REVISED ORDINANCE GOVERNING REGULATIONS AND CURRICULUM OF

B.Sc. PERFUSION TECHNOLOGY COURSE • 2019

Rajiv Gandhi University of HealthSciences, 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 B.Sc. Perfusion Technology.

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

In exercise of the powers vested under Section 35(2) of RGUHS Act, 1994, the Revised Ordinance pertaining to Regulation and the curriculum of B.Sc. Perfusion 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.
1. Eligibility for admission:

A candidate seeking admission to the B.Sc. Perfusion Technology shall have studied English as one of the principal subject during the tenure of the course and shall have passed:

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

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

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

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

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

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

a. The candidate shall have passed individually in each of the subjects.

b. Candidates who have completed diploma or vocational course through Correspondence shall not be eligible for any of the courses mentioned above.

2. Duration of the course:

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

3. Medium of instruction:

The medium of instruction and examination shall be in English.

4. Scheme of examination:

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

5. Attendance

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

- The marks of the internal assessment must be displayed on the notice board of the respective colleges within 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.
6. Internal Assessment (IA):

1st Year B.Sc. Perfusion Technology

Theory - 20 marks

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

2nd & 3rd year B.Sc. Perfusion Technology

Theory – 20 Marks
Practicals – 20 Marks

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

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

7. Subject and hours of teaching for Theory and Practicals

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

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

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

**Table - I Distribution of Teaching Hours in First Year Subjects**

<table>
<thead>
<tr>
<th>Sl. no</th>
<th>Subject Theory No. of Hours</th>
<th>Practical No. of Hours</th>
<th>Total No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>Human Anatomy</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>2.0</td>
<td>Physiology</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>3.0</td>
<td>Biochemistry I</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>4.0</td>
<td>Pathology I (Clinical Pathology, Haematology &amp; Blood Banking)</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>5.0</td>
<td>Microbiology</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>350</td>
<td>100</td>
</tr>
</tbody>
</table>

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

1. English
2. Health Care

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 Postings</th>
<th>Total No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Applied Pharmacology</td>
<td>50</td>
<td>--</td>
<td>--</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>Applied Pathology</td>
<td>30</td>
<td>30</td>
<td>--</td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>Applied Microbiology</td>
<td>30</td>
<td>30</td>
<td>--</td>
<td>60</td>
</tr>
<tr>
<td>4</td>
<td>Medicine Relevant to Perfusion Technology</td>
<td>50</td>
<td>--</td>
<td>--</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>Introduction to Perfusion 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><strong>1050</strong></td>
</tr>
</tbody>
</table>

Subsidiary Subjects

1. Sociology
2. Indian constitution
3. Environment science and health

Table - III Distribution of Teaching Hours in Third Year Subjects

<table>
<thead>
<tr>
<th>Sl. no</th>
<th>Subjects</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>Paper-I Perfusion Technology Clinical</td>
<td>50</td>
<td>50</td>
<td>250</td>
<td>350</td>
</tr>
<tr>
<td>2</td>
<td>Paper-II Perfusion Technology – Applied</td>
<td>50</td>
<td>50</td>
<td>250</td>
<td>350</td>
</tr>
<tr>
<td>3</td>
<td>Paper-III Perfusion 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><strong>1050</strong></td>
</tr>
</tbody>
</table>
Subsidiary Subjects

1. Research & Biostatistics
2. Basics Computer application

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.

8. 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
- 04 papers in the 2nd Year
- 03 papers in the 3rd Year.

Practical examination:

Two practical examinations, at the end 2nd Year and three practical examinations at the end of the 3rd year.
**TABLE-IV**

**Distribution of Subjects and marks for First Year University theory Examination**

<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>Duration</td>
<td>Marks</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>3 Hours</td>
<td>80</td>
<td>20</td>
</tr>
</tbody>
</table>

|   | English | 3 Hours | 80 | 20 | 100 |
|   | Kannada | 3 Hours | 80 | 20 | 100 |
|   | Health care | 3 Hours | 80 | 20 | 100 |

Note: I A = Internal Assessment

*Main Subjects shall have University Examination.
There shall be no University Practical Examination.
**Subsidiary subjects: Examination for subsidiary subjects shall be conducted by respective colleges.

