rd Year.

Practical examination:

- There shall be no practical examination in the first year.

- Three practical examinations, at the end 2nd Year.
- 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	100	20	120
2	Physiology	3 Hours	100	20	120
3	Biochemistry	3 Hours	100	20	120
4	Pathology	3 Hours	100	20	120
5	Microbiology	3 Hours	100	20	120
	Subsidiary Subject**				
1	English	3 Hours	80	20	100
2	Kannada	3 Hours	80	20	100
3	Health Care	3 Hours	80	20	100

Note: I A = Internal Assessment

*Main Subjects shall have University Examination. There shall be no University Practical Examination.

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

TABLE - V

Distribution of Subjects and marks for Second Year Examination

Theory					Practical			
Paper	**Subjects**	**Theory**	**I.A**	**Sub Tot al**	**Practi cals**	**I.A**	Sub total	**Grand Total**
i	Section A – Applied Pathology Section B Applied Microbiology	50 50	20	120	40	10	50	170
ii	Introduction to Respiratory Technology	100	20	120	40	10	50	170
iii	Pharmacology	100	20	120		No Practical		100
iv	Medicine relevant to Respiratory technology	100	20	120		No Practical		100

Distribution of Subsidiary Subjects & marks for First Year University Theory 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

** Subsidiarysubjects:Examinationfor subsidiary Subjects shall be conducted by respective colleges

TABLE - VI

Distribution of Subjects and marks for Third Year Examination.

SL NO	THEORY				PRACTICAL			
PAPER	SUBJECTS	THEORY	I.A	SUBTOTAL	PRACTICAL	I.A	SUB TOTAL	GRAND TOTAL
1	Respiratory Technology - Clinical	100	20	120	120 (40+40+40)	30	150	510
2	Respiratory Technology - Applied	100	20	120				
3	Respiratory Technology - Advanced	100	20	120				

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

Distribution of Subsidiary Subjects & marks for First Year University Theory Examination

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

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

11. Pass criteria

11.1. 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.

11.2. 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.

12. Carry over benefit

12.1 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.

12.2. 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.

13. 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.

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)

14. Eligibility for the award of Degree:

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

15. Distribution of Type of Questions and Marks

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **First year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10

Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (Questions no 15 & 20 choice) 10x3= 30 marks

Total= 100

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **Second and Third Year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (No choice) 10x3= 30 marks

Total= 100

SUBJECTS HAVING MAXIMUM MARKS= 80 (for **Subsidiary subjects**)		
Type of Questions	NO. of questions	Marks for Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	8 (6 x 5)	05
Short Answer Type	12 (10 x 3)	03

SUBJECTS HAVING MAXIMUM MARKS = 60		
Type of Questions	No of Questions	Marks For Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	7 (5 x 5)	05
Short Answers Type	7 (5 x 3)	03

SUBJECTS HAVING MAXIMUM MARKS = 50		
Type of Questions	No of Questions	Marks For Each Questions
Essay Type	3 (2 x 10)	10

Short Essay Type	5 (3 x 5)	05
Short Answers Type	7 (5 x 3)	03

I YEAR B.Sc. RCT

ANATOMY

Theory: 70hrs
Practicals: 20hrs

Chapter 1: Introduction:

Theory:

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

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

Chapter 2: Connective tissue:

Theory:

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

- Muscular system: Classification of muscular tissue & histology
- Names of muscles of the body

Practical:

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

Chapter 3: Cardiovascular system:

Theory:

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

Practical:

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

Chapter 4: Gastro-intestinal system

Theory:

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

Practical:

- Demonstration of parts of GIT
- Radiographs of abdomen

Chapter 5: Respiratory system

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

Practical:

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

4.

Chapter 6: Urinary system

Theory:

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

Practical:

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

Chapter 7: Reproductive system

Theory:

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

Practical:

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

Chapter 8: Endocrine glands

Theory:

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

Practical:

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

Chapter 9: Nervous system

Theory:

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

- Sympathetic trunk & names of parasympathetic ganglia

Practical:

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

Chapter 10: Sensory organs

Theory:

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

Chapter 11: Embryology:

Theory:

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

INTERNAL ASSESSMENT

Theory-average of 2 exams conducted 20

Practicals: record and lab work* 10

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

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 Anatomy shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **First year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (Questions no 15 & 20 choice) 10x3= 30 marks

Total= 100

Distribution of Marks for University Theory and Practical Exam

Theory				**Practicals**			**Grand Total**
Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
100	--	20	120	*			120

REFERENCE BOOKS:

1. William Davis (P) understanding Human Anatomy and Physiology – McGraw Hill
2. Chaursia- A Text Book of Anatomy
3. T. S. Ranganathan- A Text Book of Human Anatomy
4. Fattana, Human Anatomy (Description and applied)- Saunder's & C P Prism Publishers, Bangalore
5. ESTER. M. Grishcimer- Physiology & Anatomy with Practical Considerations, J. P.

Lippin Cott. Philadelphia
6. Bhatnagar- Essentials of Human Embryology- Revised Edition. Orient Blackswan Pvt. Ltd.

PHYSIOLOGY

Theory 70 hours
Practical 20hours

1. General Physiology

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

2. Blood

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

Red blood cells - erythropoiesis, stages of differentiation, factors affecting it, function, normal count, physiological variation.
Hemoglobin- function, concentration, types & methods of Hb estimation, fate of hemoglobin Jaundice-types Anaemia,-types
ESR, PCV, osmotic fragility & blood indices
WBC- morphology, production, functions, normal count, differential count, variation, variation Immunity (in brief)
Platelets- origin, morphology, normal count, function-Platelet plug ,bleeding disorder
Haemostasis - definition, normal haemostasis, clotting factors, mechanism of clotting, anticoagulants disorders of clotting factors.
Blood group-ABO & Rh system, Rh incompatibility blood typing ,cross matching, hazards of mismatched blood transfusion
RES, spleen and lymph.

3. Nerve-Muscle

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

NMJ, blockers, Myasthenia gravis

Classification of muscle, structure of skeletal muscle, sarcomere, contractile proteins Excitation contraction coupling, mechanism of muscle contraction, types of contraction Motor unit, fatigue, rigor mortis Smooth muscle.

4. Respiratory system

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

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

Lung volumes and capacities

Respiratory membrane , transport of O_2 & CO_2

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

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

5. Cardiovascular system

Introduction to CVS & general principles of circulation Properties of Cardiac muscle

Cardiac cycle, heart sounds, Pulse Cardiac output, factors and measurement Heart rate

BP-factors, measurement, Short term regulation Intermediate and long term regulation of BP

ECG uses and significance, .normal waveform, heart block Coronary circulation, Cutaneous circulation-Triple response Shock

Effects of exercise on CVS and Respiratory system.

6. Renal system, Skin and body temperature

Kidneys- functions, structure of nephron, type, juxtaglomerular apparatus-structure and function, non- excretory functions of kidney

Glomerular filtration rate (GFR)- Definition ,normal value, factors affecting GFR Tubular reabsorption - sites, substance reabsorbed, mechanisms of reabsorption Tubular secretion- sites, substance secreted, mechanisms of reabsorption

Counter current mechanism of concentration of urine Obligatory and Facultative reabsorption of water Micturition reflex, Diuretics

Artificial kidney, renal function tests-clearance tests
Skin -structure and function, body temperature measurement, physiological variation,
Regulation of body Temperature by physical chemical and nervous mechanisms-Role of Hypothalamus Hypothermia and fever.

7. Digestive system

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

8. Endocrine system

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

9. Reproductive system

Introduction to reproductive system, sex differentiation & Puberty Male reproductive system, functions of testosterone & Spermatogenesis
Female reproductive system, fuctions of Estrogen, Progesterone, Oogenesis Ovulation & Menstrual cycle
Physiological changes during pregnancy, pregnancy tests, parturition & lactation Male & Female contraceptive methods.

10. Central nervous system

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

Sensory pathways: Anterior spino thalamic tract and Posterior column pathway

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

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

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

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

Sleep, EEG,

Autonomic Nervous System - Sympathetic and parasympathetic distribution and functions.

11. Special senses

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

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

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

Practicals

Blood pressure Recording

Auscultation for Heart Sounds

Artificial Respiration

Determination of vital capacity

INTERNAL ASSESSMENT

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

*There shall be no university practical examination and internal assessment marks

secured in Practicals need not be sent to the university.

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 Physiology shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **First year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (Questions no 15 & 20 choice) 10x3= 30 marks

Total= 100

Distribution of Marks for University Theory and Practical Exam

Theory				**Practicals**			**Grand Total**
Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
100	--	20	120	*			120

REFERENCE BOOKS:

1. Guyton (Arthur) Text Book of Physiology. Latest Ed. Prism Publishers
2. Chatterjee (CC) Human Physiology Latest Ed. Vol. 1, Medical Allied Agency
3. Choudhari (Sujith K) Concise Medical Physiology Latest Ed. New Central Book
4. Ganong (William F) Review of Medical Physiology. Latest Ed. Appleton

BIOCHEMISTRY I

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 [5 Hours]

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

8. Lipid Metabolism [4 Hours]

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

9. Amino acid and Protein Metabolism [3 Hours]

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

10. Vitamins [5 Hours]

- Definition and classification .
- RDA, sources, coenzyme forms, biochemical functions and disorders for the following water soluble vitamins: Thiamine, Niacin, Pyridoxine,

Cobalamine, Folic acid, Ascorbic acid

- RDA, sources, coenzyme forms, biochemical functions and deficiency disorders for thefollowing fat soluble vitamins; A and vitamin D.

11. Mineral Metabolism [3 Hours]

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

12. Nutrition [6 hours]

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

13. Renal Function Tests [2 hours]

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

14. Radioactive Isotopes [1 hour]

- Definition, clinical applications
- Biological effects of radiations

15. Clinical Biochemistry [5 hours]

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

B. Buffers • Definition [2 hours]

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

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

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

16. Fundamental Chemistry (1 hour)

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

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

- Stock and working solutions.
- Molar and Normal solutions of compounds and acids. (NaCl, NaOH, HCl, H_2SO_4, H_3PO_4, CH_3COOH etc.,)
- Preparation of percent solutions – w/w, v/v w/v (solids, liquids and acids), Conversion of a percent solution into a molar solution
- Saturated and supersaturated solutions
- Standard solutions. Technique for preparation of standard solutions and Storage. E.g: glucose, albumin etc.
- Dilutions- Diluting Normal , Molar and percent solutions. Preparing working standard from stock standard.
- Part dilutions: Specimen dilutions. Serial dilutions. Reagent dilution. Dilution factors.

ASSIGNMENT TOPICS

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

PRACTICAL DEMONSTRATION [20 hours]

- Color Reactions of Carbohydrates & amino acids.
- Precipitation Reactions of proteins
- Colorimetry
- Estimation of Blood glucose Folin Wu and enzymatic method
- Estimation of Urea by DAM method

INTERNAL ASSESSMENT

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

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

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 Biochemistry I shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **First year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (Questions no 15 & 20 choice) 10x3= 30 marks

Total= 100

Distribution of Marks for University Theory and Practical Exam

Theory				Practicals			Grand Total
Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
100	--	20	120	*			120

Text Book References

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

PATHOLOGY I

(**Clinical Pathology, Hematology and Blood Banking**)

Theory-70 hours

Practicals-20 hours

I. Clinical Pathology- Theory

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

- Sputum examination
- Examination of feces

II. Hematology – Theory

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

III. Blood Bank- Theory

- Introduction blood banking
- Blood group system
- Collection and processing of blood for transfusion
- Compatibility testing
- Blood transfusion reactions

IV General Pathology:

1. Cell injury:

a. Definition, causes.
b. Cellular adaptations – Hypertrophy, hyperplasia, atrophy and metaplasia.
c. Types of cell injury – Reversible and irreversible; morphology of reversible injury.
d. Necrosis – Definition and patterns of tissue necrosis.
e. Intracellular accumulations – Lipids, cholesterol, proteins, glycogen and pigments; examples.
f. Pathologic calcification – Types and examples.

2. Inflammation:

a. Definition and signs of inflammation.
b. Types – Acute and chronic inflammation.
c. Acute inflammation – Causes, morphological patterns and outcome.
d. Chronic inflammation – Causes, morphology and examples.
e. Regeneration and repair – Mechanism of cutaneous wound healing.

f. Factors affecting wound healing.

3. Hemodynamic disorders:

a. Edema – Definition, pathogenesis and types: Renal, cardiac, pulmonary and cerebral.

b. Difference between transudate and exudate.

c. Shock – Definition, types of shock with examples: Hypovolemic, cardiogenic and septic shock, stages of shock: Nonprogressive, progressive and irreversible.

d. Thrombosis – Definition, mechanism of thrombus formation (Virchow's triad) and fate of thrombus.

e. Embolism – Definition and types: Thromboembolism, fat, air and amniotic fluid embolism.

f. Infarction – Definition and examples.

