REVISED ORDINANCE GOVERNING REGULATIONS
AND CURRICULUM OF

BACHELOR OF RESPIRATORY CARE TECHNOLOGY
COURSE 2019

Rajiv Gandhi University of Health Sciences, Karnataka, Bangalore
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.
NOTIFICATION

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

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.

**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

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Subject</th>
<th>Theory No. Of Hours</th>
<th>Practical No. Of Hours</th>
<th>Total No. Of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Human Anatomy</td>
<td>70</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>Physiology</td>
<td>70</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>Biochemistry I</td>
<td>70</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>4</td>
<td>Pathology I (Clinical Pathology, Haematology &amp; Blood Banking)</td>
<td>70</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>5</td>
<td>Microbiology</td>
<td>70</td>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>350</strong></td>
<td><strong>100</strong></td>
<td><strong>450</strong></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Subject</th>
<th>Theory No. of Hours</th>
<th>Practical No. of Hours</th>
<th>Clinical posting</th>
<th>Total No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Medicine relevant to Respiratory technology</td>
<td>50</td>
<td>--</td>
<td>--</td>
<td>50</td>
</tr>
<tr>
<td>2.</td>
<td>Section A Applied Pathology</td>
<td>30</td>
<td>30</td>
<td>--</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>Section B Applied Microbiology</td>
<td>30</td>
<td>30</td>
<td>--</td>
<td>120</td>
</tr>
<tr>
<td>3.</td>
<td>Pharmacology</td>
<td>50</td>
<td>--</td>
<td>--</td>
<td>50</td>
</tr>
<tr>
<td>4.</td>
<td>Introduction to Respiratory Technology</td>
<td>80</td>
<td>100</td>
<td>650</td>
<td>830</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>240</td>
<td>160</td>
<td>650</td>
<td>1050</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Subject</th>
<th>Theory No. of Hours</th>
<th>Practical No. of Hours</th>
<th>Clinical posting</th>
<th>Total No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Respiratory Technology - Clinical</td>
<td>50</td>
<td>50</td>
<td>250</td>
<td>350</td>
</tr>
<tr>
<td>2.</td>
<td>Respiratory Technology - Applied</td>
<td>50</td>
<td>50</td>
<td>250</td>
<td>350</td>
</tr>
<tr>
<td>3.</td>
<td>Respiratory Technology - Advanced</td>
<td>50</td>
<td>50</td>
<td>250</td>
<td>350</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>150</td>
<td>150</td>
<td>750</td>
<td>1050</td>
</tr>
</tbody>
</table>

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**

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

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.
### Distribution of Subjects and marks for Second Year Examination

<table>
<thead>
<tr>
<th>Paper</th>
<th>Subjects</th>
<th>Theory</th>
<th>I.A</th>
<th>Sub Total</th>
<th>Practicals</th>
<th>I.A</th>
<th>Sub total</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>Section A – Applied Pathology Section B Applied Microbiology</td>
<td>50</td>
<td>20</td>
<td>120</td>
<td>40</td>
<td>10</td>
<td>50</td>
<td>170</td>
</tr>
<tr>
<td>ii</td>
<td>Introduction to Respiratory Technology</td>
<td>100</td>
<td>20</td>
<td>120</td>
<td>40</td>
<td>10</td>
<td>50</td>
<td>170</td>
</tr>
<tr>
<td>iii</td>
<td>Pharmacology</td>
<td>100</td>
<td>20</td>
<td>120</td>
<td>No Practical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>iv</td>
<td>Medicine relevant to Respiratory technology</td>
<td>100</td>
<td>20</td>
<td>120</td>
<td>No Practical</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>B</th>
<th>Subsidiary Subject**</th>
<th>Duration</th>
<th>Marks</th>
<th>I.A Theory Marks</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sociology</td>
<td>3 hours</td>
<td>80</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>2.</td>
<td>Constitution of India</td>
<td>3 hours</td>
<td>80</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>3.</td>
<td>Environmental Science &amp; Health</td>
<td>3 hours</td>
<td>80</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

** Subsidiary subjects: Examination for subsidiary Subjects shall be conducted by respective colleges.
**TABLE - VI**

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

<table>
<thead>
<tr>
<th>SL NO</th>
<th>THEORY SUBJECTS</th>
<th>THEORY</th>
<th>I.A</th>
<th>SUBTOTAL</th>
<th>PRACTICAL</th>
<th>I.A</th>
<th>SUBTOTAL</th>
<th>GRAND TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Respiratory Technology - Clinical</td>
<td>100</td>
<td>20</td>
<td>120</td>
<td>120 (40+40+40)</td>
<td>30</td>
<td>150</td>
<td>510</td>
</tr>
<tr>
<td>2</td>
<td>Respiratory Technology - Applied</td>
<td>100</td>
<td>20</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Respiratory Technology - Advanced</td>
<td>100</td>
<td>20</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>B</th>
<th>Subsidiary Subject**</th>
<th>Duration</th>
<th>Marks</th>
<th>I.A Theory Marks</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ethics, Database Management</td>
<td>3 hours</td>
<td>80</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>2.</td>
<td>Research &amp; Biostatistics</td>
<td>3 hours</td>
<td>80</td>
<td>20</td>
<td>100</td>
</tr>
<tr>
<td>3.</td>
<td>Computer application</td>
<td>3 hours</td>
<td>80</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

**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**

<table>
<thead>
<tr>
<th>SUBJECTS HAVING MAXIMUM MARKS= 100 (for <strong>First year</strong>)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Questions</strong></td>
<td><strong>No. of Questions</strong></td>
<td><strong>Marks for Each Questions</strong></td>
</tr>
<tr>
<td>Long Essay</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Type of Questions</td>
<td>No. of Questions</td>
<td>Marks for Each Questions</td>
</tr>
<tr>
<td>-------------------</td>
<td>------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Long Essay</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Short Essay</td>
<td>10</td>
<td>05</td>
</tr>
<tr>
<td>Short Answer</td>
<td>10</td>
<td>03</td>
</tr>
</tbody>
</table>

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)**

<table>
<thead>
<tr>
<th>Type of Questions</th>
<th>No. of Questions</th>
<th>Marks for Each Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essay Type</td>
<td>3 (2 x 10)</td>
<td>10</td>
</tr>
<tr>
<td>Short Essay Type</td>
<td>8 (6 x 5)</td>
<td>05</td>
</tr>
<tr>
<td>Short Answer Type</td>
<td>12 (10 x 3)</td>
<td>03</td>
</tr>
</tbody>
</table>