**TABLE – V**

**Distribution of Subjects and marks for Second Year Examination of B.Sc. Perfusion Technology**

<table>
<thead>
<tr>
<th>Paper</th>
<th>Subject</th>
<th>Theory</th>
<th>Practicals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Univ. IA</td>
<td>Sub Total</td>
</tr>
<tr>
<td>I</td>
<td>Applied Pharmacology</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>II</td>
<td>Applied Pathology</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>II</td>
<td>Applied Microbiology</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>III</td>
<td>Medicine Relevant to Perfusion Technology</td>
<td>100</td>
<td>20</td>
</tr>
<tr>
<td>IV</td>
<td>Introduction to Perfusion Technology</td>
<td>100</td>
<td>20</td>
</tr>
</tbody>
</table>
TABLE – VI

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

<table>
<thead>
<tr>
<th>Paper</th>
<th>Subject</th>
<th>Univ. exam</th>
<th>IA</th>
<th>Sub Total</th>
<th>Univ. Prac</th>
<th>IA</th>
<th>Sub Total</th>
<th>Grand Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Paper-I Perfusion Technology Clinical</td>
<td>100</td>
<td>20</td>
<td>120</td>
<td>120(40+40)</td>
<td>30</td>
<td>150</td>
<td>510</td>
</tr>
<tr>
<td>II</td>
<td>Paper-II Perfusion Technology Applied</td>
<td>100</td>
<td>20</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>Paper-III Perfusion Technology Advanced</td>
<td>100</td>
<td>20</td>
<td>120</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

9. Pass criteria

9.1. 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.

9.2. 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.
10. Carry over benefit

10.1 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.

10.2. 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.

11. Declaration of Class

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

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

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

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

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

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

12. 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.
13. Distribution of Type of Questions and Marks for Various Subjects

**THEORY**

9. Distribution of Type of Questions and Marks

<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>
</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

**SUBJECTS HAVING MAXIMUM MARKS= 100 (for First 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>
</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>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 (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>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- 1 Questions (No choice) 2x10= 20 marks
2. Short essay- 05 Questions (Choice is on Questions no 03) 06x5= 30 marks
3. Short answer- 05 Questions (Choice is on Questions no 03) 10x3= 30 marks

Total= 80

**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>Long Essay</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>Short Essay</td>
<td>05</td>
<td>05</td>
</tr>
<tr>
<td>Short Answer</td>
<td>05</td>
<td>03</td>
</tr>
</tbody>
</table>

4. Long essay- 1 Questions (No choice) 1x10= 10 marks
5. Short essay- 05 Questions (Choice is on Questions no 03) 05x5= 25 marks
6. Short answer- 05 Questions (Choice is on Questions no 03) 05x3= 15 marks

Total= 50
FIRST YEAR B.SC PERFUSION TECHNOLOGY

ANATOMY

No. of theory classes: 70 hours
No. of practical classes: 20 hours

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
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

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

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
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

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

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

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

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

11. Embryology:
Theory:
- Spermatogenesis & oogenesis
- Ovulation, fertilization
- Fetal circulation
- Placenta

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

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

SCHEME OF EXAMINATION THEORY
There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for Anatomy shall be as given under.
SUBJECTS HAVING MAXIMUM MARKS= 100 (for First year)

<table>
<thead>
<tr>
<th>Type of Questions</th>
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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 (Questions no 15 & 20 choice) $10 \times 3 = 30$ marks
Total= 100

Distribution of Marks for University Theory and Practical Exam

<table>
<thead>
<tr>
<th>Practicals</th>
<th>Grand total</th>
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<tbody>
<tr>
<td>Theory</td>
<td>IA</td>
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<tr>
<td>IA</td>
<td>Sub Total</td>
</tr>
</tbody>
</table>

100 20 120 * 120

REFERENCE BOOKS:
1. William Davis (P) understanding Human Anatomy and Physiology – McGraw Hill
2. Chauris- A Text Book of Anatomy
3. T. S. Ranganathan- A Text Book of Human Anatomy
4. Fattana, Human Anatomy (Description and applied)- Saund’rs & C P Prism Publishers, Bangalore
5. ESTER. M. Grischimer- Physiology & Anatomy with Practical Considerations, J. P. Lippin Cott. Philadelphia
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 O\textsubscript{2} & CO\textsubscript{2}
   Chemical regulation of respiration
   Neural regulation of respiration
   Hypoxia, Acclamatization,
   Dysbarism. Artificial respiration
   Definition-Periodic breathing ,dyspnoea, apnoea, asphyxia,, cyanosis