4. Immune system:

a. Autoimmune diseases – General features, enumerate systemic and organ specific autoimmune diseases.

b. Systemic lupus erythematosus – Manifestations and diagnosis.

5. Neoplasia:

a. Definition and nomenclature of tumors.

b. Differences between benign and malignant neoplasms.

c. Enumerate modes of carcinogenesis: Genes, physical, chemical and microbial agents of carcinogenesis.

d. Modes of spread of tumors.

e. Clinical aspects of neoplasia.

f. Grading and staging of cancers.

g. Laboratory diagnosis of cancer.

Practicals

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

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 100 marks. Distribution of type of questions and marks for Pathology I shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **First year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (Questions no 15 & 20 choice) 10x3= 30 marks

Total= 100

Distribution of Marks for University Theory and Practical Exam

Theory				**Practicals**			**Grand Total**
Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
100	--	20	120	*			120

REFERENCE BOOKS:

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

Microbiology I

Theory: 70 Hours
Practicals: 20 Hours

1. Introduction (6 hrs)

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

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

Morphology of bacterial cell

2. Growth and Nutrition (6 hrs.)

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

3. Sterilization and disinfection (8 hrs.)

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

4. **Biomedical waste management principle and practice**

5. Immunology (5hrs.)

Immunity - mechanism of immunity, classification, types
Vaccines
Immunization schedule
Definition of antigen, antibody, list of antigen antibody reaction (no need of detailed account of antigen antibody reactions)
Definition of hypersensitivity and classification (no need of detailed account of types of hypersensitivity)

6. Infection (5 hrs.)

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

7. Systematic bacteriology (15 hrs.)

Disease caused and laboratory diagnosis of medically important bacteria (Staphylococcus, coagulase negative Staphylococcus, MRSA, Streptococcus pyogenes, Pneumococcus, gonococcus, E.coli, diarrhoeagenic E.coli, Salmonella, Vibrio cholerae, ElTor vibrios, Halophilic vibrios, Shigella, Mycobacterium tuberculosis, Mycobacterium leprae, Atypical Mycobacteria, Treponema pallidum, leptospira)
(no need of classification, antigenic structure, virulence mechanism)

8. Parasitology (10 hrs.)

Introduction to Parasitology
List of medically important parasites and diseases (E.histolytica, Plasmodium, W.bancrofti, Ascaris, Ancylostoma, B.coli, G.lamblia, T.solium, T.saginata)
Laboratory diagnosis of parasitic infection (No need of including life cycles)

9. Virology (10 hrs.)

Introduction to virology
List of medically important viruses and diseases (AIDS, Hepatitis, Rabies, Polio, Arbo viruses)
Cultivation of viruses and laboratory diagnosis of viral infections

10. Mycology (5 hrs.)

Introduction to Mycology
Classification of medically important fungi - (based on morphology, spore production, disease production, taxonomy)
List of medically important fungi and diseases (Candidiasis, Cryptococcosis, Dermatophytes, Aspergillosis, Mucor Mycosis)
Laboratory diagnosis of fungal infections.

Practicals (20 hrs.)

Compound microscope (Demonstration)
Demonstration of sterilization equipments
Demonstration of culture media and culture methods
Demonstration of antibiotic sensitivity testing
Demonstration of serological tests - Widal, VDRL, ASO, CRP, RA
Demonstration of gram stain and ZN staining
Demonstration of Helminthic ova
Grams stain, Acid fast staining
Stool exam for Helminthic ova

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

INTERNAL ASSESSMENT

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

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 Microbiology I shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **First year)**		
Type of Questions	No. of Questions	Marks for Each Questions

Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (Questions no 15 & 20 choice) 10x3= 30 marks

Total= 100

Distribution of Marks for University Theory and Practical Exam

Theory				**Practicals**			**Grand Total**
Theory	Viva Voce	IA	Sub Total	Practicals	IA	Sub Total	
100	--	20	120	*			120

Reference Books-

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

SUBSIDIARY SUBJECTS

ENGLISH

COURSE OUTLINE

COURSE DESCRIPTION: This course is designed to help the student acquire a good

command and comprehension of the English language through individual papers and conferences.

BEHAVIOURAL OBJECTIVES:

The student at the end of training is able to

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

UNIT - I: INTRODUCTION:

Study Techniques

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

Use of the dictionary

Enlargement of vocabulary Effective diction

UNIT - II: APPLIED GRAMMAR:

Correct usage

The structure of sentences The structure of paragraphs Enlargements of Vocabulary

UNIT - III: WRITTEN COMPOSITION:

Precise writing and summarizing Writing of bibliography Enlargement of Vocabulary

UNIT - IV: READING AND COMPREHENSION:

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

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

Paragraph, Essay, Letter, Summary, Practice in writing

UNIT - VI: VERBAL COMMUNICATION:

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

Scheme of Examination

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

SUBJECTS HAVING MAXIMUM MARKS= 80 (for **First year**)		
Type of Questions	NO. of questions	Marks for Each Questions

Essay Type	3 (2 x 10)	10
Short Essay Type	8 (6 x 5)	05
Short Answer Type	12 (10 x 3)	03

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

Marks required for a pass is 35%

REFERENCE

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

HEALTH CARE

Teaching Hours : 40 Introduction to Health

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

National Health Policy

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

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

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

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

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

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

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

First Aid :

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

Reference Books:

1. Preventive and Social Medicine by J.Park
2. Text Book of P & SM by Park and Park
3. 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

SUBJECTS HAVING MAXIMUM MARKS= 80 (for **First year**)		
Type of Questions	NO. of questions	Marks for Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	8 (6 x 5)	05
Short Answer Type	12 (10 x 3)	03

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

APPLIED PHARMACOLOGY

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

I. *Cardiovascular drugs- Enumerate the mode of action, side effects And therapeutic uses of the following drugs.*

a. Antihypertensives
   - Beta Adrenergic antagonists
   - Alpha Adrenergic antagonists
   - Peripheral Vasodilators
   - Calcium channel blockers

b. Antiarrhythmic drugs
c. Cardiac glycosides
d. Sympathetic and nonsympathetic inotropic agents.
e. Coronary vasodilators.
f. Antianginal and anti failure agents
g. Lipid lowering & anti atherosclerotic drugs.
h. Drugs used in Haemostais- anticoagulants Thrombolytics and antithrombolytics.
i. Cardioplegic drugs- History, Principles and types of cardioplagia.
j. Primary solutions - History, principles & types.
k. Drugs used in the treatment of shock.

II. *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.

III. *Analgessics*

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

IV. *Antihistamines and antiemetics-*

- Classification, Mechanism of action, adverse effects,

Preparations, dose and routes and administration.

V. *CNS stimulants and depressants*

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

VI. *Pharmacological protection of organs during CPB*

VII. *Inhalational gases and emergency drugs.*

VIII. *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.

IX. Corticosteroids - Classification, mechanism of action, adverse effects and complications. Preparation, dose and routes of administration.

X. *Diuretics*

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

XI. *Chemotherapy of infections*

- Definition
- Classification and mechanism of action of antimicrobial agents
- Combination of antimicrobial agents
- Chemoperophylaxis.
- 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 100 marks. Distribution of type of questions and marks for applied Pharmacology shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **Second and Third Year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice)	2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice)	10x5= 50 marks
3. Short answer- 10 Questions (No choice)	10x3= 30 marks
	Total= 100

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.

APPLIED PATHOLOGY

I. CARDIOVASCULAR SYSTEM

- Hypertension-Definition, types and briefly Pathogenesis and effects of Hypertension.
- 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.

II. HAEMATOLOGY

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

III. RESPIRATORY SYSTEM

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

PRACTICALS

1. Estimation Bleeding & Clotting time.

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 Pathology shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **Second and Third Year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (No choice) 10x3= 30 marks

Total= 100

PRACTICAL EXAMINATION *40 Marks.*

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

Sl. No.	Tests	Marks
1.	Interpretation of Hematology Chart	05
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 Clostriduium difficle, 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 synctial virus etc), blood borne transmission (HIV, Hepatitis B, Hepatitis C, Cytomegalovirus, Ebola virus etc), oro faecal route (Salmonella, Hepatitis A etc), direct contact (Herpes Simplex Virus etc). Preventive measures to combat the spread of these infections by monitoring and control. 6 Hours

3. Microbiological surveillance and sampling: Required to determine the frequency of potential bacterial pathogens including Streptococcus pneumoniae, Haemophilus influenzae, and Moraxella catarrhalis and also to assess the antimicrobial resistance.
   Sampling: rinse technique, direct surface agar plating technique. 6 Hours

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

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

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

PRACTICALS- 30 HOURS

1. Principles of autoclaving & quality control of Sterilization.
2. Collection of specimen from outpatient units, inpatient units, minor operation theater and major operation theater for sterility testing.
3. The various methods employed for sterility testing.
4. Interpretation of results of sterility testing.
5. Disinfection of wards, OT and Laboratory.

PRACTICAL EXAMINATION *40 Marks*

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

Sl. No.	Tests	Marks
5.	Dry heat / Moist heat: Temperature recording charts interpretation	05
6.	Dry heat / Moist heat: Color change indicators interpretation	05
7.	Air sampling culture plates interpretation of Colony forming units based on air flow rate and sampling time	05
8.	Interpretation of Sterility of Hemodialysis water/Distilled water/Deionised water based on growth of colonies in BHI agar to be reported as X CFU/mL	05
		20

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 Microbiology shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **Second and Third Year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (No choice) 10x3= 30 marks

Total= 100

PRACTICAL EXAMINATION *40 Marks.*

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

43

MEDICINE RELEVANT TO RESPIRATORY CARE TECHNOLOGY

CardioPulmonary Diseases

Course Description

This course is designed to teach the respiratory therapy student about the pathological changes, clinical findings and treatment of major cardiopulmonary diseases.

Learning Objectives

By the end of this course students will be able to:

1. Enumerate the pathological changes that occurs in the pulmonary system of patients suffering from cardiopulmonary diseases
2. Describe and diagnose clinical features and outline the treatment of cardiopulmonary disease
3. Appreciate the role of the respiratory therapist in the management and diagnosis of cardiopulmonary disease

Course Outline

Topic
CARDINAL MANIFESTATIONS AND PRESENTATION OF DISEASES Alteration in circulatory and Respiratory Functions Dyspnea Cough Chest Pain and Palpitations Hematemesis and Hemoptysis Hypoxia and Cyanosis Fever Edema
Respiratory Insufficiency and Respiratory Failure Classification Background, Pathophysiology, Etiology and Management of Respiratory failure
OBSTRUCTIVE LUNG DISEASES Chronic Obstructive Pulmonary Disease (COPD), Chronic Bronchitis and Emphysema Anatomic alterations of the lungs associated with Chronic Bronchitis and Emphysema Etiology and Epidemiology, Risk factors, Diagnosis and assessment of Chronic Obstructive Pulmonary Disease Distinguishing features between Emphysema and Chronic Bronchitis Cardiopulmonary clinical manifestations associated with Chronic Bronchitis and Emphysema General management of COPD Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines of COPD
Asthma National Asthma Education and prevention program Global Initiative for Asthma (GINA) guidelines Anatomic alterations of the lung Etiology, Classification and Epidemiology, Diagnosis of Asthma Cardiopulmonary clinical manifestations associated with Asthma General Management of Asthma Respiratory care treatment protocols
Respiratory Insufficiency and Respiratory Failure Classification Background, Pathophysiology, Etiology and Management of Respiratory failure
OBSTRUCTIVE LUNG DISEASES Chronic Obstructive Pulmonary Disease (COPD), Chronic Bronchitis and Emphysema Anatomic alterations of the lungs associated with Chronic Bronchitis and Emphysema

Etiology and Epidemiology, Risk factors, Diagnosis and assessment of Chronic Obstructive Pulmonary Disease Distinguishing features between Emphysema and Chronic Bronchitis Cardiopulmonary clinical manifestations associated with Chronic Bronchitis and Emphysema General management of COPD Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines of COPD
Asthma National Asthma Education and prevention program Global Initiative for Asthma (GINA) guidelines Anatomic alterations of the lung Etiology, Classification and Epidemiology, Diagnosis of Asthma Cardiopulmonary clinical manifestations associated with Asthma General Management of Asthma Respiratory care treatment protocols
Cystic Fibrosis Anatomic alterations of the lung Etiology and Epidemiology Cardiopulmonary clinical manifestations, Pancreatic insufficiency associated with Cystic Fibrosis General Management of Cystic fibrosis Heart or Heart-Lung transplantation
Bronchiectasis Anatomic alterations of the lung Etiology and Epidemiology Diagnosis, Cardiopulmonary clinical manifestations associated with Bronchiectasis General and Pharmacological management for Bronchiectasis
LOSS OF ALVEOLAR VOLUME Atelectasis Anatomic alterations of the lung Etiology , Classification of Atelectasis Cardiopulmonary clinical manifestations associated with Postoperative Atelectasis
INFECTIOUS PULMONARY DISEASE Pneumonia, Lung Abscess Formation and Important Fungal Diseases Pneumonia: Anatomic alterations of the lungs Etiology and Epidemiology Community acquired Pneumonia Chronic Pneumonia Fungal diseases: Anatomic alterations of the lungs Primary pathogens Viral Pneumonia Pneumonia in the immunocompromised patients