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)**

<table>
<thead>
<tr>
<th>Type of Questions</th>
<th>No of Questions</th>
<th>Marks for Each Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essay Type</td>
<td>3 (2 x 10)</td>
<td>10</td>
</tr>
<tr>
<td>Short Essay Type</td>
<td>7 (5 x 5)</td>
<td>05</td>
</tr>
<tr>
<td>Short Answer Type</td>
<td>7 (5 x 3)</td>
<td>03</td>
</tr>
</tbody>
</table>

**SUBJECTS HAVING MAXIMUM MARKS = 60**

<table>
<thead>
<tr>
<th>Type of Questions</th>
<th>No of Questions</th>
<th>Marks For Each Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essay Type</td>
<td>3 (2 x 10)</td>
<td>10</td>
</tr>
<tr>
<td>Short Essay Type</td>
<td>7 (5 x 5)</td>
<td>05</td>
</tr>
<tr>
<td>Short Answers Type</td>
<td>7 (5 x 3)</td>
<td>03</td>
</tr>
</tbody>
</table>

**SUBJECTS HAVING MAXIMUM MARKS = 50**

<table>
<thead>
<tr>
<th>Type of Questions</th>
<th>No of Questions</th>
<th>Marks For Each Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essay Type</td>
<td>3 (2 x 10)</td>
<td>10</td>
</tr>
</tbody>
</table>
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

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
*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**

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**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)- Saundér’s & C P Prism Publishers, Bangalore
5. ESTER. M. Grishcimer- Physiology & Anatomy with Practical Considerations, J. P.
PHYSIOLOGY

Theory 70 hours
Practical 20 hours

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 O₂ & CO₂ 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, functions of Estrogen, Progesterone, Oogenesis
Ovulation & Menstrual cycle
Physiological changes during pregnancy, pregnancy tests, parturition & lactation
Male & Female contraceptive methods.
10. Central nervous system

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 Practical: 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.

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   **Total= 100**

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

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**REFERENCE BOOKS:**

2. Chatterjee (CC) Human Physiology Latest Ed. Vol. 1, Medical Allied Agency
3. Choudhari (Sujith K) Concise Medical Physiology Latest Ed. New Central Book

**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 the following fat soluble vitamins; A and vitamin D.

11. **Mineral Metabolism [3 Hours]**
• Name the macro/ microminerals
• Iron: Sources ,RDA, Functions and Disorders of deficiency and excess
• Calcium and phosphorus: Sources ,RDA, functions, normal serum levels and hormones regulating their levels.

12. **Nutrition [6 hours]**
• Balanced diet (Definition)
• Caloric value ; Definition , Caloric values of carbohydrates, proteins and fats
• Total daily caloric requirements of an adult male and female,
• RDA (Definition, standard values for nutrients)
• Basal metabolic rate(BMR) ; Definition , Magnitude of BMR in men and women, Factors affecting BMR
• Thermic effect/ SDA of food (Definition, values for major macronutrients)
• Carbohydrates ; Daily dietary requirement. 2. Dietary fibers (Definition, functions, importance and their daily requirements)
• Proteins ; Daily requirement , Biological value. a. Definition b. Protein used as a standard for this, Protein sources with high and low biological value , Mutual supplementation of proteins (Definition, examples).
• Fats ; Daily requirement , Essential fatty acids (Definition, functions, daily requirement and deficiency manifestations) , Saturated and unsaturated fatty acids (Definition, sources, examples).
• Malnutrition

13. **Renal Function Tests [2 hours]**
• Name the different tests to assess the kidney functions
• Explain Creatinine clearance & Inulin clearance
• Urinary acidification test

14. **Radioactive Isotopes [1 hour]**
• Definition, clinical applications
• Biological effects of radiations
15. **Clinical Biochemistry [ 5 hours ]**
   A. Definitions of acid, base, pH and pKa [1 hour]
   B. Buffers • Definition [2 hours]
      • Henderson Hasselbalch equation,
      • Principal buffer systems in the ECF ICF and urine
      • Bicarbonate and phosphate buffer systems (pKa value, normal ratio of base/acid in the plasma)
      • Acidosis & Alkalosis (Definition, classification, causes and biochemical findings)
   C. Normal serum levels and condition where they are altered [2 hour]
      • Glucose, Protein, urea, uric acid, and creatinine
      • Bilirubin, cholesterol
      • Serum Electrolytes

16. **Fundamental Chemistry (1 hour)**
   • Valency, Molecular weight & Equivalent weight of elements and compounds. Normality, Molarity, Molality.

17. **Solutions: Definition, use, classification where appropriate, preparation and storage** (5 hours)
   • Stock and working solutions.
   • Molar and Normal solutions of compounds and acids. (NaCl, NaOH, HCl, H2SO4, H3PO4, CH3COOH 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.
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.

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Total= 100

Distribution of Marks for University Theory and Practical Exam

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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.
- Varley’s Practical Clinical Biochemistry, 4th, 5th and 6th 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.
   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.

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Distribution of Marks for University Theory and Practical Exam

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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)
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 (5 hrs.)
   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, EITor 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.**

<p>| SUBJECTS HAVING MAXIMUM MARKS= 100 (for First year) |
|---------------------------------------------|------------------|------------------|</p>
<table>
<thead>
<tr>
<th>Type of Questions</th>
<th>No. of Questions</th>
<th>Marks for Each Questions</th>
</tr>
</thead>
</table>

38
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

<table>
<thead>
<tr>
<th>Theory</th>
<th>Viva Voce</th>
<th>IA</th>
<th>Sub Total</th>
<th>Practicals</th>
<th>IA</th>
<th>Sub Total</th>
<th>Grand Total</th>
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<tbody>
<tr>
<td>100</td>
<td>--</td>
<td>20</td>
<td>120</td>
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<td>120</td>
</tr>
</tbody>
</table>

Distribution of Marks for University Theory and Practical Exam

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

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

<table>
<thead>
<tr>
<th>SUBJECTS HAVING MAXIMUM MARKS= 80 (for First year)</th>
</tr>
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<tbody>
<tr>
<td>Type of Questions</td>
</tr>
</tbody>
</table>

40
<table>
<thead>
<tr>
<th>Essay Type</th>
<th>3 (2 x 10)</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short Essay Type</td>
<td>8 (6 x 5)</td>
<td>05</td>
</tr>
<tr>
<td>Short Answer Type</td>
<td>12 (10 x 3)</td>
<td>03</td>
</tr>
</tbody>
</table>

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

REFERENCE
2. Wren and Martin - Grammar and Composition, 1989, Chanda & Co, Delhi
5. Journalism Made Simple D Wainwright
6. Writers Basic Bookself Series, Writers Digest series
7. Interviewing by Joan Clayton Platkon

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

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

<table>
<thead>
<tr>
<th>Type of Questions</th>
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<th>Marks for Each Questions</th>
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</thead>
<tbody>
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</tr>
</tbody>
</table>

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 Haemostasis—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. Analgesics
   - Definition and classification
   - Routes of administration, dose, frequency of administration, Side effects and management of non opioid and opioid 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 administration.