5. Cardiovascular system
   Introduction to CVS & general principles of circulation
   Properties of Cardiac muscle
   Cardiac cycle, heart sounds, Pulse
   Cardiac output, factors and measurement
Heart rate
BP-factors, measurement, Short term regulation
Intermediate and long term regulation of BP

ECG uses and significance, normal waveform, heart block
Coronary circulation, Cutaneous circulation-Triple response
Shock
Effects of exercise on CVS and Respiratory system

6. Renal system, Skin and body temperature
Kidneys- functions, structure of nephron, type, juxtaglomerular apparatus-structure and function, non-excretory functions of kidney
Glomerular filtration rate (GFR)- Definition, normal value, factors affecting GFR
Tubular reabsorption - sites, substance reabsorbed, mechanisms of reabsorption
Tubular secretion- sites, substance secreted, mechanisms of reabsorption
Counter current mechanism of concentration of urine
Obligatory and Facultative reabsorption of water
Micturition reflex, Diuretics
Artificial kidney, renal function tests-clearance tests
Skin -structure and function, body temperature measurement, physiological variation,
Regulation of body Temperature by physical chemical and nervous mechanisms-Role of Hypothalamus
Hypothermia and fever

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

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

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

10. Central nervous system

Introduction to CNS, Sensory receptors classification, properties
Synapse—classification, properties
Sensory pathways: Anterior spino thalamic tract and Posterior column pathway
Lateral spino thalamic tract, Types of pain, Referred pain, Thalamus; nuclei and function
Classification of reflexes, Monosynaptic reflex- Stretch reflex, muscle spindle, inverse stretch reflex.
Polysynaptic reflex—Withdrawal reflex
Motor pathways: Pyramidal pathway and functions, UMN, LMN
Cerebral cortex (Sensory and motor)-functions, Medulla and Pons—functions
Cerebellum—functions, disorders
Basal ganglia—functions, disorders
Hypothalamus and Limbic system—functions
CSF, lumbar puncture
Sleep, EEG,
Autonomic Nervous System—Sympathetic and parasympathetic distribution and functions

11. Special senses

Vision—Functional anatomy of eye, visual pathway, lesion
Refractive errors, color vision
Audition—Physiological anatomy of ear, Mechanism of hearing, auditory pathway, deafness
Olfaction—modalities, receptor, function, abnormalities
Gustation—modalities, receptor, function, taste pathway, abnormalities

Practicals

Blood pressure Recording
Auscultation for Heart Sounds
Artificial Respiration
Determination of vital capacity

INTERNAL ASSESSMENT

Theory-average of 2 exams conducted 20
Practicals: record and lab work 10
*There shall be no university practical examination and internal assessment marks secured in Practical 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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3. Short answer- 10 Questions (Questions no 15 & 20 choice)  
   \[10 \times 3 = 30 \text{ marks}\]

\textbf{Total= 100}

\textbf{NO PRACTICAL EXAMINATION}

\textbf{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

No. Theory classes: 70 hours

No. of 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 access 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.

• Part dilutions: Specimen dilutions. Serial dilutions. Reagent dilution. Dilution factors
ASSIGNMENT TOPICS
1. Units of measurement
2. Hazards - Physical, Chemical, Biological
3. Arterial blood gas analysis
4. Responsibilities of Health care personnel
5. Biomedical waste management

Total theory hours = 70

PRACTICAL DEMONSTRATION [20 hours]
- Color Reactions of Carbohydrates & amino acids.
- Precipitation Reactions of proteins
- Colorimetry
- Estimation of Blood glucose Folin Wu and enzymatic method
- Estimation of Urea by DAM method

INTERNAL ASSESSMENT
Theory-average of 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 shall be as given under.

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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
NO PRACTICAL EXAMINATION

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

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

- General Pathology:

- 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.

- **3) 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.

- **4) 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.

- **5) Immune system:**
  
a. Autoimmune diseases – General features, enumerate systemic and organ specific autoimmune diseases.

b. Systemic lupus erythematosus – Manifestations and diagnosis.
6) 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 (for BSc MLT only)

INTERNAL ASSESSMENT

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

*There shall be no university practical examination and internal assessment marks secured in Practical 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 shall be as given under.