Necrotizing Pneumonia and Lung Abscess Bronchiolitis Obliterans Organizing Pneumonia (BOOP) Cardiopulmonary clinical manifestations associated with Pneumonia General management of Pneumonia
Tuberculosis (TB) Anatomic alterations of the lung Etiology and Epidemiology, Types of Tuberculosis Tuberculosis among health care workers Diagnostic tests, Cardiopulmonary clinical manifestations associated withTuberculosis General Management of Tuberculosis
PULMONARY VASCULAR DISEASE Pulmonary edema Anatomic alterations of the lung Etiology and Epidemiology Cardiogenic and Non-Cardiogenic Pulmonary Edema General management of Pulmonary Edema Cardiopulmonary clinical manifestations associated with Pulmonary Edema
Pulmonary Vascular Disease: Pulmonary Embolism Anatomic alterations of the lung Etiology and Epidemiology Diagnosis and Screening General management of Pulmonary Embolism Cardiopulmonary clinical manifestations associated with Pulmonary Embolism Pulmonary Hypertension Pulmonary Hypertension due to lung disease Emerging role of Respiratory Therapist in Pulmonary Vascular Disorders
CHEST WALL AND SPINAL DIFORMITIES Pleural Effusion and Empyema Anatomic alterations of the lung Pleural anatomy and Physiology Etiology and Epidemiology Hydrothorax, Hemothorax, Urinothorax, Chylothorax, PyothoraxCardiopulmonary clinical manifestations associated with Pleural Effusion and Empyema General management of Pleural Effusion
Kyphoscoliosis Anatomic alterations of the lung Etiology and Epidemiology Kyphosis and Scoliosis Pectus Excavatum and Pectus Carinatum Cardiopulmonary clinical manifestations associated with Kyphoscoliosis General managent of Scoliosis Respiratory Care Treatment Protocols

LUNG CANCERS Carcinomas of Lung Anatomic alterations of the lungs Types, Etiology and Epidemiology Diagnosis and Screening Cardiopulmonary clinical manifestations associated with Cancer of the Lung Staging of Lung Cancer General management of Lung Cancer
INTERSTITIAL AND INFLAMMATORY LUNG DISEASE Interstitial Lung Disease (ILD) Anatomic alterations of the lungs Etiology and Epidemiology Classification of ILD Cardiopulmonary clinical manifestations associated with Chronic Interstitial Lung Disease General management of Interstitial Lung Disease
Inflammatory Lung Disease and its Pulmonary effects Rheumatoid Arthritis and Pulmonary complications Pulmonary involvement in Systemic Sclerosis
DIFFUSE ALVEOLAR DISEASE Acute Respiratory Distress Syndrome (ARDS) Anatomic alterations of the lung Etiology and Epidemiology Diagnostic criteria for Acute Respiratory Distress Syndrome The National Institute of Health ARDS network Cardiopulmonary clinical manifestations associated with ARDS General management of ARDS Recent updates in ARDS management
NEURO-RESPIRATORY DISORDERS Gullian-Barré (GB) Syndrome Anatomic alterations of the lungs associated with Gillian-Barré Syndrome Etiology and Epidemiology Clinical presentation Cardiopulmonary clinical manifestations General Management
Myasthenia Gravis (MG) Anatomic alterations of the lungs Etiology and Epidemiology Screening and Diagnosis Cardiopulmonary clinical manifestations General management
Cardiopulmonary Care and Assessment of Patients with Neuromuscular Disease Chronic neuromuscular disease Cardiopulmonary clinical manifestations associated with neuromusculardiseases

General management of neuromuscular disease Ventilatory management of patients with neuromuscular disease
CARDIOVASCULAR DISEASES Congestive heart failure Pathophysiology Diagnosis Management
Valvular Heart Disease Mitral and tricuspid Regurgitation Mitral and tricuspid stenosis Aortic and pulmonary valve Stenosis and Regurgitation
Cardiomyopathy, Myocarditis and Endocarditis Pathophysiology Diagnosis Management
Cardiac tamponade and Pericarditis Pathophysiology Diagnosis Management
Cardiothoracic Surgical Conditions and Prolonged Assisted Circulation Indication, Contraindications and Complications Pre-operative management Post-operative management • Thoracotomies, Lung Volume Reduction Surgery (LVRS), Pneumonectomy, Lung Transplantation • Coronary Angioplasty, Coronary Artery Bypass Grafting (CABG), Heart Transplantation • Principles of Ventricular Assist Device
Coronary and Peripheral Vascular Disease Hypertension Primary and Secondary hypertension Grades of hypertension Accelerated hypertension
Ischemic Heart Disease Myocardial infarction Stable and Unstable Angina Acute Coronary Syndrome
Shock: Definition, Classification, Pathophysiology and General management Hypovolemic shock Cardiogenic shock Obstructive shock Distributive shock
PULMONARY MANIFESTATIONS OF CENTRAL NERVOUS SYSTEM DISEASES Acute Stroke: Ischemic stroke and Hemorrhagic stoke

Definition Classification Risk factors Management
Seizure and Epilepsy Traumatic Brain Injury and Respiratory Manifestations Hypoxemic encephalopathy and Coma
ENVIRONMENTAL AND OCCUPATIONAL DISORDERS Occupational Disorders Asbestos-related lung disease Coal workers lung disease Silicosis Sarcoidosis Acute and chronic responses to toxic inhalations
Environmental Disorders High-altitude physiology and clinical disorders Diving injuries and air embolism Thermal injuries (Burns) Acute smoke inhalation injuries-CO Poisoning Drowning Electrical safety injuries Thermal injuries Envenomation Tetanus
TRAUMA AND MANAGEMENT- The Deadly Dozen of Chest Trauma and Management Immediate Life-Threatening Injuries: Anatomic alteration, Pathophysiology and Management Airway obstruction Tension Pneumothorax Pericardial Tamponade Open Pneumothorax Massive Hemothorax Flail chest Potential Life-threatening Injuries: Anatomic alteration, Pathophysiology and Management Thoracic aortic disruption Tracheobronchial injuries Blunt Myocardial injury Diaphragmatic Injuries Oesophageal injury Pulmonary Contusion

Cervical Spine Injury and management
Extremity trauma- Long bone fracture and Fat embolism
AN INTRODUCTION TO SLEEP DISORDERS- CARDIOPULMONARY MANIFESTATIONS Obstructive sleep Apnea

Central sleep Apnea
Mixed Sleep Apnea
Sleep-related hypoventilation and hypoxemia syndromes
Diagnosis of obstructive sleep apnea

Cardiopumonary pharmacology

Administration of Aerosolized & Instilled Medications:

Describe general advantages and disadvantages associated with the delivery of aerosolized medications.

Describe the three most common devices used to administer aerosolized Respiratory Care drugs, their advantages and disadvantages, optimal procedures for effective medication delivery, basic care of MDIs, SVNs. DPIs

a. Small Reservoir Nebulizer (SVN)
b. Metered Dose Inhaler (MDI)
c. Dry Powder Inhaler (DPI)

Describe the use of SVNs and MDIs for aerosol drug administration during continuous mechanical ventilation.

Describe the clinical situations in which continuous and high-dose, high frequency aerosol bronchodilator therapy would be indicated.

Define drug administration by instillation including advantages and disadvantages of utilizing this method for medication delivery.

Describe how to select the most appropriate aerosol delivery device for a patient.

Drugs affecting Respiratory system:

Bronchodilator drugs-

Differentiate between bronchoconstriction & bronchospasm, pathological triad of mechanisms leading to bronchoconstriction, types of bronchodilator.

Role of the sympathetic receptor site intracellular chemical (c-AMP) & role of the parasympathetic receptor site intracellular chemical (c-GMP).

Generic name, Trade name, Mode of action, Receptor site stimulation, Side effects & Usual adult dosage of following drugs:

- Sympathomimetic/adrenergic bronchodilators.
- Parasympatholytic/anti-cholinergic/anti-muscarinic bronchodilator drugs.
- Xanthine drugs.

2.1 Given various patient clinical scenarios, be able to suggest the most appropriate bronchodilator therapy, including drug of choice, route of delivery, and recommended dosage

Mucus Controlling Therapy-

3.1 Key terms associated with mucokinetic, mucolytics, mucoactive drugs

3.2 Physical characteristics of the mucociliary system of the lung, Types of secretory glands, Anatomical

structures, Normal structure and composition of mucus, Normal ciliary function, describe various factors that can adversely affect the mucociliary system.

3.3 Identify substances that lyse/breakdown pulmonary secretions, Compare and contrast major mucolytic drugs, Identify the dosage ranges for each mucolytic drug, describe hazards and contraindications associated with each mucolytic drug, Identify delivery methods for each drug.

Anti-Inflammatory and Anti- Asthma Agents:

Corticosteroids-

. Describe key terms and abbreviations, inflammatory process, contrast humoral (circulating) and cell-mediated immunity, Humoral immunity process involving mast cells and antigen/antibody reactions, early phase and late phase inflammatory response.

Describe the three major effects of corticosteroids, differentiate between anabolic and catabolic steroids, describe the hypothalamic-pituitary-adrenal (HPA) axis for control of normal body corticosteroid production, describe how "exogenous (outside the body)" steroid therapy can suppress the HPA axis and lead to "steroid dependency".

Describe potential side effects associated with prolonged/long-term systemic steroid therapy, identify common oral and aerosolized steroid drugs used in the treatment of respiratory disease, advantages and disadvantages associated with the use of aerosolized corticosteroid drugs, characteristics of oral versus aerosol delivered corticosteroids.

Identify how the procedure for administering MDI/DPI steroid preparations should be modified in contrast to other types of medications delivered in this form.

Non-Steroidal Anti-Asthma Agents (NSAAA)

Mode of action, Mode of administration, Trade names, Usual adult dosages & Hazards/ Precautions of NSAAA

Role of cromolyn sodium and nedocromil sodium, leukotriene antagonists/modifiers in the prevention of bronchospasm and airway inflammation.

Anti-Infective Agents:

Describe the rationale for aerosol administered anti-infective agents, describe the clinical effectiveness of administering anti-infective agents to the lungs via the inhalational route.

Identify special clinical situations that would indicate the use of this administration method for anti-infective therapy, potential side effects and hazards associated with using this route for anti-infective drug delivery.

Identify various common anti-infective agents administered by the RCP in clinical practice (Antibacterial agents, Antiviral agents, Antifungal agents)

Drugs affecting Cardiovascular system:

(Mode of action, Mode of administration, Trade names, Usual adult dosages & Hazards/ Precautions of each of these following drugs:)

Anti-hypertensive drugs

Anti- Arrhythmic drugs

Drugs affecting vascular tone and volume of circulation, renin angiotensin in system & other mechanisms of affecting these systems.

pharmacology and physiology of inhaled nitric oxide
Drugs used in Acute Care (Mode of action, Mode of administration, Trade names, Usual adult dosages & Hazards/ Precautions of each of these following drugs:) Drugs used in Cardiac arrest and Pre Arrest Drugs used in Acute Coronary Syndrome Drugs used in Cerebrovascular Accidents

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 Respiratory Care Technology shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **Second and Third Year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (No choice) 10x3= 30 marks

Total= 100

NO PRACTICAL EXAMINATION

44

INTRODUCTION TO RESPIRATORY CARE TECHNOLOGY

Introduction to Respiratory Therapy

Introduction to Respiratory Therapy profession

Course Description

'Introduction to Respiratory Therapy Profession' provides an overview of the history and development of Respiratory Therapy profession. The course is designed to explain the role and scope of respiratory therapy profession and describes the academic and Career Perspectives in Respiratory therapy. This course emphasizes on the standards of professional and clinical practices that a Respiratory Therapist should follow in an actual hospital setting. The course provides an introduction of various clinical domains and equipment used in Respiratory Therapy.