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.

<table>
<thead>
<tr>
<th>SUBJECTS HAVING MAXIMUM MARKS= 100 (for Second and Third Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Questions</strong></td>
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<tr>
<td>-----------------------</td>
</tr>
<tr>
<td>Long Essay</td>
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<tr>
<td>Short Essay</td>
</tr>
<tr>
<td>Short Answer</td>
</tr>
</tbody>
</table>

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.


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.
- 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)

<table>
<thead>
<tr>
<th>Type of Questions</th>
<th>No. of Questions</th>
<th>Marks for Each Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Essay</td>
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<td>10</td>
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<td>Short Essay</td>
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<td>05</td>
</tr>
<tr>
<td>Short Answer</td>
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<td>03</td>
</tr>
</tbody>
</table>

1. Long essay- 2 Questions (second question choice) \[2 \times 10 = 20\] marks
2. Short essay- 10 Questions (Questions no 5 & 10 choice) \[10 \times 5 = 50\] marks
3. Short answer- 10 Questions (No choice) \[10 \times 3 = 30\] marks
   **Total= 100**

**PRACTICAL EXAMINATION**

40 Marks.

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

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Tests</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Interpretation of Hematology Chart</td>
<td>05</td>
</tr>
<tr>
<td>2.</td>
<td>Interpretation of Urine Chart</td>
<td>05</td>
</tr>
<tr>
<td>3.</td>
<td>Estimation of Hemoglobin</td>
<td>05</td>
</tr>
<tr>
<td>4.</td>
<td>Estimation of Bleeding time &amp; Clotting time</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>
1. Health care associated infections and Antimicrobial resistance: Infections that patients acquire during the course of receiving treatment for other conditions within a healthcare setting like Methicillin Resistant Staphylococcus aureus infections, Infections caused by Clostridium difficile, Vancomycin resistant enterococci etc. Catheter related blood stream infections, Ventilator associated pneumonia, Catheter Related urinary tract infections, Surveillance of emerging resistance and changing flora. The impact and cost attributed to Hospital Associated infection.

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

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

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

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.

6. Preparation of materials for autoclaving: Packing of different types of materials, loading, holding time and unloading.
PRACTICALS - 30 HOURS

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.

<table>
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<tr>
<th>Sl. No.</th>
<th>Tests</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>Dry heat/Moist heat: Temperature recording charts interpretation</td>
<td>05</td>
</tr>
<tr>
<td>6.</td>
<td>Dry heat/Moist heat: Color change indicators interpretation</td>
<td>05</td>
</tr>
<tr>
<td>7.</td>
<td>Air sampling culture plates interpretation of Colony forming units based on air flow rate and sampling time</td>
<td>05</td>
</tr>
<tr>
<td>8.</td>
<td>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</td>
<td>05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>Type of Questions</th>
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   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.