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Total= 100
NO PRACTICAL EXAMINATION

REFERENCE BOOKS:

1. Culling Histopathology techniques
2. Bancroft Histopathology techniques
3. Koss- Cytology
4. Winifred Diagnostic cytopathology
5. Oral Cytopathology
6. Todd and Sanford- clinical diagnosis by Laboratory Medicine
7. Dacie and Lewis- Practical Hematology
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
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 (5hrs.)
   Immunity - mechanism of immunity, classification, types
   Vaccines
   Immunization schedule
   Definition of antigen, antibody, list of antigen antibody reaction (no need of detailed account of antigen antibody reactions)
   Definition of hypersensitivity and classification (no need of detailed account of types of hypersensitivity)

6. Infection (5 hrs.)
   Definition, types and mode of transmission
   Hospital acquired infection - causative agents, mode of transmission and prophylaxis.
   Antimicrobial sensitivity testing

7. Systematic bacteriology (15 hrs.)
   Disease caused and laboratory diagnosis of medically important bacteria (Staphylococcus, coagulase negative Staphylococcus, MRSA, Streptococcus pyogenes, Pneumococcus, gonococcus, E.coli, diarrhoeagenic E.coli, Salmonella, Vibrio cholerae, ETor 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
Practicals: record and lab work

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

SCHEME OF EXAMINATION THEORY
There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for Microbiology shall be as given under.

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Total= 100

NO PRACTICAL EXAMINATION

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


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<td>12 (10 x 3)</td>
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</tr>
</tbody>
</table>

No Practical or Viva voce examination
This is a subsidiary subject, examination to be conducted by respective colleges. Marks required for a pass is 35%

REFERENCE
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:**

**Preventive and Social Medicine** by J. Park
Text Book of P & SM by Park and Park
Counseling & Communicate skills for medical and health, Bayne- Orient Longman Pvt. Ltd.
Scheme of Examination


<table>
<thead>
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No Practical or Viva voce examination

This is a subsidiary subject, examination to be conducted by respective colleges. Marks required for a pass is 35%
SECOND YEAR B.SC PERFUSION TECHNOLOGY

APPLIED PHARMACOLOGY

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

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

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

a. Antihypertensives
   - Beta Adrenergic antagonists
   - Alpha Adrenergic antagonists
   - Peripheral Vasodilators
   - Calcium channel blockers
b. Antiarrhythmic drugs
c. Cardiac glycosides
d. Sympathetic and non sympathetic inotropic agents.
e. Coronary vasodilators.
f. Antianginal and anti failure agents
g. Lipid lowering & anti atherosclerotic drugs.
h. Drugs used in Haemostais – anticoagulants Thrombolytics and antithrombolytics.
i. Cardioplegic drugs- History, Principles and types of cardioplegia.
j. Primary solutions – History, principles & types.

k. Drugs used in the treatment of shock.

III. Anaesthetic agents.
- Definition of general and local anaesthetics.
- Classification of general anaesthetics.
- Pharmacokinetics and Pharmacodynamics of inhaled anaesthetic agents.
- Intravenous general anaesthetic agents.
- Local anaesthetics – classification mechanism of action, duration of action and methods to prolong the duration of action. Preparation, dose and routes of administration.
IV Analgessics
  • Definition and classification
  • Routes of administration, dose, frequency of administration, Side effects and management of non opioid and opioid analgesics

V. Antihistamines and antiemetics
  • Classification, Mechanism of action, adverse effects, Preparations, dose and routes and administration.

VI. CNS stimulants and depressants
  • Alcohol
  • Sedatives, hypnotics and narcotics
  • CNS stimulants
  • Neuromuscular blocking agents and muscle relaxants.

VII. Pharmacological protection of organs during CPB

VIII. Inhalational gases and emergency drugs.

IX. Pharmacotherapy of respiratory disorders
  • Introduction – Modulators of bronchial smooth muscle tone and pulmonary vascular smooth muscle tone
  • Pharmacotherapy of bronchial asthma
  • Pharmacotherapy of cough
  • Mucokinetic and mucolytic agents
  • Use of bland aerosols in respiratory care.

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

XI Diuretics
  • Renal physiology
  • Side of action of diuretics
  • Adverse effects
  • Preparations, dose and routes of administration.

XII. Chemotherapy of infections
  • Definition
  • Classification and mechanism of action of antimicrobial agents
  • Combination of antimicrobial agents
  • 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.
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 ANATOMY & PHYSIOLOGY RELATED TO PERFUSION TECHNOLOGY shall be as given under.