Learning Objectives

By the end of this course students will be able to:

- Explain the history of respiratory care and its professional organizations.
- Understand the role and scope of the respiratory therapist in the health care sector
- Understand the Academic and Career Perspectives in Respiratory Therapy
- Understand and explain the standards of professional practice.
- Recognize the ethical and legal aspects implied in respiratory care profession
- Understand the importance of developing communication skills and the need for maintaining interpersonal and interprofessional relationships.
- Discuss the standards of clinical practice including health promotion and infection control practices.
- Understand the importance of various clinical domains and practice in Respiratory Therapy.

Respiratory Care as a profession History and development of Respiratory Therapy profession Professional Organizations and events Respiratory Therapy education
Role and Scope of Respiratory Therapist in the Health Care Sector
Academic and Career Perspectives in Respiratory Therapy Academic Perspectives- Masters, Doctorate, Post-Doctoral Fellowships in Respiratory Care and Allied Fields; Higher Certification in advanced and related areas like Emergency Medical Care and Extra corporeal Life Support Therapy Clinical Professionals Academic Professionals Research Professionals Corporate Professionals
Standards of Professional Practice Competencies Scope of Practice- Diagnostics and Therapeutics Standards of practice Evidence-Based Respiratory Therapy Research in Respiratory Therapy Elements of hospital based Respiratory Therapy Critical thinking in Respiratory Therapy Professional Hierarchy in Respiratory Therapy Profession
Ethical and Legal Implications of Practice- Codes of Ethics, Ethical Theories and principles & Legal issues related to Respiratory Therapy Profession
Communication in Health care Communication skills Conflict and conflict resolution Interpersonal and inter-professional relationship.
Standards of Clinical Practice Clinical Assessment and Management Health promotion and Education Principles of Infection Prevention and Control

Infection prevention strategies

Orientation to Profession

Orientation to the Respiratory Therapy laboratories.

Orientation to Intensive Care Units and Emergency Departments

Oxygen Therapy devices.

Aerosol and humidification equipment and devices.

Mechanical Ventilators.

Pulmonary Function and Sleep lab

Other Respiratory Care modalities.

Respiratory Therapy Science

Introduction to Infection Control in Respiratory Care

Modes of Transmission

Standard precautions- Aerosol, Droplet, Contact, Negative pressure, Positive pressure isolations

Basics of sterilization and Disinfection

Personal Protective Gears

Basic Cardiac Life Support

Heart attack and Cardiac arrest

Importance and application of Chain of Survival

Cardiopulmonary and cerebral resuscitation- Rationale, indication, technique.

Difference between adults, children and infants CPCR

Automated External Defibrillation- Indication, technique, Special considerations

Choking in adults, children and infants- Indicators and management

Airway management

Maintaining patent airway

Basic Airway Adjuncts:

- Nasopharyngeal Airway
- Oropharyngeal Airway (Guedel, Berman airways)

Bag valve mask ventilation- Flow and Self inflating

Introduction to Basic Respiratory Science

Basic Physics for the Respiratory Therapist: -

Behavior of gases, Gas pressure Gas laws: • Boyle's Law Charles' and Gay-Lussac's Laws • Fick's Law, Henry's Law, Graham's Law • Combined Gas Law • Dalton's Law of Partial Pressures • Avogadro's Law Laws of Diffusion • Combined gas law's Fluid Mechanics: Patterns of Flow, Compressible flow, Poiseuille's Law, Reynolds Number, Bernoulli Principle, Venturi Principle, Coanda Effect
Oxygen analyzers Physical oxygen analyzers Electrical oxygen analyzers Electrochemical oxygen analyzers
Humidity and Aerosol Therapy Physiology of Heat and Moisture Exchange Indications for Humidification and Warming of Inspired Gases Types of humidifiers and Equipment Problem Solving and Troubleshooting Bland Aerosol Therapy Equipment Sputum Induction Selecting the Appropriate Therapy Aerosolized Drug Therapy Characteristics of Therapeutic Aerosols Hazards of Aerosol Therapy Aerosol Drug Delivery Systems
Hyperbaric oxygen therapy Physiological effects Methods of administration Indications and Contraindications Complications and Hazards Troubleshooting
Oxygen analyzers

Physical oxygen analyzers Electrical oxygen analyzers Electrochemical oxygen analyzers
Humidity and Aerosol Therapy Physiology of Heat and Moisture Exchange Indications for Humidification and Warming of Inspired Gases Types of humidifiers and Equipment Problem Solving and Troubleshooting Bland Aerosol Therapy Equipment Sputum Induction Selecting the Appropriate Therapy Aerosolized Drug Therapy Characteristics of Therapeutic Aerosols Hazards of Aerosol Therapy Aerosol Drug Delivery Systems
Airway Clearance Therapy Mechanism of Coughing Physiology of Airway Clearance Therapies General Goals and Indications Determining the Need for Airway Clearance Therapy Airway Clearance Methods- Active Cycle of Breathing Techniques, Autogenic Drainage, Forced Expulsion Techniques like Coughing and Huffing Postural drainage Positive Expiratory Pressure- Acapella, Flutter Selecting Airway Clearance Techniques Endotracheal suctioning - Indications, Contraindications, Complications, Assessment of need, Assessment of outcome, Types of suction Clinical aspects of Suction techniques Suction catheters (Open and Closed) Suction regulators Portable suction Units
Chest Physiotherapy Devices Manual, pneumatic and electrical percussors High-Frequency Oscillation Devices- Vest Intrapulmonary Percussive Ventilation

High-Frequency Chest Wall Oscillation Devices Mechanical Insufflation Exsufflation- Cough Assist
Lung Expansion Therapy Incentive Spirometers • Volume-Displacement Devices • Flow-Dependent Devices Intermittent Positive-Pressure Breathing Devices Positive Airway Pressure (PAP) Devices • Continuous Positive Airway Pressure • Bilevel Positive Airway Pressure Thoracic expansion exercises, Breathing exercises and Ventilatory Muscle training- Techniques
Noninvasive monitoring of Oxygen and Carbon dioxide Pulse oximetry Co-oximetry Colorimetric End-tidal determination End-tidal Capnography • Main and Side stream • Waveform morphology and applications Transcutaneous monitoring Transcutaneous monitoring of carbon-di-oxide Transcutaneous monitoring of oxygen
Advanced Cardiovascular Life Support Review of Basic Cardiac Life Support Review of Cardiac electrophysiology Cardiac Arrest Rhythms and Management (Shockable and Non shockable) Pre Arrest Rhythms- Tachy and Brady arrhythmias Post Cardiac Arrest Management Acute Stroke and management Acute coronary Syndrome and management Defibrillator- Technical aspect and Clinical application Pacer- Technical aspect and clinical application
Airway Management Review of Airway Anatomy Airway assessment • Congenital anomalies

- Acquired anomalies
- Predictors of Difficult airway- Mallampatti, LEMON, ULBT, TMD

Advanced Airway Adjuncts

- Endotracheal tubes
- Double lumen tube
- Specialized endotracheal tubes

Supraglottic Airways

- Laryngeal Mask Airway and its variants
- Combi tube
- Laryngeal tubes- King's LT

Aids to Endotracheal Intubation: -

- Laryngoscopes- Macintosh and Miller
- Endotracheal Tube Guide/Intubating Stylet
- Video laryngoscopy
- Bronchoscopy guided intubation

Adjuncts to Endotracheal Intubation: -

- Lighted Stylets or Light-wand
- Tube exchanger
- Bougie
- Indirect Laryngoscopy

Retrograde Wire Intubation

Blind Intubation

Complications of Intubation

Confirmation of definitive airway- ETCO2, 5 Points, EDD

Specialized Endotracheal Tubes

Surgical Airway Devices (Indication & Contraindication, Procedure, Complication and Hazard): -

- Tracheostomy Tubes
- Cricothyrotomy sets
- Trans-tracheal catheters
- Positioning Adjuncts- ET tube holder, TT holder
- Cuff manometer

Extubation and Decannulation

Artificial Resuscitators (Bag Valve Units) Types of Artificial Resuscitators- Manual, Expired Air, Flow/ Oxygen powered Specification and standards Manual Resuscitators- Types, parts Indications and Techniques Hazards Associated with Manual Resuscitators Inspection & Troubleshooting T- piece resuscitator
Bronchoscopy Types- Flexible and Rigid Parts, physics and principle of flexible bronchoscopes Indications, Contraindications, Monitoring and Complications Assessment of need and outcome Upper airway, tracheal and bronchial anatomy- bronchoscopy approach Infection control and sterilization of bronchoscopes
Vascular Procedures Introduction to Vascular Procedures Importance of Asepsis in Vascular procedures Types, Indications and Techniques of Venous access- Peripheral IV cannulation, Central venous cannulation, PICC lines Types, Indications and Techniques of Arterial Cannulation- Peripheral and Central Arterial Cannulation
Intercostal Drains and Tubes Basic principles of chest tube Chest Drainage system- Indications, technical aspects, set up and maintenance Troubleshooting
Circulatory Assist Devices Extra Corporeal Life Support- ECLS- Types- ECMO, ECCO2R Extracorporeal Membrane Oxygenation - ECMO Types, indication, contraindications, complications Pump Cannula Oxygenator Circuit Sensors
Blood Gas Analyzer

Blood gas machine- Calibration and Quality control of blood gasmeasuring systems Blood gas sensor blocks POC testing
Respiratory Monitoring Principles of Monitoring Oxygen Content Alveolar-Arterial Oxygen Tension Difference Alveolar gas equation PaO2/FiO2 Ratio SpO2/FiO2 Ratio Oxygenation Index Oxygen Saturation Index Respiratory Quotient V/Q ratio Quantification of Shunt Monitoring lung and chest wall resistance, compliance Minute ventilation- Wrights spirometry Peak inspiratory and expiratory flow meters- Indication, technique, contraindications
Cardiovascular Monitoring Central Venous Pressure Arterial BP monitoring Pulmonary Artery Pressure Cardiac output monitoring
Neurologic Monitoring Conscious levels- Alert, Confused, Lethargic, Obtunded, Stupor,Coma Glasgow Coma Scale Score Pupillary Response, Corneal response, Eye movements Respiratory Rate and Pattern- Abnormal patterns Intracranial Pressure Monitoring
Assessment and Monitoring of other systems Monitoring Renal Function Monitoring Liver Function Nutritional Monitoring: - • Assessment of Nutritional Status • Functional Assessment

- Metabolic Assessment
- Estimating Nutritional Requirements

INTRODUCTION TO PULMONARY FUNCTION TESTING

Types and Indications

- Airway function tests
- Lung volume and ventilation tests
- Diffusing capacity tests
- Blood gases and gas exchange tests
- Cardiopulmonary exercise tests
- Metabolic measurements

Preliminaries to Patient Testing

- Before patient testing
- Patient preparation (pre-test instructions)
- Withholding medications
- Smoking cessation
- Other patient preparation issues
- Anthropometric measurements

Physical assessment

Pulmonary history

Test Performance and Sequence

Technologist-driven protocols

Patient instruction

PULMONARY FUNCTION TESTING EQUIPMENT

Volume-Displacement Spirometers

- Water-seal spirometers
- Dry rolling seal spirometers
- Bellows-type spirometers

Flow-Sensing Spirometers

- Turbines
- Pressure differential flow sensors
- Heated-wire flow sensors
- Pitot tube flow sensors
- Ultrasonic flow sensors
- Flow sensor summary
- Portable (office) spirometers

PeakFlowmeters

Body Plethysmographs

- Pressure plethysmographs
- Flow plethysmographs

Breathing Valves

- Free breathing and demand valves
- Directional valves
- Gas-sampling valves

Pulmonary Gas Analyzers
Computers for Pulmonary Function Testing
Data acquisition and instrument control Pulmonary function data storage and programs

SPIROMETRY:
Description, Technique, Significance and Pathophysiology
Acceptability and Repeatability for Spirometry Results
Vital Capacity
Forced Vital Capacity, Forced Expiratory Volume, and Forced Expiratory Flow
Flow-Volume Curve
Peak expiratory flow
Maximum Voluntary Ventilation
Before- and After-Bronchodilator Studies

DIFFUSION CAPACITY TESTS
Diffusion Capacity of Lung for Cardon Monoxide (DLCO) or Transfer Factor of Lung for Carbon Monoxide (TLCO)
Techniques
Description
Significance and pathophysiology

LUNG VOLUMES, AIRWAY RESISTANCE AND GAS DISTRIBUTION TESTS
Lung Volumes: Functional Residual Capacity, Residual Volume, Total Lung Capacity, and Residual Volume/Total Lung Capacity Ratio
Description
Technique
Significance and pathophysiology
Airway Resistance and Conductance (Body plethysmograph)
Description
Technique
Significance and pathophysiology
Gas Distribution Tests: Single-Breath Nitrogen Washout, Closing Volume, and Closing Capacity
Description
Technique