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
<table>
<thead>
<tr>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>CARDINAL MANIFESTATIONS AND PRESENTATION OF DISEASES</td>
</tr>
<tr>
<td>Alteration in circulatory and Respiratory Functions</td>
</tr>
<tr>
<td>Dyspnea</td>
</tr>
<tr>
<td>Cough</td>
</tr>
<tr>
<td>Chest Pain and Palpitations</td>
</tr>
<tr>
<td>Hematemesis and Hemoptysis</td>
</tr>
<tr>
<td>Hypoxia and Cyanosis</td>
</tr>
<tr>
<td>Fever</td>
</tr>
<tr>
<td>Edema</td>
</tr>
<tr>
<td>Respiratory Insufficiency and Respiratory Failure</td>
</tr>
<tr>
<td>Classification Background, Pathophysiology, Etiology and Management of Respiratory failure</td>
</tr>
<tr>
<td>OBSTRUCTIVE LUNG DISEASES</td>
</tr>
<tr>
<td>Chronic Obstructive Pulmonary Disease (COPD), Chronic Bronchitis and Emphysema</td>
</tr>
<tr>
<td>Anatomic alterations of the lungs associated with Chronic Bronchitis and Emphysema</td>
</tr>
<tr>
<td>Etiology and Epidemiology, Risk factors, Diagnosis and assessment of Chronic Obstructive Pulmonary Disease</td>
</tr>
<tr>
<td>Distinguishing features between Emphysema and Chronic Bronchitis</td>
</tr>
<tr>
<td>Cardiopulmonary clinical manifestations associated with Chronic Bronchitis and Emphysema</td>
</tr>
<tr>
<td>General management of COPD</td>
</tr>
<tr>
<td>Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines of COPD</td>
</tr>
<tr>
<td>Asthma</td>
</tr>
<tr>
<td>National Asthma Education and prevention program</td>
</tr>
<tr>
<td>Global Initiative for Asthma (GINA) guidelines</td>
</tr>
<tr>
<td>Anatomic alterations of the lung</td>
</tr>
<tr>
<td>Etiology, Classification and Epidemiology, Diagnosis of Asthma</td>
</tr>
<tr>
<td>Cardiopulmonary clinical manifestations associated with Asthma</td>
</tr>
<tr>
<td>General Management of Asthma</td>
</tr>
<tr>
<td>Respiratory care treatment protocols</td>
</tr>
<tr>
<td>Respiratory Insufficiency and Respiratory Failure</td>
</tr>
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<td>Topic</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
</tr>
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<tr>
<td>Cardiopulmonary clinical manifestations associated with Asthma</td>
</tr>
<tr>
<td>General Management of Asthma</td>
</tr>
<tr>
<td>Respiratory care treatment protocols</td>
</tr>
<tr>
<td><strong>Cystic Fibrosis</strong></td>
</tr>
<tr>
<td>Anatomic alterations of the lung</td>
</tr>
<tr>
<td>Etiology and Epidemiology</td>
</tr>
<tr>
<td>Cardiopulmonary clinical manifestations, Pancreatic insufficiency associated with Cystic Fibrosis</td>
</tr>
<tr>
<td>General Management of Cystic fibrosis</td>
</tr>
<tr>
<td>Heart or Heart-Lung transplantation</td>
</tr>
<tr>
<td><strong>Bronchiectasis</strong></td>
</tr>
<tr>
<td>Anatomic alterations of the lung</td>
</tr>
<tr>
<td>Etiology and Epidemiology</td>
</tr>
<tr>
<td>Diagnosis, Cardiopulmonary clinical manifestations associated with Bronchiectasis</td>
</tr>
<tr>
<td>General and Pharmacological management for Bronchiectasis</td>
</tr>
<tr>
<td><strong>LOSS OF ALVEOLAR VOLUME</strong></td>
</tr>
<tr>
<td>Atelectasis</td>
</tr>
<tr>
<td>Anatomic alterations of the lung</td>
</tr>
<tr>
<td>Etiology, Classification of Atelectasis</td>
</tr>
<tr>
<td>Cardiopulmonary clinical manifestations associated with Postoperative Atelectasis</td>
</tr>
<tr>
<td><strong>INFECTIOUS PULMONARY DISEASE</strong></td>
</tr>
<tr>
<td>Pneumonia, Lung Abscess Formation and Important Fungal Diseases</td>
</tr>
<tr>
<td><strong>Pneumonia: Anatomic alterations of the lungs</strong></td>
</tr>
<tr>
<td>Etiology and Epidemiology Community acquired Pneumonia</td>
</tr>
<tr>
<td>Chronic Pneumonia</td>
</tr>
<tr>
<td>Fungal diseases: Anatomic alterations of the lungs</td>
</tr>
<tr>
<td>Primary pathogens</td>
</tr>
<tr>
<td>Viral Pneumonia</td>
</tr>
<tr>
<td>Pneumonia in the immunocompromised patients</td>
</tr>
<tr>
<td>Necrotizing Pneumonia and Lung Abscess</td>
</tr>
<tr>
<td>--------------------------------------</td>
</tr>
<tr>
<td>Cardiopulmonary clinical manifestations associated with Pneumonia</td>
</tr>
<tr>
<td><strong>Tuberculosis (TB)</strong></td>
</tr>
<tr>
<td>Anatomic alterations of the lung</td>
</tr>
<tr>
<td>Tuberculosis among health care workers</td>
</tr>
<tr>
<td>General Management of Tuberculosis</td>
</tr>
<tr>
<td><strong>PULMONARY VASCULAR DISEASE</strong></td>
</tr>
<tr>
<td>Pulmonary edema</td>
</tr>
<tr>
<td>Etiology and Epidemiology</td>
</tr>
<tr>
<td>General management of Pulmonary Edema</td>
</tr>
<tr>
<td><strong>Pulmonary Vascular Disease:</strong></td>
</tr>
<tr>
<td>Pulmonary Embolism</td>
</tr>
<tr>
<td>Etiology and Epidemiology</td>
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<td>General management of Pulmonary Embolism</td>
</tr>
<tr>
<td>Pulmonary Hypertension</td>
</tr>
<tr>
<td>Emerging role of Respiratory Therapist in Pulmonary Vascular Disorders</td>
</tr>
<tr>
<td><strong>CHEST WALL AND SPINAL DIFORMITIES</strong></td>
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<td>• Thoracotomies, Lung Volume Reduction Surgery (LVRS), Pneumonectomy, Lung Transplantation</td>
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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
Cardiopulmonary 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 mукokinetic, mукolytics, mукоactive 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.

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<tr>
<th>SUBJECTS HAVING MAXIMUM MARKS= 100 (for Second and Third Year)</th>
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<tbody>
<tr>
<td>Type of Questions</td>
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<tr>
<td>Long Essay</td>
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<tr>
<td>Short Essay</td>
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<tr>
<td>Short Answer</td>
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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
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.
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<td>History and development of Respiratory Therapy profession</td>
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<td>Professional Organizations and events</td>
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<td>Role and Scope of Respiratory Therapist in the Health Care Sector</td>
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<td>Academic and Career Perspectives in Respiratory Therapy</td>
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<tr>
<td>Academic Perspectives- Masters, Doctorate, Post-Doctoral Fellowships in</td>
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<td>Respiratory Care and Allied Fields; Higher Certification in advanced</td>
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<td>areas like Emergency Medical Care and Extra corporeal Life Support</td>
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<td>Therapy</td>
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<td>Codes of Ethics, Ethical Theories and principles &amp; Legal issues related to Respiratory Therapy Profession</td>
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<td>Principles of Infection Prevention and Control</td>
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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
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<td>Endotracheal suctioning - Indications, Contraindications, Complications, Assessment of need, Assessment of outcome, Types of suction</td>
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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)
- 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 gas measuring 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
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 Carbon 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
  Description
  Technique

CARDIOPULMONARY EXERCISE 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

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<tr>
<th>Spirometry calibration – Volume calibration</th>
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<td>Vital Capacity measurement</td>
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<td>Peak Flow meter measurement</td>
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<td>Pre and Post-bronchodilator test</td>
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<td>Diffusion capacity Tests – DL$_{CO}$-Single breath</td>
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<td>Bodyplethysmography measurement – Lung volumes</td>
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<td>Bodyplethysmography measurement – Airway resistance and conductance</td>
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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.

<table>
<thead>
<tr>
<th>SUBJECTS HAVING MAXIMUM MARKS = 100 (for Second and Third Year)</th>
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<tbody>
<tr>
<td><strong>Type of Questions</strong></td>
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<tr>
<td>Long Essay</td>
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<td>Short Essay</td>
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<td>Short Answer</td>
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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 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

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<td>Short Essay Type</td>
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<tr>
<td>Short Answer Type</td>
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</table>

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-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-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:

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

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

<table>
<thead>
<tr>
<th>SI No</th>
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</table>
| 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 |
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| **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,
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