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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

APPLIED PATHOLOGY

I. CARDIOVASCULAR SYSTEM
- Atherosclerosis- Definition, risk factors, briefly Pathogenesis & morphology, clinical significance and prevention.
- Hypertension- Definition, types and briefly Pathogenesis and effects of Hypertension.
- Aneurysms – Definition, classification, Pathology and complications.
- Pathophysiology of Heart failure.
- Cardiac hypertrophy – causes, Pathophysiology & Progression to Heart Failure.
- Ischemic 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.
- Congenital heart diseases – Basic defect and effects of important types of congenital heart diseases.

II. HAEMATOLOGY
• Leukocyte disorders- Briefly leukaemia, leukocytosis, agranulocytosis etc.,
• Bleeding disorders- Definition, classification, causes & effects of important types of bleeding disorders. Briefly various laboratory tests used to diagnose bleeding disorders.

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

IV. RENAL SYSTEM
• Clinical manifestations of renal diseases. Briefly causes, mechanism, effects and laboratory diagnosis of ARF & CRS. Briefly Glomerulonephritis and Pyelonephritis.
• End stage renal disease – Definition, causes, effects and role of dialysis and renal transplantation in its management.
• Brief concept about obstructive uropathy.

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 PHARMOCOLOGY RELATED TO PERFUSION TECHNOLOGY shall be as given under.

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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

NO PRACTICAL EXAMINATION
APPLIED MICROBIOLOGY

THEORY - 40 HOURS

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

2. Disease communicable to Healthcare workers in hospital set up and its preventive measure: Occupationallly acquired infections in healthcare professionals by respiratory route (tuberculosis, varicella-zoster, respiratory syncitial 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 sterilitytesting.
3. The various methods employed for sterility testing.
4. Interpretation of results of sterility testing.
5. Disinfection of wards, OT and Laboratory.
Scheme of Examination Theory
There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for CONCEPTS OF APPLIED MICROBIOLOGY

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3. Short answer - 10 Questions (No choice) 10x3 = 30 marks

**Total = 100**

**MEDICINE RELEVANT TO PERFUSION TECHNOLOGY**

Cardiovascular System  
Ischaemic heart diseases  
Rheumatic heart disease  
Congenital heart disease  
Hypertension  
Aortic Aneurysms  
Cardiomyopathy Peripheral vascular disease  
Pulmonary edema and LV failure  
Hematology  
Anaemia  

Bleeding disorders  
Laboratory tests used to diagnose bleeding disorders (in brief)  
Respiratory System  
Chronic obstructive airway diseases (COPD)  
Concept of obstructive versus restrictive pulmonary disease PFT and its interpretation  
Renal System  
ARF & CRF  
End stage renal disease  
Role of dialysis and renal transplantation in its management CNS  
Automatic nervous system (Sympathetic & Parasympathetic system)  
Brief mention of CNS disorders & their etiology Others  
DM  
Obesity
Pregnancy
Paediatric Patient (neonate/Infant)
Elderly patient

**Scheme of examination theory**
There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for MEDICINE RELEVANT TO PERFUSION TECHNOLOGY

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**Total= 100**

**INTRODUCTION TO PERFUSION TECHNOLOGY**

Basics of diagnostic techniques:
Chest of X-ray
ECG
Echo
Angiography
Nuclear Cardiology
Laboratory investigations in relation to perfusion technology
Cardiopulmonary bypass and perfusion technology
History of Cardiac surgery and perfusion
• Specific reference of Gibbon Lillehei, carrel
• Pre CPB surgery
• Azygous Flow principle.
• Hypothermic/nonhypothermic non-CPB surgery including gross’s Well technique and controlled cross circulation.
Monitoring and instrumentation
• Concepts of monitoring – instrumentation technology of ECG machine,
• pressure transducer, syringe and peristaltic pumps, monitors, ventilators, pulse oximeters, temperature probes and

thermo regulatory monitoring, defibrillators and fibrillators. Piped and non-piped gas delivery systems and connections. Basic physics related to medically used gases.
• Haemodynamic monitoring
• Haemostatic monitoring
• Haemotologic monitoring
• Maintenance of oxygen, carbon dioxide and acid-base status and their monitoring
• Neurological monitoring (SSPE, EEG and cerebral function monitor)
• Aseptic technique.
• Cardiac surgery team, profession and terminology, scope of perfusion technology