CARDIOPULMONARY EXCERSISE TESTING
Exercise Protocols
Exercise Workload
Cardiovascular Monitors During Exercise
Heart rate and electrocardiogram
Blood pressure
Safety
Ventilation During Exercise
Equipment selection and calibration
Minute ventilation
Tidal volume and respiratory rate
Flow-volume loop analysis

Oxygen Consumption, Carbon Dioxide Production, and Respiratory Exchange Ratio During Exercise
- Oxygen consumption
- Carbon dioxide production
- Respiratory exchange ratio
- Anaerobic or ventilatory threshold
- Ventilatory equivalent for oxygen
- Ventilatory equivalent for carbon dioxide
- Oxygen pulse

Exercise Blood Gases
- Arterial catheterization
- Arterial puncture
- Pulse oximetry
- Arterial oxygen tension during exercise
- Arterial carbon dioxide tension during exercise
- Acid-base status during exercise
- Exercise variables calculated from blood gases

Cardiac Output During Exercise
- Noninvasive cardiac output techniques
- Direct Fick method
- Thermodilution method
- Cardiac output during exercise
- Symptoms scales
- Quality of test
- Interpretation strategies

BRONCHOPROVOCATION TESTS

Bronchoprovocation challenge testing: Indications, Contraindications, Technique and Complications
- Methacholine Challenge
- Histamine Challenge
- Mannitol Challenge
- Exercise Challenge
- Eucapnic Voluntary Hyperventilation

SPECIALIZED PULMONARY FUNCTION TEST REGIMENS

Respiratory Muscle Strength Testing: Description, Techniques, Significance and Pathophysiology

Forced Oscillation – Impulse Oscillometry

Preoperative Pulmonary Function Testing

Pulmonary Function Testing for Disability
- Forced vital capacity and forced expiratory volume
- Diffusing capacity
- Exercise testing

Metabolic Measurements: Indirect Calorimetry: Description, Techniques, Significance and Pathophysiology

QUALITY SYSTEMS IN PULMONARY FUNCTION LABORATORIES

QualityManual

Quality System Essentials

Organization Facilities and safety Personnel Process management Control methods: mechanical and biologic Spirometry calibration and mechanical quality control Gas analyzers and DLCO systems Body plethysmographs Calibration and quality control Path of Workflow Pre-test process Testing Post-testing
PEADRIATIC PULMONARY FUNCTION TESTING Spirometry Bronchoprovocation Challenges Lung Volumes Diffusion Capacity Infant, Toddler, and Preschool Pulmonary Function Testing Standards for Testing – Variability in reference sets and predicted values for pediatrics
Spirometry calibration – Volume calibration
Vital Capacity measurement
Forced Vital Capacity measurement
Maximum Voluntary Ventilation Measurement
Peak Flow meter measurement
Pre and Post-bronchodilator test
Diffusion capacity Tests – DL_{CO}-Single breath
Bodyplethysmography measurement – Lung volumes
Bodyplethysmography measurement – Airway resistance and conductance

46

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 Introduction to Respiratory Care Technology shall be as given under.

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **Second and Third Year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (No choice) 10x3= 30 marks

Total= 100

PRACTICAL EXAMINATION *40 Marks.*

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

Reference Books:

1. Sachdeva & Vidyabhushan, Introduction to the study of sociology
2. Indrani T.K., Text book of sociology for graduates nurses and Physiotherapy students, JP Brothers, New Delhi 10

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

SUBJECTS HAVING MAXIMUM MARKS= 80 (for **Second year**)		
Type of Questions	NO. of questions	Marks for Each Questions
Essay Type	3 (2 x 10)	10
Short Essay Type	8 (6 x 5)	05
Short Answer Type	12 (10 x 3)	03

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

INDIAN CONSTITUTION
Prescribed for the First Year students of all degree classes

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

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

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

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

Unit – V: Special Rights created in the Constitution for: Dalits, Backwards, Women and Children and the Religious and Linguistic Minorities.

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

Unit – VII: The Election Commission and State Public Service commissions.

Unit – VIII: Method of amending the Constitution.

Unit – IX: Enforcing rights through Writs:

Unit – X: Constitution and Sustainable Development in India.

Reference 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 AND 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.
Text Book of Environmental Studies for under graduate courses By Erach Bharucha
Reprinted in 2006, Orient Longman Private Limited /Universities Press India Pvt. Ltd.

Third Year

Paper – I Respiratory Therapy – Clinical

ESSENTIALS OF CRITICAL CARE

Course Description

This course is intended to introduce principles of critical care and the importance of the initial care of critically ill/injured patients to the Respiratory Therapy Students, who upon their graduation will spend most of their time in ICU settings.

Learning Objectives

By the end of this course students will be able to

- Explain the initial and ongoing assessment of critically ill or injured patients.
- Understand common ICU cases, disease presentation and the disease process
- Identify and understand diagnostic tests that are commonly used in ICUs, that includes imaging and laboratory tests.
- Evaluate the findings of assessment and interpret abnormal physiological parameters and observations to identify patients who are likely to have a critical physiological decline.
- Assist and be the part of ICU team, in dealing with sudden deterioration of the critically ill patient

- Develop and integrate clinical skills and academic knowledge in order to practice advanced assessment, life support and therapeutic skills, within the scope of practice.
- Prepare equipment and devices related to cardiorespiratory support and airway management in emergency and elective scenarios
- Act as a patient advocate, when it comes to patient safety and quality assurance in the caring of critically ill patients.
- Engage in the delivery of high-quality evidence based multidisciplinary care as either a team member or team leader, upon the crisis scenarios.

Course Outline

Sl No	Topic
1.	**Assessment of Critically Ill** Subjective and Objective Patient Assessment Neurological Assessment Respiratory Assessment Cardiovascular and Circulatory Assessment including Hemodynamics GI Assessment
2.	**Monitoring in Critical Care** Waveform monitoring- CVP, Arterial line, TCM, PAP, SpO2, ETCO2, ECG, Cardiac output monitoring, Thermo-dilution methods Bundles of Care in ICU- VAP bundle, Vascular bundle, Sepsis bundle, FAST
3.	Diagnostic Tests in Critical Care Imaging in ICU like Chest X-rays, Ultrasonography, Echocardiography Chest CT- types and abnormal findings Laboratory interpretations, that include hematology, microbiology, biochemistry and pathology reports
4.	Resuscitation in ICU Advanced Resuscitation in ICU

	Post cardiac arrest care Targeted temperature management Extracorporeal CPR
5.	Acute Respiratory Failure, Mechanical Ventilation and other Adjuncts Types of Respiratory Failure, Clinical manifestations, Diagnosis, Pathophysiology, Pharmacological adjuncts and other aspects management Disease specific noninvasive ventilation strategies and HFNC Disease specific invasive ventilation strategies and hybrid modes ECLS including VV-ECMO, VA-ECMO, ECCO2R- Indications, types of cannula, monitoring, troubleshooting, weaning and decannulation
6.	Oxygenation, Circulation and Acid-Base Disorders Principles of Oxygen therapy- Oxygen cascade, Oxygen content in blood, Cardiac output Oxygen balance- Global perfusion, ODC, SAO2, SVO2, SCVO2 Determinants of Oxygen balance- Oxyhemoglobin saturation, Central venous pressure, NIBP, Arterial BP and waveforms, Lactate, SCVO2 Acid base disorders- Acute and Chronic Respiratory Acidosis and Alkalosis, Acute and Chronic Metabolic Acidosis and Alkalosis, Compensatory Mechanisms, Anion gap, Differential diagnosis etc.
7.	Circulatory impairments Clinical features, mechanism and pathophysiology of different types of shock. Systemic changes in warm and cold shock Fluid resuscitation and responsive assessment in shock- PLR, IVC Collapsibility, SBP variation, SVR etc.
8.	Basics of Neuro and Neurosurgical Care Ischemic and hemorrhagic stroke- ICU management Intracranial Pressure and Cerebral perfusion pressure and its importance Brain protective ventilation strategy Brain death and apnea tests
9.	ICU Pharmacology

	Antiarrhythmics, Anticoagulants and thrombolytics Inotropes and other vasoactive drugs Analgesics and Sedatives- Classification and indications Skeletal muscle relaxants- Classification and indications Sedation Scale: Richmond Agitation-Sedation Scale (RASS), Ramsay's Sedation Scale
10.	Common ICU scenarios and management Sepsis- Definition, Stages, Resuscitation and Management guidelines Inter and Intra hospital transport of Ventilated patients- Checklist, Assessment, Preparation, Troubleshooting and Stabilization Pulmonary Embolism Life threatening electrolyte disturbances GI Bleed Acute pancreatitis Hepato-pulmonary Syndrome OP Poisoning Leptospirosis, Malaria, Dengue
11.	Common ICU Procedures Oral and Nasal Endotracheal Intubation- Indication, Contraindication, Complications Percutaenous Tracheostomy- Indication, Contraindication, Complications Arterial Line Insertion- Indication, Sites, Contraindication, Complications Central Line Insertion- Indication, Sites, Contraindication, Complications Needle Thoracocentesis- Site, Indication, Contraindication, Complications Intercostal Drainage insertion- Indication, Site, Contraindication and Complications Bronchoscopy- Indication, Contraindication, Complications Pericardiocentesis- Site, Indication, Contraindication, Complications Peripherally Inserted Central Catheter- Indication, Contraindication,

	Complications

12.	Basics of Obstetric Critical Care Hypertensive disorders- Eclampsia, Pre-eclampsia Amniotic Fluid Embolism
13.	Ethics in Critical Care Medicine Do Not Attempt Resuscitate Scenarios and End of the Life Care Organ donation

CARDIOPULMONARY REHABILITATION

Course Description

This course provides important aspect of managing chronic pulmonary diseases. The course deals with historical perspective, basic concepts, family education and home care as a part of pulmonary rehabilitation.

Learning Objectives

By the end of this course students will be able to:

1. Describe the historical perspective of pulmonary rehabilitation.
2. Explain the basic concepts of pulmonary rehabilitation.
3. Select and assess the chronic respiratory disease patients for pulmonary rehabilitation and family education.
4. Discuss on nutritional assessment and support.
5. Explain the behavioral medicine psychological, cognitive and social factors in pulmonary rehabilitation.
6. Enumerate the preventive aspects for the patient with chronic lung disease.
7. List the exercises in the rehabilitation of patients with respiratory disease.
8. Discuss on home mechanical ventilation.
9. Have the background knowledge and skills required for the rehabilitation of non – COPD lung disease and rehabilitation for the pediatric patient with pulmonary disease.

10. Have the background knowledge and skills required for physical medicine interventions and rehabilitation of the patient with neuromuscular weakness and surgical therapy for COPD patients.

Course Outline

Sl No	Topic
1.	**OVERVIEW OF PULMONARY REHABILITATION** Definition, Rationale for Pulmonary Rehabilitation Pulmonary Rehabilitation and Integrated Care of the Respiratory Patient History of Pulmonary Rehabilitation Evidence-Based Guidelines on Pulmonary Rehabilitation Positioning Pulmonary Rehabilitation within the GOLD 2017 Guidelines Current status of Pulmonary Rehabilitation
2.	SELECTING AND ASSESSING THE PULMONARY REHABILITATION CANDIDATE Patient Selection Patient Assessment
3.	EXERCISE ASSESSMENT AND TRAINING Rationale for Exercise Training in Chronic Lung Disease Mechanisms of Exercise Intolerance in Chronic Respiratory Disease Exercise Assessment, Field Tests (Walking Tests) Graded Exercise Test and Cardiopulmonary Exercise Tests Functional Performance Assessment Exercise Prescription Oxygen Titration Volume, Pattern and Progression of Exercise Training Resistance Exercise Testing Other Tests of Muscular Training Flexibility Training Patient Safety Precautions in Pulmonary Hypertension Exercise Induced Hypoxemia Home exercise Considerations Emergency Procedures Documentation of the Evaluation and Treatment Session
4.	COLLABORATIVE SELF MANAGEMENT AND PATIENT EDUCATION Developing an Individualized Self-Management Program Implementing Self-Management Training