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<td><strong>1.</strong></td>
<td>OVERVIEW OF PULMONARY REHABILITATION</td>
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<tr>
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<td>Definition, Rationale for Pulmonary Rehabilitation</td>
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<td>Pulmonary Rehabilitation and Integrated Care of the Respiratory Patient</td>
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<td>History of Pulmonary Rehabilitation</td>
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<td>Evidence-Based Guidelines on Pulmonary Rehabilitation</td>
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<td>Positioning Pulmonary Rehabilitation within the GOLD 2017 Guidelines</td>
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<td>Current status of Pulmonary Rehabilitation</td>
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<td><strong>2.</strong></td>
<td>SELECTING AND ASSESSING THE PULMONARY REHABILITATION CANDIDATE</td>
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<td>Patient Selection</td>
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<td>Patient Assessment</td>
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<td><strong>3.</strong></td>
<td>EXERCISE ASSESSMENT AND TRAINING</td>
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<tr>
<td></td>
<td>Rationale for Exercise Training in Chronic Lung Disease</td>
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<td>Mechanisms of Exercise Intolerance in Chronic Respiratory Disease</td>
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<td>Exercise Assessment, Field Tests (Walking Tests)</td>
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<td>Graded Exercise Test and Cardiopulmonary Exercise Tests</td>
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<td>Volume, Pattern and Progression of Exercise Training</td>
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<td>Resistance Exercise Testing</td>
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<td>Other Tests of Muscular Training</td>
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<td>Flexibility Training</td>
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<td>Patient Safety</td>
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<td>Precautions in Pulmonary Hypertension</td>
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<td>Exercise Induced Hypoxemia</td>
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<td>Home exercise Considerations</td>
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<td>Emergency Procedures</td>
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<td>Documentation of the Evaluation and Treatment Session</td>
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<td>COLLABORATIVE SELF MANAGEMENT AND PATIENT EDUCATION</td>
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<td>Developing an Individualized Self-Management Program</td>
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<td>PSYCHOSOCIAL ASSESSMENT AND INTERVENTION</td>
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<td>Interventions to Improve Psychosocial Functioning</td>
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<td>Timing and Analyzing Outcomes</td>
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<td>Patient Centered Outcome Measures</td>
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<th>DISEASE SPECIFIC APPROACHES IN PULMONARY REHABILITATION</th>
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<td>Pulmonary Hypertension</td>
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<td>Pulmonary Rehabilitation and the Surgical Patient</td>
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<td>Interdisciplinary Team</td>
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<td>Administrative aspects of Program management</td>
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<td>Post rehabilitation Maintenance</td>
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<th>DISEASE SPECIFIC APPROACHES IN PULMONARY REHABILITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.</td>
<td>Obstructive Lung Disease</td>
</tr>
<tr>
<td></td>
<td>Restrictive Lung Disease</td>
</tr>
<tr>
<td></td>
<td>Pulmonary Hypertension</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>SUBJECTS HAVING MAXIMUM MARKS= 100 (for Second and Third Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Questions</td>
</tr>
<tr>
<td>---------------------</td>
</tr>
<tr>
<td>Long Essay</td>
</tr>
<tr>
<td>Short Essay</td>
</tr>
<tr>
<td>Short Answer</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Terminologies and Functional Concepts of Mechanical Ventilation</strong></td>
</tr>
<tr>
<td>Physiological terms and Concepts related to Mechanical Ventilation</td>
</tr>
<tr>
<td>Normal Mechanics of Spontaneous Ventilation</td>
</tr>
<tr>
<td>Lung Characteristics and Time Constants</td>
</tr>
<tr>
<td>Types of Mechanical Ventilation</td>
</tr>
<tr>
<td>Pressures in Positive Pressure Ventilation</td>
</tr>
<tr>
<td>Technical aspects of Mechanical Ventilator</td>
</tr>
<tr>
<td>Historical Perspective on Ventilator Classification</td>
</tr>
<tr>
<td>Internal Function</td>
</tr>
<tr>
<td>Power Source or Input Power</td>
</tr>
<tr>
<td>Control Systems and Circuits</td>
</tr>
<tr>
<td>Power Transmission and Conversion System</td>
</tr>
<tr>
<td>Calibration of specific ventilators</td>
</tr>
<tr>
<td>Mechanical delivery of a Breath</td>
</tr>
<tr>
<td>Basic Model of Ventilation in the Lung during Inspiration</td>
</tr>
<tr>
<td>Factors Controlled and Measured During Inspiration</td>
</tr>
<tr>
<td>Overview of Inspiratory Waveform Control</td>
</tr>
<tr>
<td>Phases of a Breath and Phase Variables</td>
</tr>
<tr>
<td>Types of Breaths</td>
</tr>
<tr>
<td>Chatburn’s classification- Nomenclature</td>
</tr>
<tr>
<td>Assessing and establishing the need for Mechanical Ventilation</td>
</tr>
<tr>
<td>Respiratory Failure</td>
</tr>
<tr>
<td>Patient History and Diagnosis</td>
</tr>
<tr>
<td>Physiological Measurements in Acute Respiratory Failure</td>
</tr>
<tr>
<td>Overview of Criteria for Mechanical Ventilation</td>
</tr>
<tr>
<td>Possible Alternatives to Invasive Ventilation</td>
</tr>
<tr>
<td>Modes of Mechanical Ventilation</td>
</tr>
<tr>
<td>Modes of Invasive Ventilation</td>
</tr>
<tr>
<td>Modes of Non-invasive ventilation</td>
</tr>
<tr>
<td>Dual and hybrid Modes of Ventilation</td>
</tr>
<tr>
<td>Initial Ventilator Settings</td>
</tr>
<tr>
<td>----------------------------</td>
</tr>
<tr>
<td>Determinants during Volume controlled Ventilation</td>
</tr>
<tr>
<td>Special considerations</td>
</tr>
<tr>
<td>Determinants during Pressure controlled Ventilation</td>
</tr>
<tr>
<td>Special considerations</td>
</tr>
<tr>
<td>Setting Baseline Pressure– PEEP</td>
</tr>
<tr>
<td>Determinants during dual controlled and hybrid ventilations</td>
</tr>
<tr>
<td>Selection of other parameters- FiO2, Sensitivity- Pressure and flow, Alarms, Sigh</td>
</tr>
<tr>
<td>Overview of Disease specific ventilation- Initial settings</td>
</tr>
<tr>
<td>• Chronic Obstructive Pulmonary Disease, Asthma</td>
</tr>
<tr>
<td>• Neuromuscular Disorders, Closed Head Injury</td>
</tr>
<tr>
<td>• Pneumonia, Acute Respiratory Distress Syndrome, ILD and Cardiogenic Pulmonary Edema</td>
</tr>
<tr>
<td>Patient Assessment on Mechanical Ventilation</td>
</tr>
<tr>
<td>Documentation/Charting</td>
</tr>
<tr>
<td>Initial assessment and serial assessments</td>
</tr>
<tr>
<td>Airway Pressure monitoring</td>
</tr>
<tr>
<td>Vital Signs, Blood Pressure, and Physical Examination of the Chest</td>
</tr>
<tr>
<td>Management of Endotracheal Tube and Tracheostomy Tube Cuffs</td>
</tr>
<tr>
<td>Monitoring Compliance and Airway Resistance</td>
</tr>
<tr>
<td>Assessment of Respiratory Function</td>
</tr>
<tr>
<td>Noninvasive Measurements of Blood Gases</td>
</tr>
<tr>
<td>Pulse Oximetry</td>
</tr>
<tr>
<td>Capnography (Capnometry)</td>
</tr>
<tr>
<td>Exhaled Nitric Oxide Monitoring</td>
</tr>
<tr>
<td>Transcutaneous Monitoring</td>
</tr>
<tr>
<td>Indirect Calorimetry and Metabolic Measurements</td>
</tr>
<tr>
<td>Overview of Indirect Calorimetry</td>
</tr>
<tr>
<td>Respiratory Mechanics</td>
</tr>
<tr>
<td>Hemodynamic Monitoring</td>
</tr>
<tr>
<td>Review of Cardiovascular Principles</td>
</tr>
<tr>
<td>Hemodynamic Measurements</td>
</tr>
</tbody>
</table>
# Interpretation of Hemodynamic Profiles