5.	PSYCHOSOCIAL ASSESSMENT AND INTERVENTION Assessment of Psychosocial Functioning Interventions to Improve Psychosocial Functioning Psychosocial Provider
6.	NUTRITIONAL ASSESSMENT AND INTERVENTION Compromised Nutritional Status in Pulmonary Disease Diet Intake and COPD Assessment of Nutritional Status Nutrition Support
7.	PATIENT CENTERED EVIDENCE BASED OUTCOMES Timing and Analyzing Outcomes Patient Centered Outcome Measures
8.	DISEASE SPECIFIC APPROACHES IN PULMONARY REHABILITATION Obstructive Lung Disease Restrictive Lung Disease Pulmonary Hypertension Lung cancer Pulmonary Rehabilitation and the Surgical Patient
9.	PROGRAM MANAGEMENT Interdisciplinary Team Program content Administrative aspects of Program management Post rehabilitation Maintenance Strategies for Program success
10.	COLLABORATIVE SELF MANAGEMENT AND PATIENT EDUCATION Developing an Individualized Self-Management Program Implementing Self-Management Training
11.	PSYCHOSOCIAL ASSESSMENT AND INTERVENTION Assessment of Psychosocial Functioning Interventions to Improve Psychosocial Functioning Psychosocial Provider
12.	NUTRITIONAL ASSESSMENT AND INTERVENTION Compromised Nutritional Status in Pulmonary Disease Diet Intake and COPD Assessment of Nutritional Status Nutrition Support
13.	PATIENT CENTERED EVIDENCE BASED OUTCOMES Timing and Analyzing Outcomes Patient Centered Outcome Measures
14.	DISEASE SPECIFIC APPROACHES IN PULMONARY REHABILITATION Obstructive Lung Disease Restrictive Lung Disease Pulmonary Hypertension

	Lung cancer Pulmonary Rehabilitation and the Surgical Patient
15.	PROGRAM MANAGEMENT Interdisciplinary Team Program content Administrative aspects of Program management Post rehabilitation Maintenance Strategies for Program success
1.	Polysomnogram Channels EEG Channels EOG Channels EMG Channels EKG Channels Respiratory Channels SpO2 Body Position

1.	Scoring of Sleep and Events Apnea- Hypopnea Index Sleep staging Rules Arousal Rules Cardiac Rules Movement rules Respiratory rules Sleep Study Times, Formulas, and Calculations
2.	Pharmacology in Sleep Medicine Hypnotics Stimulants Sedatives Antipsychotics and antidepressants Effect of medication on MSLT and MWT
3.	Other Interventions and Therapeutics Dental Sleep Medicine Surgical and Pharmacologic Treatment of Sleep Disorders

	Sleep Hygiene Patient and Family Education

Scheme of Examination -Theory

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

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **Second and Third Year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (No choice) 10x3= 30 marks

Total= 100

PRACTICAL EXAMINATION

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

Paper – II Respiratory Therapy – Applied

Mechanical Ventilation

Course Description

This course is designed to build the knowledge for Respiratory Therapy students, about the basic terminologies and technical aspects of mechanical ventilation. This course also covers the working principles of mechanical ventilators, different modes of ventilation and various monitoring aspects.

Learning Objectives

By the end of this course students will be able to:

- Understand the basic terminologies and technical concepts of Mechanical Ventilation.
- Differentiate between Volume Ventilation, Pressure Ventilation and other hybrid modes.
- Identify Indications, complications, and physiologic effects of mechanical ventilation.
- Apply appropriate ventilator, initial mode & ventilator parameters
- Understand the concept of Noninvasive Ventilation
- Identify various types of technical and clinical problems encountered during mechanical ventilation of critically ill patients, and describe the steps that can be used to protect a patient when problems occur.

Course Outline

Topic
Terminologies and Functional Concepts of Mechanical Ventilation Physiological terms and Concepts related to Mechanical Ventilation Normal Mechanics of Spontaneous Ventilation Lung Characteristics and Time Constants Types of Mechanical Ventilation Pressures in Positive Pressure Ventilation
Technical aspects of Mechanical Ventilator Historical Perspective on Ventilator Classification Internal Function Power Source or Input Power Control Systems and Circuits Power Transmission and Conversion System Calibration of specific ventilators
Mechanical delivery of a Breath Basic Model of Ventilation in the Lung during Inspiration Factors Controlled and Measured During Inspiration Overview of Inspiratory Waveform Control Phases of a Breath and Phase Variables Types of Breaths Chatburn's classification- Nomenclature
Assessing and establishing the need for Mechanical Ventilation Respiratory Failure Patient History and Diagnosis Physiological Measurements in Acute Respiratory Failure Overview of Criteria for Mechanical Ventilation Possible Alternatives to Invasive Ventilation
Modes of Mechanical Ventilation Modes of Invasive Ventilation Modes of Non-invasive ventilation Dual and hybrid Modes of Ventilation

Initial Ventilator Settings
Determinants during Volume controlled Ventilation
Special considerations
Determinants during Pressure controlled Ventilation
Special considerations
Setting Baseline Pressure– PEEP
Determinants during dual controlled and hybrid ventilations
Selection of other parameters- FiO2, Sensitivity- Pressure and flow, Alarms, Sigh
Overview of Disease specific ventilation- Initial settings

- Chronic Obstructive Pulmonary Disease, Asthma
- Neuromuscular Disorders, Closed Head Injury
- Pneumonia, Acute Respiratory Distress Syndrome, ILD and Cardiogenic Pulmonary Edema

Patient Assessment on Mechanical Ventilation
Documentation/Charting
Initial assessment and serial assessments
Airway Pressure monitoring
Vital Signs, Blood Pressure, and Physical Examination of the Chest
Management of Endotracheal Tube and Tracheostomy Tube Cuffs
Monitoring Compliance and Airway Resistance

AAssessment of Respiratory Function
Noninvasive Measurements of Blood Gases
Pulse Oximetry
Capnography (Capnometry)
Exhaled Nitric Oxide Monitoring
Transcutaneous Monitoring
Indirect Calorimetry and Metabolic Measurements
Overview of Indirect Calorimetry
Respiratory Mechanics

Hemodynamic Monitoring
Review of Cardiovascular Principles
Hemodynamic Measurements

Interpretation of Hemodynamic Profiles Clinical Applications
Sedatives, Analgesics and Muscle Relaxants Sedatives and Analgesics Muscle relaxants
Noninvasive Positive-Pressure Ventilation Types of Noninvasive Ventilation Techniques Indications for Noninvasive Positive-Pressure Ventilation Patient Selection Criteria Equipment Selection for Noninvasive Ventilation Selection of Patient Interface Setup and Preparation for Noninvasive Ventilation Monitoring and Adjustment of Noninvasive Ventilation Aerosol Delivery in Noninvasive Ventilation Complications of Noninvasive Ventilation Weaning from and Discontinuing Noninvasive Ventilation
Disease Specific Ventilation Strategies Chronic Obstructive Pulmonary Diseases, Asthma Neuromuscular Disorders, Closed Head Injury Pneumonia, Acute Respiratory Distress Syndrome, Pulmonary Edema ILD
Ventilator Graphics Relationship of Flow, Pressure, Volume, and Time Scalars, Curves, and Loops Assessment of Pulmonary Mechanics Assessing Patient-Ventilator Asynchrony Advanced Applications
Patient-Ventilator Management Strategies Troubleshooting Ventilation Abnormalities Common Methods of Changing Ventilation Based on PaCO2and pH Metabolic Acidosis and Alkalosis Mixed Acid–Base Disturbances Increased Physiological Dead Space Increased Metabolism and Increased Carbon Dioxide Production

Intentional Iatrogenic Hyperventilation
Permissive Hypercapnia
Airway Clearance during Mechanical Ventilation
Secretion Clearance from an Artificial Airway
Administering Aerosols to Ventilated Patients
Postural Drainage and Chest Percussion
Flexible Fiberoptic Bronchoscopy
Additional Patient Management Techniques and Therapies in Ventilated Patients

- Sputum and Upper Airway Infections
- Fluid Balance
- Psychological and Sleep Status
- Patient Safety and Comfort
- Transport of Mechanically Ventilated Patients within an Acute Care Facility

Acute Respiratory Distress Syndrome and Mechanical Ventilation
Acute Respiratory Distress Syndrome
Pathophysiology- The inflammatory Cascade
Changes in Computed Tomogram with ARDS
Lung-Protective Strategies: Setting Tidal Volume and Pressures in ARDS
Long-Term Follow-Up on ARDS
Pressure–Volume Loops in ARDS
Recruitment Maneuvers in ARDS
Prone ventilation
The Importance of Body Position during Positive Pressure Ventilation
Basics of Oxygenation using FIO_2, PEEP Studies, and Pressure–Volume Curves for establishing
Basics of Oxygen Delivery to the Tissues
Positive End-Expiratory Pressure and Continuous Positive Airway Pressure

- PEEP Ranges
- Indications for PEEP and CPAP

- Initiating PEEP Therapy
- Identifying Optimum PEEP
- Use of Pulmonary Vascular Pressure Monitoring with PEEP
- Contraindications and Physiological Effects of PEEP
- Weaning From PEEP

Extra-pulmonary Effects of Mechanical Ventilation

Effects of Positive-Pressure Ventilation on Heart and the great vessels
Adverse Cardiovascular Effects of Positive-Pressure Ventilation
Factors Influencing Cardiovascular Effects of Positive-Pressure Ventilation
Beneficial Effects of Positive-Pressure Ventilation on Heart Function in Patients with Left Ventricular Dysfunction
Physiological Effects and Complications of Mechanical Ventilation
Effects of Mechanical Ventilation on Intracranial Pressure, Renal Function, Liver Function, and Gastrointestinal Function
Effects of Mechanical Ventilation on Intracranial Pressure and Cerebral Perfusion
Renal Effects of Mechanical Ventilation
Effects of Mechanical Ventilation on Liver and Gastrointestinal Function
Nutritional Complications during Mechanical Ventilation

1.	**Effects of Positive-Pressure Ventilation on the Pulmonary System** Lung Injury with Mechanical Ventilation Effects of Mechanical Ventilation on Gas Distribution and Pulmonary Blood Flow Respiratory and Metabolic Acid–Base Status in Mechanical Ventilation Air Trapping (Auto-PEEP) Hazards of Oxygen Therapy with Mechanical Ventilation Increased Work of Breathing Ventilator- Mechanical and Operational Hazards Complications of the Artificial Airway
2.	Ventilator-Associated Events Epidemiology Ventilator associated infections- Ventilator-Associated Pneumonia, Types

	Pathogenesis of Ventilator-Associated Pneumonia Diagnosis of Ventilator-Associated Pneumonia Treatment of Ventilator-Associated Pneumonia Strategies to Prevent Ventilator-Associated Pneumonia

3.	Troubleshooting during Mechanical Ventilation Identifying the Patient in Sudden Distress Patient-Related Problems Ventilator-Related Problems Common Alarm Situations Use of Graphics to Identify Ventilator Problems
4.	Liberation and Discontinuation from Mechanical Ventilation Liberation/ Weaning Techniques Titration of ventilation during Weaning Closed-Loop Weaning Evaluation of Clinical Criteria for Weaning Pathology of Ventilator Dependence Assessment of weaning readiness Assessment during a Spontaneous Breathing Trial Spontaneous Breathing Trial Failure Non-respiratory Factors That May Complicate Weaning Sedation Strategies and Protocols Weaning Protocols Extubation- Readiness criteria and techniques Extubation failure and Reintubation criteria Role of Tracheostomy in Weaning Long-Term Care Facilities for Patients Requiring Prolonged Ventilation Weaning in Long-Term Ventilation Units Weaning from Non-invasive ventilation Withholding and Withdrawing Ventilator Support
5.	Long-Term Ventilation

	Goals of Long-Term Mechanical Ventilation and Patient Selection Preparation for Discharge to the Home Equipment Selection for Home Ventilation Complications of Long-Term Positive Pressure Ventilation Expiratory Muscle Aids and Secretion Clearance Tracheostomy Tubes, Speaking Valves, and Tracheal Buttons Ancillary Equipment and Equipment Cleaning for Home Mechanical Ventilation
6.	Advances and Adjuncts in Mechanical Ventilation Airway Pressure Release Ventilation High-Frequency Oscillatory Ventilation: Technical Aspects, Initial Settings, Indication and Exclusion Criteria, Monitoring, Assessment, and Adjustment Liquid Ventilation Advanced technologies like Automatic Tube Compensation, Closed loop weaning, Intelligent ventilation Advanced modes like Adaptive Support Ventilation, Pressure Regulated Volume Control, Proportional Assist Ventilation, Volume Support Ventilation Anesthesia machine- Components and working principles Heliox Therapy: Gas Flow through the Airways, indications, complications, Devices Inhaled Nitric Oxide: Technical Aspects, Initial Settings, Indication and Exclusion Criteria, Monitoring, Assessment, and Adjustment Neurally Adjusted Ventilatory Assist- Adjuncts Monitoring the Electrical Activity of the Diaphragm Diaphragm Electrical Activity Monitoring Diaphragmatic pacemaker

Emergency Medical Care

Course Description

This course is intended to introduce principles of emergency care and the importance of the immediate care of acutely ill/injured patients to the Respiratory Therapy Students, who upon their graduation will have to extend their professional expertise in Emergency Departments (ED), as a part of Multidisciplinary team of Physicians and Nurses.

Learning Objectives

By the end of this course students will be able to:

- Recognize the life-threatening ED cases, disease presentation and the disease process.
- Identify patients who are acutely ill or can rapidly decline to cardiopulmonary failure.
- Perform initial and ongoing assessment of acutely ill or injured patients.
- Evaluate the findings of assessment and interpret abnormal physiological parameters and observations to identify patients who are likely to have a critical and immediate physiological decline.
- Identify and understand diagnostic tests that are commonly used in Emergency rooms, that includes imaging and laboratory tests.

- Develop and integrate clinical skills and academic knowledge in order to practice advanced assessment, life support and therapeutic skills, within the scope of practice.
- Participate in multi-disciplinary team approach to recognize, report and respond to patients experiencing acute physiological deteriorations, within the scope of practice.
- Engage in the delivery of high-quality evidence based multidisciplinary care as either a team member or team leader, upon the crisis scenarios.

Course Outline

Sl No	Topic
1.	**Patient Assessment in Emergency Department** Triage Objective and Subjective Patient Assessment Vital Signs Assessment Systemic assessment including; Cardiovascular and Circulatory Assessment, Airway and Respiratory Assessment and Neurological Assessment (GCS, PEARL). Focused History and Physical Assessment in Trauma Patients, including Head to Examination and the mnemonic DCAP-BTLS-TIC Focused History and Physical Assessment in Medical Patients, including the mnemonic SAMPLE Ongoing Assessment in Emergency Department
2.	Diagnostic Tests in Emergency Department Imaging in ED like Chest and skeletal X-rays, Focused Assessment of Sonography in Trauma (FAST), Lung Ultrasonography and Echocardiography Basics of laboratory investigations like Blood routine, Cardiac Enzymes and Septic markers

3.	Airway Management and Ventilation Airway Adjuncts in Emergency Medicine; including video laryngoscopy, bronchoscopy guided intubation and surgical airways. Drugs used during airway stabilization- Sedatives, Analgesics, Muscle relaxants, Antiarrhythmics etc. Acute ventilation strategies- Invasive and Non-invasive ventilation
4.	Respiratory Emergencies Types of Respiratory Failure, Clinical manifestations, Diagnosis, Pathophysiology, Pharmacological adjuncts and Other aspects management Upper airway emergencies and management Lower airway emergencies and management Parenchymal emergencies and management Respiratory emergencies due to CNS involvement
5.	Cardiac Emergencies Life threatening arrhythmias Recall of Cardiac arrest and resuscitation Acute Coronary Syndrome- STEMI, N-STEMI and Unstable Angina Congestive Heart Failure and management Cardiac tamponade Cardiac contusion
6.	Circulatory Emergencies Mechanism, pathophysiology and management of • Hypovolemic shock • Cardiogenic shock • Obstructive shock Distributive shock- Septic, Neurogenic, Anaphylactic etc.
7.	Neurological Emergencies Traumatic brain injury Ischemic and hemorrhagic stroke Brain protective ventilation strategy
8.	Poisoning and Toxicology Introduction and Principles of Management

	OP poisoning, Aluminum Phosphide Caustic ingestion Drug overdose and management- Acetaminophen, Aspirin, Benzodiazepines, TCA
9.	Trauma Emergencies Systemic Trauma and management- Thoracic Trauma, Head and Neck Trauma Blunt and Penetrating Trauma • Management of Impaled Objects- Face and elsewhere Stabilization of Cervical Spine Log roll and Spine immobilization Burns • Types of burns • Wallace's rule of nine and other assessment criteria • Management of specific types of burns Inhalational Injuries Carbon monoxide poisoning and management Electrical Injuries- Cardiac complications, Rhabdomyolysis, Compartment syndrome

PRACTICAL	
no.	**Topics to be covered**
1.	Triage and Initial systemic assessment
2.	Focused Physical examination
3.	Head to Toe examination in Trauma
4.	Helmet removal /C-Spine stabilization /Log roll
5.	Preparation of Airway carts
6.	Arrhythmia recognition and interventions
7.	Inter hospital transport of ventilated patients

8.	Airway management in Trauma
9.	Clinical and Technical aspects of defibrillation
10.	Interpretation of CXR
11.	Airway and Lung Ultrasound

Advanced Cardiopulmonary Diagnostics

Course Description

This course will familiarize the respiratory therapy students with advanced diagnostic procedures and methods used to diagnose a patient's clinical condition with special reference to cardiopulmonary function.

Learning Objectives

By the end of this course students will be able to:

- Describe the indications, technical aspects, procedure involved with various cardiopulmonary diagnostics.
- Perform diagnostic tests to identify the basic functional areas of lung and related structures and how different diseases variably affect these structures on diagnostic tests.
- Recognize and interpret abnormal findings and be able to clinically correlate the cardiopulmonary derangements.

Course Outline

Sl No	Topic
1.	**ADVANCED ELECTROCARDIOGRAM INTERPRETATION** Evidence of Cardiac Ischemia, Injury, or Infarction • ST segment – T wave changes is ischemia, injury and infarction • Assessing Chest Pain Electrocardiogram Patterns with Chronic Lung Disease Core pulmonale, COPD, pulmonary embolism Electrocardiogram Patterns with Heart failure and Electrolyte imbalance Changes in heart failure, changes in hyper or hypokalemia Axis Deviation • Left axis deviation • Right axis deviation Evolution of electrocardiographic changes- • Localization of ischemia or infarction, Noninfarction Q waves, Primary and secondary T wave change Electrolyte and Metabolic ECG abnormalities- • Cardiac arrhythmias, Ventricular premature beats, Supra-ventricular, tachycardias, Atrial flutter/fibrillation, Ventricular Tachycardia/Ventricular fibrillation, Atrio Ventricular block, Prolonged PR interval, Mobitz type 1 and 2 block, Complete heart block, Electrical Therapies- • Recall- Defibrillator, Cardioverter, Pacer • Indications, Contraindications and Complications of Electrical therapies. • Electrophysiological Changes during electrical therapies
2.	Advanced Cardiopulmonary Imaging ✓ Introduction and their importance in Respiratory Therapy
3.	Computed Tomography of Chest Basic physics, principles, technical and safety aspects Thoracic Anatomy

	Types- Standard, High resolution, CT Angiography. Windows- Lung, Mediastinal and Bone Indications, Contraindications Preparation of patient Approach to CT Interpretation Review common pathologies CT Pulmonary angiogram
4.	Magnetic Resonance Imaging of Thorax Basic physics, principles, technical and safety aspects Thoracic Anatomy Indications, Contraindications Preparation of patient and safety Image interpretation- Image Views and Image weights Review common pathologies
5.	Ventilation Perfusion Scan (V/Q Scan) Principle and Techniques Indication Contraindications, risks and safety Interpretation- Normal and Abnormal Classification of V/Q scan interpretation
6.	Ultrasonography Physics Machine and Modes Knobology and technical specifications Lung Ultrasound- Normal and abnormal signs Airway Ultrasound- Normal and abnormal signs Diaphragmatic Ultrasound- Normal signs, diaphragmatic thickness and excursion- decision making in respiratory care Infection control practices in ICU sonology
7.	Bronchoscopy Basic physics, principles, technical and safety aspects Indications and contraindications Complications

	Applied anatomy of upper respiratory tract, trachea and bronchi- Bronchoscopy approach Bronchoscopy in ventilated patients Assessment of need and assessment of outcome Preparation, procedure, monitoring and post-procedural plans Infection control practices in bronchoscopy Endobronchial Ultrasound
8.	Tread Mill Tests and Holter Monitoring Exercise physiology, protocols, Lead systems, Patient preparation ST segment displacement – types and measurement, Non electrocardiographic observations Exercise test indications, contra-indications and precautions Cardiac arrhythmias and conduction disturbances during stress testing, Emergencies in the stress testing laboratory. Principles of Holter Recording, Connections of the Holter recorder, Holter Analysis Guidelines for ambulatory electrocardiography
9.	Echocardiography Principles and physics of echocardiography Types of echo- TTE, TEE Modes- M- Mode and 2D transthoracic echocardiography, Views used in transthoracic echocardiography Doppler echocardiography: pulsed, continuous wave and color Preparation of ICU patients for TEE, Monitoring and Post procedural stabilization

Scheme of Examination -Theory

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

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **Second and Third Year)**

Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (No choice) 10x3= 30 marks

Total= 100

PRACTICAL EXAMINATION

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

Paper – III Respiratory Therapy – Advance

Neonatal Respiratory Care

Course Description

This course is an introduction to the respiratory therapy student on the Neonatal respiratory physiology and mechanics and management of cardiopulmonary disorders.

Learning Objectives

By the end of this course students will be able to:

- Describes about the fetal lung development and the gas exchange
- To train the student about neonatal resuscitation guidelines.
- Focusses on assessment and monitoring of the neonatal patient.
- Describes about the respiratory diagnostics for the pediatric population.
- Also focusses on the pathophysiology, salient features and treatment of major neonatal disorders.

Course Outline

Sl No	Topic
1.	**DEVELOPMENT OF RESPIRATORY SYSTEM** **Fetal development** Fetal lung development Fetal gas exchange and circulation Surfactant Production and Metabolism Composition of Surfactant Functions of Surfactant Artificial Surfactant- Semi-Synthetic & Synthetic **Postnatal development** Transition from intrauterine to extrauterine life Post-natal lung development
2.	**Neonatal Resuscitation** Preparation for resuscitation Initial steps of newborn care Positive-pressure ventilation Airway management: Endotracheal tubes and laryngeal mask Chest compression Medication Post Resuscitation care Resuscitation and stabilization of babies born preterm
3.	Thermoregulation Thermoneutral environment Mechanisms of heat loss Hypothermia Prevention of hypothermia Kangaroo mother care
4.	Examination and assessment of the neonatal patients Gestational age and size assessment Physical examination of the neonate

	Neurological assessment Pulmonary examination Non pulmonary examination Laboratory assessment Radiographic chest assessment
5.	Neonatal Pulmonary Disorders Respiratory distress syndrome Meconium aspiration syndrome Neonatal pneumonia Apnea of prematurity Transient Tachypnea of the neonate Bronchopulmonary dysplasia Asphyxia in the neonate – Hypoxic-ischemic encephalopathy Pulmonary hemorrhage Pulmonary Air Leak Persistent pulmonary hypertension of the neonate
6.	Surgical Disorders of newborn Choanal atresia Cleft Palate Congenital diaphragmatic hernia Tracheoesophageal fistula Congenital cardiac defects
7.	Noninvasive hemodynamic monitoring techniques Pulse oximetry: Different measurement devices, principles Capnography Transcutaneous monitoring Colorimetry
8.	Invasive hemodynamic monitoring techniques Blood gas sampling Arterial puncture Capillary blood gas sampling Continuous invasive monitoring Central venous catheterization

	Pulmonary artery catheterization
9.	THERAPEUTIC APPROACHES IN TREATMENT FOR NEONATAL DISORDERS Oxygen therapy Assessment of need Targeted saturation in newborns Complications Delivery devices Heated humidified high flow nasal cannula (HHHFNC)
10.	Surfactant Replacement Therapy Need for surfactant therapy Techniques of surfactant delivery- Early/late rescue, INSURE, MIST, LISA Types of surfactants Assessment of the outcome
11.	Non-Invasive Mechanical Ventilation of Newborns Continuous Positive airway pressure (CPAP) Non-invasive Positive pressure ventilation (NIPPV) Interfaces selection and fit Indications, contraindications and complications of NIV Physiological effects Monitoring the patient and ventilator circuit
12.	Invasive mechanical ventilation of newborns Indications and contraindications of invasive ventilation Types of mechanical ventilation Modes of Ventilation Improvement of oxygenation and ventilation - adjustments of ventilator setting Weaning and Extubation
13.	**Unconventional modes of Ventilation** High Frequency ventilation Nitric oxide therapy Extracorporeal membrane oxygenation

PRACTICAL	
no.	**Topics covered**
1.	**NEONATAL RESUSCITATION** • Initial steps of resuscitation • PPV devices • Route of Drug administration • Medication
2.	**THERMOREGULATION** • Heat loss • Strategies to prevent heat loss
3.	**ASSESSMENT OF NEWBORN** • Initial steps of assessments • APGAR scoring • BALLARD Scoring • DOWN Scoring • Silverman- Anderson Scoring
4.	**MONITORING IN ICU** • Equipment's required • Pulse oximetry types • Pulmonary artery catheters
5.	**NEONATAL CHEST X-RAY** • Normal Chest X-ray • Pulmonary Diseases • Congenital Heart Diseases • Artificial airways and lines
6.	**NON-INVASIVE VENTILATION STRATEGIES** • CPAP setting • HHHFNC setting
7.	**INVASIVE VENTILATION STRATEGIES** • Initiation • Management • Weaning • Extubation
8.	**UNCONVENTIONAL MODES OF VENTILATION** • High Frequency Ventilation

	• Inhaled Nitric oxide therapy • Extracorporeal membrane oxygenation

Paediatric Respiratory Care

Course Description

This course provides students with the knowledge and tools to improve respiratory care of infants and children.