## Clinical Applications

<table>
<thead>
<tr>
<th>Sedatives, Analgesics and Muscle Relaxants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedatives and Analgesics</td>
</tr>
<tr>
<td>Muscle relaxants</td>
</tr>
</tbody>
</table>

## Noninvasive Positive-Pressure Ventilation

<table>
<thead>
<tr>
<th>Types of Noninvasive Ventilation Techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indications for Noninvasive Positive-Pressure Ventilation</td>
</tr>
<tr>
<td>Patient Selection Criteria</td>
</tr>
<tr>
<td>Equipment Selection for Noninvasive Ventilation</td>
</tr>
<tr>
<td>Selection of Patient Interface</td>
</tr>
<tr>
<td>Setup and Preparation for Noninvasive Ventilation</td>
</tr>
<tr>
<td>Monitoring and Adjustment of Noninvasive Ventilation</td>
</tr>
<tr>
<td>Aerosol Delivery in Noninvasive Ventilation</td>
</tr>
<tr>
<td>Complications of Noninvasive Ventilation</td>
</tr>
<tr>
<td>Weaning from and Discontinuing Noninvasive Ventilation</td>
</tr>
</tbody>
</table>

## Disease Specific Ventilation Strategies

| Chronic Obstructive Pulmonary Diseases, Asthma |
| Neuromuscular Disorders, Closed Head Injury   |
| Pneumonia, Acute Respiratory Distress Syndrome, Pulmonary Edema ILD |

## Ventilator Graphics

<table>
<thead>
<tr>
<th>Relationship of Flow, Pressure, Volume, and Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scalars, Curves, and Loops</td>
</tr>
<tr>
<td>Assessment of Pulmonary Mechanics</td>
</tr>
<tr>
<td>Assessing Patient-Ventilator Asynchrony</td>
</tr>
<tr>
<td>Advanced Applications</td>
</tr>
</tbody>
</table>

## 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 $\text{FiO}_2$, 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

<table>
<thead>
<tr>
<th>1.</th>
<th><strong>Effects of Positive-Pressure Ventilation on the Pulmonary System</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lung Injury with Mechanical Ventilation</td>
</tr>
<tr>
<td></td>
<td>Effects of Mechanical Ventilation on Gas Distribution and Pulmonary Blood Flow</td>
</tr>
<tr>
<td></td>
<td>Respiratory and Metabolic Acid–Base Status in Mechanical Ventilation</td>
</tr>
<tr>
<td></td>
<td>Air Trapping (Auto-PEEP)</td>
</tr>
<tr>
<td></td>
<td>Hazards of Oxygen Therapy with Mechanical Ventilation</td>
</tr>
<tr>
<td></td>
<td>Increased Work of Breathing</td>
</tr>
<tr>
<td></td>
<td>Ventilator- Mechanical and Operational Hazards</td>
</tr>
<tr>
<td></td>
<td>Complications of the Artificial Airway</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.</th>
<th><strong>Ventilator-Associated Events</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Epidemiology</td>
</tr>
<tr>
<td></td>
<td>Ventilator associated infections- Ventilator-Associated Pneumonia, Types</td>
</tr>
<tr>
<td>Pathogenesis of Ventilator-Associated Pneumonia</td>
<td></td>
</tr>
<tr>
<td>Diagnosis of Ventilator-Associated Pneumonia</td>
<td></td>
</tr>
<tr>
<td>Treatment of Ventilator-Associated Pneumonia</td>
<td></td>
</tr>
<tr>
<td>Strategies to Prevent Ventilator-Associated Pneumonia</td>
<td></td>
</tr>
</tbody>
</table>

| 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

<table>
<thead>
<tr>
<th>SL No</th>
<th>Topic</th>
<th>Patient Assessment in Emergency Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td>Triage</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Objective and Subjective Patient Assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vital Signs Assessment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Systemic assessment including; Cardiovascular and Circulatory Assessment, Airway and Respiratory Assessment and Neurological Assessment (GCS, PEARL).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Focused History and Physical Assessment in Trauma Patients, including Head to Examination and the mnemonic DCAP-BTLS-TIC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Focused History and Physical Assessment in Medical Patients, including the mnemonic SAMPLE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ongoing Assessment in Emergency Department</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SL No</th>
<th>Topic</th>
<th>Diagnostic Tests in Emergency Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td></td>
<td>Imaging in ED like Chest and skeletal X-rays, Focused Assessment of Sonography in Trauma (FAST), Lung Ultrasonography and Echocardiography</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Basics of laboratory investigations like Blood routine, Cardiac Enzymes and Septic markers</td>
</tr>
<tr>
<td>3.</td>
<td>Airway Management and Ventilation</td>
<td>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</td>
</tr>
<tr>
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<tr>
<td>4.</td>
<td>Respiratory Emergencies</td>
<td>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</td>
</tr>
<tr>
<td>5.</td>
<td>Cardiac Emergencies</td>
<td>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</td>
</tr>
<tr>
<td>6.</td>
<td>Circulatory Emergencies</td>
<td>Mechanism, pathophysiology and management of • Hypovolemic shock • Cardiogenic shock • Obstructive shock Distributive shock- Septic, Neurogenic, Anaphylactic etc.</td>
</tr>
<tr>
<td>7.</td>
<td>Neurological Emergencies</td>
<td>Traumatic brain injury Ischemic and hemorrhagic stroke Brain protective ventilation strategy</td>
</tr>
<tr>
<td>8.</td>
<td>Poisoning and Toxicology</td>
<td>Introduction and Principles of Management</td>
</tr>
</tbody>
</table>
### 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