Learning Objectives

By the end of this course students will be able to:

- Differentiate the anatomic and physiological differences between adult and child.
- Perform initial assessment of a pediatric patient at bedside
- Describe the pathophysiology, salient features and treatment of pediatric cardiopulmonary disorders.
- Assist physician in decision making process and respiratory care procedures

Course Outline

Sl No	Topic
1.	**General Examination and assessment of a child** Physical examination Airway and thoracic radiographic assessment
2.	**Respiratory Disorders** Airway disorders Croup

	Epiglottitis Tonsillitis Adenoditis Bronchiolitis Pediatric Asthma Pediatric lung and related disorders Pneumonitis, Pneumonia Cystic fibrosis Pediatric sleep-disordered breathing Acute respiratory distress syndrome / Pediatric acute respiratory syndrome Disorders of the pleura Neurological and neuromuscular disorders Surgical disorders in childhood that requires respiratory care
3.	Cardiovascular Disorders Dysrhythmias Congenital heart diseases- Cyanotic and Acyanotic and Management Heart Failure
4.	Acutely ill or Injured child Major Trauma Drowning Burns Poisoning and Envenomation
5.	Pediatric Resuscitation Systematic approach to the seriously ill or injured child Recognition of respiratory distress and failure Management of respiratory distress and failure Recognition of shock Management of shock Recognition and management of arrythmia's Recognition and management of cardiac arrest Post resuscitation management Assessment and Resuscitation Sedation and Analgesia
6.	Hemodynamic monitoring Non-invasive monitoring techniques Invasive monitoring techniques
7.	Respiratory Care Procedures Administration of gas mixtures- Oxygen & Heliox therapy • Assessment of need • Precautions & Hazards

	• Delivery devices • Outcome Assessment Establishment of artificial airway • Orotracheal / Nasotracheal intubation • Laryngeal mask airway • Tracheostomy • Management of difficult airway Pediatric flexible bronchoscopy
8.	Non-invasive Respiratory Support Assessment of need for non-invasive ventilation Techniques of non-invasive ventilation High Flow Nasal Cannula
9.	Invasive mechanical ventilation Need for invasive ventilation Initial ventilatory settings Monitoring in mechanically ventilated patient Weaning and Extubation from mechanical ventilation
10.	Unconventional modes of ventilation High frequency ventilation Inhaled nitric oxide therapy
11.	Extracorporeal Membrane Oxygenation in Pediatrics
12.	Pediatric Home Care Oxygen therapy at home Tracheostomy management Home mechanical ventilation

Biostatistics and Research methodology

Course Description

This course familiarizes the students of respiratory therapy with the basic research tool and its role in health sciences. This course enables them to collect data, organize and analyse them to generate scientific evidence

Learning Objectives

By the end of this course students will be able to:

- Explain the role of statistics in health care service
- Differentiate different variables and use different scales of measurement
- Perform basic statistical tests,
- Perform probability, sampling, statistical distributions
- Use appropriate software packages for performing statistical analysis

Course Outline

Sl No	Topic
1.	**Introduction to Biostatistics:** Definition of Biostatistics Characteristics of statistical data Role of statistics in health science **Variables** Qualitative & Quantitative Continuous & Discrete Nominal & Ordinal **Scales of Measurement** Nominal Ordinal Interval Ratio
2.	**Tabular presentation of data :** Types of class intervals: Inclusive, Exclusive & Open ended Frequency, Relative and Cumulative frequency Frequency Table **Tabular presentation of data** Types of class intervals: Inclusive, Exclusive & Open ended Frequency, Relative and Cumulative frequency Frequency Table **Diagrammatic presentation of data:** Bar diagram: Simple, Clustered and Stacked Pie diagram
3.	Measures of Location (Definition, computation, merits, demerits & application) Mean Median Mode Quartiles

	Percentiles
4.	Measures of Variation (Definition, computation, merits, demerits & application) Range Inter-quartile range Variance Standard deviation Coefficient of variation
5.	Sampling Population & Sample Reasons for sampling Errors in sampling Non probability & probability sampling (comparison) Probability Sampling (Method, Merits & Demerits) Simple random Stratified Systematic Cluster Non-Probability
6.	Normal Distribution Concept Normal curve and its properties Reference Range Exercises Skewness and Kurtosis Concept Types
7.	Correlation &Regression Concept Scatter diagrams Pearson's and Spearman's correlation coefficient (No computation) Properties of correlation coefficient Assumptions & Interpretation Dependent and Independent variables Simple Linear Regression equation Interpretation of intercept and slope (No computation) Assumptions of simple linear regression Prediction
8.	Research Principles of Research Methodology Introduction to the Research process- Terminologies used in research

	Classifications of Research Methods, Research designs Types of research (for example; pure research, applied research, experiment vs. non-experiment research, and clinical trials) Quantitative vs. qualitative research Prospective vs. retrospective studies Methods in Literature Review
9.	Data Collection Methods of Data Collection Observation Interview Focus groups Questionnaire
10.	How to do a Research Research Proposal, Synopsis, Abstract Research topics Literature review Research questions and hypothesis Referencing Styles
11.	Evidence-based Practice (EBP) Definition of EBP Implementing EBP in healthcare setting
12.	Epidemiology Definition Uses Descriptive Epidemiology Designs Case Reports Case Series Cross Sectional studies Ecological descriptive studies

Patient assessments and diagnostics

Medical History and Interview

Patient Interview

- Principles of Communication
- Structuring the Interview
- Questions and Statements Used to Facilitate
- Conversational Interviewing
- Alternative Sources for a Patient History

Cardiopulmonary History and Comprehensive Health History

- Variations in Health Histories
- General Content of Health Histories
- Review of Systems Chief Complaint
- History of Present Illness
- Past History
- Family History
- Occupational and Environmental History

Reviewing the Patient's Medical Record

- Admission Note
- Physician Orders
- Progress Notes
- DNAR/DNR Status

Assessment Standards for Patients with Pulmonary Dysfunction

Clinical Laboratory Studies

Clinical Laboratory Overview

- Phases of Laboratory Testing
- Composition of Blood
- Specimen Integrity and Effect on Test Results
- Laboratory Test Parameters

Hematology

- Complete Blood Count
- Erythrocyte Sedimentation Rate
- Coagulation Screening Tests

Chemistry

- Basic Metabolic Panel
- Renal Panel
- Hepatic Panel
- Lipid Panel
- Cardiac Biomarkers

Microbiology

- Pre-analytical Phase: Specimen Selection, Collection, and Transport
- Microscopic Examination of Specimens Culture and Sensitivity
- Examination of Pulmonary Secretions Bronchoalveolar Lavage
- Pleural Fluid Examination

Histology and Cytology

Skin Testing

Recommended Laboratory Tests

Electrocardiogram Interpretation

Electrocardiogram: Cardiac Electrophysiology.

Conduction system of the Heart

Basic Electrocardiogram Waves

- Electrocardiogram Paper and Measurements
- Normal ECG waves
- Evaluating Heart Rate

Electrocardiogram Leads

- Limb Leads
- Chest Leads
- Evaluating the Mean QRS Axis

Steps of Electrocardiogram Interpretation

Normal Sinus Rhythm

Causes and Manifestations of Dysrhythmias

Identification of Common Dysrhythmias

Tachy-arrythmias

- Premature Atrial Contraction, Sinus tachycardia, Supraventricular tachycardia, Junctional rhythm, Atrial flutter, Atrial fibrillation, Premature Ventricular Contraction, Ventricular tachycardia

Cardiac Arrest Rhythms

- Pulseless Ventricular Tachycardia, Ventricular Fibrillation, Pulseless Electrical Activity (PEA), Asystole

Brady-arrhythmias

- Sinus Bradycardia, Sick Sinus syndrome, Junctional rhythms

Heart Blocks

- First, Second, Third degree heart block, left bundle branch block

Documentation

General Purposes of Documentation

The Joint Commission and Legal Aspects of the Medical Record

Types of Medical Records Organizing Patient Information

Charting Methods

- Subjective, Objective, Assessment, and Plan (SOAP) Charting
- Assessment, Plan, Implementation, and Evaluation (APIE) Charting
- Problem, Intervention, and Plan (PIP) Charting
- Situation, Background, Assessment, and Recommendation (SBAR) Charting
- Hospital Medical Record keeping and Electronic medical reports

Older Patient Assessment

Patient-Clinician Interaction

- Principles of Communication
- Reducing Communication Barriers

Age-Related Sensory Deficit

- Hearing Impairment
- Vision Impairment

Aging of the Organ Systems

- Age-Related Changes Pulmonary Defense Mechanisms Unusual Presentations of Illness

Patient Assessment

- Vital Signs
- Inspection and Palpation Pulmonary Auscultation
- Cardiac Auscultation

Diagnostic Tests

- Gas Exchange
- Laboratory Values

Comprehensive Geriatric Assessment

- Functional Ability

Topics covered

47

MEDICAL HISTORY TAKING, PATIENT INTERVIEW. REVIEWING MEDICAL RECORDS.

ASSESSMENT OF CARDIOPULMONARY SYMPTOMS

BASIC PATIENT ASSESSMENT AND OBTAINING VITAL SIGNS

- Measuring body temperature
- Measuring the pulse
- Measuring Respiratory rate
- Assessing blood pressure
- Auscultation of breath sounds

PATIENT ASSESSMENT: INSPECTION, PALPATION, PERCUSSION

- Chest Landmarks for Assessment
- Assessment techniques and abnormal findings
- Preexamination and other considerations
- Examination of head and neck
- Inspection, Palpation and Percussion of thorax
- Examination of the Precordium
- Auscultation of heart sounds
- Examination of abdomen
- Examination of extremities

NEUROLOGIC ASSESSMENT

- Assessing Consciousness
- Glasgow Coma Scale
- Mini-Mental State Examination
- Assessment of Consciousness in the Intensive Care Unit
- Cranial Nerve Examination
- Sensory Examination
- Motor Examination
- Deep Tendon, Superficial, and Brainstem Reflexes
- Coordination, Balance, and Gait Examination
- Observing Ancillary Testing of the Neurologic System
- Brain Death evaluation

ARTERIAL BLOOD GAS SAMPLING

- Anatomical landmarks for Arterial puncture
- Complications of arterial puncture
- Blood gas sampling error
- Supplies needed for arterial puncture
- Arterial puncture techniques
- Indwelling arterial catheter sampling
- Supplies for capillary sampling
- Capillary sampling techniques
- Systematic interpretation of arterial blood gas report
    - Oxygenation assessment
    - Acid base assessment

DOCUMENTATION AND GOAL ASSESSMENT

- The medical record
- Goal assessment and documentation
- Documentation guidelines and abbreviations

Scheme of Examination -Theory

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

SUBJECTS HAVING MAXIMUM MARKS= 100 (for **Second and Third Year)**		
Type of Questions	No. of Questions	Marks for Each Questions
Long Essay	2	10
Short Essay	10	05
Short Answer	10	03

1. Long essay- 2 Questions (second question choice) 2x10= 20 marks
2. Short essay- 10 Questions (Questions no 5 &10 choice) 10x5= 50 marks
3. Short answer- 10 Questions (No choice) 10x3= 30 marks

Total= 100

PRACTICAL EXAMINATION

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

Behavioral Objectives:

Understands statistical terms.

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

Unit – I : Introduction

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

Branches of statistics.

Statistics and health science including nursing. Parameters and estimates.

Descriptive and inferential statistics. Variables and their types.

Measurement scales

Unit – II : Tabulation of Data

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

Types of diagrams - histograms, frequency polygons, smooth frequency polygon, commulative 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 dispression. The range, the average deviation. The variance and standard deviation.
Calculation of variance and standard deviation ungrouped and grouped. Properties and uses of variance and SO

Unit -V: Probability and Standard Distributions. Meaning of probability of standard distribution. The Binominal distribution.
The normal distribution.
Divergence from normality - skewness, kurtosis.

Unit - VI: Sampling Techniques

Need for sampling - Criteria for good samples. Application of sampling in Community.
Procedures of sampling and sampling designs errors. Sampling variation and tests of significance.

Unit - VII: Health Indicator

Importance of health Indicator.

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

Recommended Books.

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

BASICS IN COMPUTER APPLICATIONS

Time allotted: 20 hours

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

Introduction to Data processing :

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

Hardware Concepts :

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

Concept of Software.

Classification of software : System software. Application of software. Operating system. Computer system. Computer virus. Precautions against viruses. Dealing with viruses.

Computers in medical electronics Basic Anatomy of Computers

Principles of programming

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

Data processing

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

No Practical or Viva voce examination