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

<table>
<thead>
<tr>
<th>SI No</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><strong>ADVANCED ELECTROCARDIOGRAM INTERPRETATION</strong>&lt;br&gt;Evidence of Cardiac Ischemia, Injury, or Infarction&lt;br&gt;• ST segment – T wave changes is ischemia, injury and infarction&lt;br&gt;• Assessing Chest Pain&lt;br&gt;Electrocardiogram Patterns with Chronic Lung Disease&lt;br&gt;Core pulmonale, COPD, pulmonary embolism&lt;br&gt;Electrocardiogram Patterns with Heart failure and Electrolyte imbalance&lt;br&gt;Changes in heart failure, changes in hyper or hypokalemia&lt;br&gt;Axial Deviation&lt;br&gt;• Left axis deviation&lt;br&gt;• Right axis deviation&lt;br&gt;Evolution of electrocardiographic changes-&lt;br&gt;• Localization of ischemia or infarction, Noninfarction Q waves, Primary and secondary T wave change&lt;br&gt;Electrolyte and Metabolic ECG abnormalities-&lt;br&gt;• 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,&lt;br&gt;Electrical Therapies-&lt;br&gt;• Recall- Defibrillator, Cardioverter, Pacer&lt;br&gt;• Indications, Contraindications and Complications of Electrical therapies.&lt;br&gt;• Electrophysiological Changes during electrical therapies</td>
</tr>
<tr>
<td>2.</td>
<td>Advanced Cardiopulmonary Imaging&lt;br&gt;✓ Introduction and their importance in Respiratory Therapy</td>
</tr>
<tr>
<td>3.</td>
<td>Computed Tomography of Chest&lt;br&gt;Basic physics, principles, technical and safety aspects&lt;br&gt;Thoracic Anatomy</td>
</tr>
</tbody>
</table>
|  | 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 |
<table>
<thead>
<tr>
<th>8.</th>
<th>Tread Mill Tests and Holter Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercise physiology, protocols, Lead systems, Patient preparation</td>
<td></td>
</tr>
<tr>
<td>ST segment displacement – types and measurement, Non electrocardiographic observations</td>
<td></td>
</tr>
<tr>
<td>Exercise test indications, contra-indications and precautions</td>
<td></td>
</tr>
<tr>
<td>Cardiac arrhythmias and conduction disturbances during stress testing, Emergencies in the stress testing laboratory.</td>
<td></td>
</tr>
<tr>
<td>Principles of Holter Recording, Connections of the Holter recorder, Holter Analysis</td>
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</tr>
<tr>
<td>Guidelines for ambulatory electrocardiography</td>
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</tbody>
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<thead>
<tr>
<th>9.</th>
<th>Echocardiography</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principles and physics of echocardiography</td>
<td></td>
</tr>
<tr>
<td>Types of echo- TTE, TEE</td>
<td></td>
</tr>
<tr>
<td>Modes- M- Mode and 2D transthoracic echocardiography, Views used in transthoracic echocardiography</td>
<td></td>
</tr>
<tr>
<td>Doppler echocardiography: pulsed, continuous wave and color</td>
<td></td>
</tr>
<tr>
<td>Preparation of ICU patients for TEE, Monitoring and Post procedural stabilization</td>
<td></td>
</tr>
</tbody>
</table>

**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)**
<table>
<thead>
<tr>
<th>Type of Questions</th>
<th>No. of Questions</th>
<th>Marks for Each Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Essay</td>
<td>2</td>
<td>10</td>
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<tr>
<td>Short Essay</td>
<td>10</td>
<td>05</td>
</tr>
<tr>
<td>Short Answer</td>
<td>10</td>
<td>03</td>
</tr>
</tbody>
</table>

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.
<table>
<thead>
<tr>
<th>Sl No</th>
<th>Topic</th>
</tr>
</thead>
</table>
| 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 |
<table>
<thead>
<tr>
<th>Neurological assessment</th>
<th>Pulmonary examination</th>
<th>Non pulmonary examination</th>
<th>Laboratory assessment</th>
<th>Radiographic chest assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5.</strong> Neonatal Pulmonary Disorders</td>
<td><strong>5.</strong> Neonatal Pulmonary Disorders</td>
<td>Respiratory distress syndrome</td>
<td>Meconium aspiration syndrome</td>
<td>Neonatal pneumonia</td>
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<tr>
<td></td>
<td></td>
<td>Apnea of prematurity</td>
<td>Transient Tachypnea of the neonate</td>
<td>Bronchopulmonary dysplasia</td>
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<td></td>
<td></td>
<td>Pulmonary hemorrhage</td>
<td>Asphyxia in the neonate – Hypoxic-ischemic encephalopathy</td>
<td>Pulmonary Air Leak</td>
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<td></td>
<td></td>
<td>Persistent pulmonary hypertension of the neonate</td>
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<tr>
<td><strong>6.</strong> Surgical Disorders of newborn</td>
<td><strong>6.</strong> Surgical Disorders of newborn</td>
<td>Choanal atresia</td>
<td>Cleft Palate</td>
<td>Congenital diaphragmatic hernia</td>
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<td>Tracheoesophageal fistula</td>
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<td>Congenital cardiac defects</td>
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<tr>
<td><strong>7.</strong> Noninvasive hemodynamic monitoring techniques</td>
<td><strong>7.</strong> Noninvasive hemodynamic monitoring techniques</td>
<td>Pulse oximetry: Different measurement devices, principles</td>
<td>Capnography</td>
<td>Transcutaneous monitoring</td>
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<td>Colorimetry</td>
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<tr>
<td><strong>8.</strong> Invasive hemodynamic monitoring techniques</td>
<td><strong>8.</strong> Invasive hemodynamic monitoring techniques</td>
<td>Blood gas sampling</td>
<td>Arterial puncture</td>
<td>Capillary blood gas sampling</td>
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<td>Continuous invasive monitoring</td>
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<td>Central venous catheterization</td>
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<td>Pulmonary artery catheterization</td>
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<td><strong>9.</strong></td>
<td>THERAPEUTIC APPROACHES IN TREATMENT FOR NEONATAL DISORDERS</td>
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<td></td>
<td>Oxygen therapy</td>
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<td></td>
<td>Assessment of need</td>
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<td>Targeted saturation in newborns</td>
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<td></td>
<td>Complications</td>
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<td></td>
<td>Delivery devices</td>
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<td></td>
<td>Heated humidified high flow nasal cannula (HHHFNC)</td>
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<td><strong>10.</strong></td>
<td>Surfactant Replacement Therapy</td>
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<td>Need for surfactant therapy</td>
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<td></td>
<td>Techniques of surfactant delivery- Early/late rescue, INSURE, MIST, LISA</td>
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<td></td>
<td>Types of surfactants</td>
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<td>Assessment of the outcome</td>
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<td><strong>11.</strong></td>
<td>Non-Invasive Mechanical Ventilation of Newborns</td>
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<tr>
<td></td>
<td>Continuous Positive airway pressure (CPAP)</td>
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<td>Non-invasive Positive pressure ventilation (NIPPV)</td>
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<td>Interfaces selection and fit</td>
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<td>Indications, contraindications and complications of NIV</td>
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<td>Physiological effects</td>
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<td>Monitoring the patient and ventilator circuit</td>
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<td><strong>12.</strong></td>
<td>Invasive mechanical ventilation of newborns</td>
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<td>Indications and contraindications of invasive ventilation</td>
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<td>Types of mechanical ventilation</td>
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<td>Modes of Ventilation</td>
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<td>Improvement of oxygenation and ventilation - adjustments of ventilator setting</td>
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<td>Weaning and Extubation</td>
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<td><strong>13.</strong></td>
<td>Unconventional modes of Ventilation</td>
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<td></td>
<td>High Frequency ventilation</td>
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<td></td>
<td>Nitric oxide therapy</td>
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<td>Extracorporeal membrane oxygenation</td>
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</tbody>
</table>
| **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 |
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

<table>
<thead>
<tr>
<th>SI No</th>
<th>Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>General Examination and assessment of a child</td>
</tr>
<tr>
<td></td>
<td>Physical examination</td>
</tr>
<tr>
<td></td>
<td>Airway and thoracic radiographic assessment</td>
</tr>
<tr>
<td>2.</td>
<td>Respiratory Disorders</td>
</tr>
<tr>
<td></td>
<td>Airway disorders</td>
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<td>Croup</td>
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<td>3.</td>
<td>Cardiovascular Disorders</td>
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<tr>
<td></td>
<td>Dysrhythmias</td>
</tr>
<tr>
<td></td>
<td>Congenital heart diseases- Cyanotic and Acyanotic and Management</td>
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</table>

**Heart Failure**

<table>
<thead>
<tr>
<th>4.</th>
<th>Acutely ill or Injured child</th>
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<tbody>
<tr>
<td></td>
<td>Major Trauma</td>
</tr>
<tr>
<td></td>
<td>Drowning</td>
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<td></td>
<td>Burns</td>
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<td></td>
<td>Poisoning and Envenomation</td>
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<thead>
<tr>
<th>5.</th>
<th>Pediatric Resuscitation</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Systematic approach to the seriously ill or injured child</td>
</tr>
<tr>
<td></td>
<td>Recognition of respiratory distress and failure</td>
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<tr>
<td></td>
<td>Management of respiratory distress and failure</td>
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<td></td>
<td>Recognition of shock</td>
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<tr>
<td></td>
<td>Management of shock</td>
</tr>
<tr>
<td></td>
<td>Recognition and management of arrhythmia’s</td>
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<tr>
<td></td>
<td>Recognition and management of cardiac arrest</td>
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<td></td>
<td>Post resuscitation management</td>
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<td></td>
<td>Assessment and Resuscitation</td>
</tr>
<tr>
<td></td>
<td>Sedation and Analgesia</td>
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<thead>
<tr>
<th>6.</th>
<th>Hemodynamic monitoring</th>
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<tbody>
<tr>
<td></td>
<td>Non-invasive monitoring techniques</td>
</tr>
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</table>

**Invasive monitoring techniques**

<table>
<thead>
<tr>
<th>7.</th>
<th>Respiratory Care Procedures</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Administration of gas mixtures- Oxygen &amp; Heliox therapy</td>
</tr>
<tr>
<td></td>
<td>• Assessment of need</td>
</tr>
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<td></td>
<td>• Precautions &amp; Hazards</td>
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</tbody>
</table>

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**
<p>| | |</p>
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<tbody>
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</tbody>
</table>
|   | Delivery devices  
|   | Outcome Assessment  
| Establishing 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

<table>
<thead>
<tr>
<th>SI No</th>
<th>Topic</th>
</tr>
</thead>
</table>
| 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  
|       | **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

#### Measures of Variation
- **Range**
- **Inter-quartile range**
- **Variance**
- **Standard deviation**

#### Coefficient of variation

### 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**

### Normal Distribution
- **Concept Normal curve and its properties**
- **Reference Range**
- **Exercises**
- **Skewness and Kurtosis**
  - **Concept**
  - **Types**

### 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**

### 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

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-arythmias

- 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

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.

<table>
<thead>
<tr>
<th>SUBJECTS HAVING MAXIMUM MARKS= 100 (for Second and Third Year)</th>
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<tbody>
<tr>
<td>Type of Questions</td>
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<tr>
<td>Long Essay</td>
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<tr>
<td>Short Essay</td>
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<tr>
<td>Short Answer</td>
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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, cumulative frequency curve, ogive.
Normal probability curve.
Unit - III: Measure of Central Tendency
Need for measures of central tendency
Definition and calculation of mean - ungrouped and grouped
Meaning, interpretation and calculation of median ungrouped and grouped.
Meaning and calculation of mode.
Comparison of the mean, and mode.
Guidelines for the use of various measures of central tendency.

Unit - IV: Measure of Variability
Need for measure of dispersion. The range, the average deviation. The variance and standard deviation.
Calculation of variance and standard deviation ungrouped and grouped. Properties and uses of variance and SO

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

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

Unit - VII: Health Indicator
Importance of health Indicator.
Indicators of population, morbidity, mortality, health services. Calculation of rates and rations of health.

Recommended Books.
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:

Concept of Software.
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