Physiology of Extracorporeal circulation
Heart – Lung machine
• Principles of extracorporeal circulation
• Materials used in EC circuit
• Principles of extracorporeal gas exchange

Various types of oxygenators
• Bubble oxygenators
• Rotating spiral/cylinder/disc oxygenators
• Membrane oxygenators
• Mechanism of action components defoaming, rated flow. Theory of blood pumps
• Ideal blood pump, pulsatile versus non-pulsatile flow, occlusive and non-occlusive pumps, various types of pumps roller, bellow, sigmamotor, diaphragm, ventricular and centrifugal pumps.

Element of extracorporeal circulation/hazards of:
  a. blood failure
  b. Bubble trap
  c. Flow meters
  d. Temperatures
  e. Heat exchanger
  f. Regulating devices

Connection of the vascular system with extracorporeal circulation:
• Arterial and venous cannulae.
• Connecting tubes and connectors
• Vents
• Suckers
• Cardioplegia delivery system
• Venous drainage.

Haemodynamic of arterial return, venous drainage, cardioplegia Delivery and venting.


Scheme of Examination:
There shall be one theory paper of three hours duration carrying 100marks.
Distribution of type of questions and marks for Introduction to Perfusion technology
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3. Short answer- 10 Questions (No choice) \[10 \times 3 = 30 \text{ marks}\]

**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:**
1. Concepts of social groups, influence of formal and informal groups on health and sickness.
2. The role of primary groups and secondary groups in the hospital and rehabilitation setup.

**Family :**
The family, meaning and definitions
Functions of types of family
Changing family patterns
Influence of family on individual’s health, family and nutrition, the effects of sickness in the family and psychosomatic disease and their importance to physiotherapy

**Community :**
Rural community: Meaning and features – Health hazards to rural communities, health hazards to tribal community.

Urban community – Meaning and features – Health hazards of urbanities

**Culture and Health :**
Concept of Health
Concept of culture
Culture and Health
Culture and Health Disorders

**Social Change :**
Meaning of social changes
Factors of social changes
Human adaptation and social change
Social change and stress
Social change and deviance
Social change and health programme

The role of social planning in the improvement of health and rehabilitation

**Social Problems of disabled :**
Consequences of the following social problems in relation to sickness and disability remedies to prevent these problems
Population explosion
Poverty and unemployment Beggary
Juvenile delinquency
Prostitution
Alcoholism
Problems of women in employment
Social Security:
Social Security and social legislation in relation to the disabled

Social Work:
Meaning of Social Work
The role of a Medical Social Worker

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

Unit-I: Meaning of the team ‘Constitution’ making of the Indian Constitution 1946-1940.

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

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


Unit-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.

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.

THIRD YEAR B.SC PERFUSION TECHNOLOGY

Paper-I Perfusion Technology Clinical

1. Pharmacokinetics and Pharmacodynamics of Cardiopulmonary bypass
2. Drugs (including anesthetic drugs) used in cardiopulmonary bypass
3. Conduct and monitoring of Cardiopulmonary bypass
4. Adequacy of perfusion – General considerations, specific aspects of perfusion, monitoring, other concomitants which may affect its adequacy
5. Pulsatile perfusion – Introduction, theory & physiology of pulsatile flow, hemodynamic, metabolic effects, Clinical use, hematological effects
6. Cannulation techniques during cardiopulmonary bypass
7. Termination of cardiopulmonary bypass – principles and methodology
8. Myocardial protection and cardioplegia- pretreatment of the Myocardium, cardioplegia, hypothermia, controlled reperfusion, myocardial protection for specific clinical problems, Complications of cardioplegia. Non cardioplegic methods during cardiac surgery on cardiopulmonary bypass
9. Oxygenation – general consideration, bubble & membrane (including assessment and comparison of oxygenator function)
11. Priming fluids and hemodilution

Scheme of Examination:
There shall be one theory paper of three hours duration carrying 100 marks.
Distribution of type of questions and marks for Paper I Perfusion technology-Clinical shall be as given under

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3. Short answer- 10 Questions (No choice) 10x3= 30 marks

Total= 100

PRACTICAL EXAMINATION
One common practical for all the three papers with equal weightage of marks i.e. 40 marks for each paper
PAPER-II PERFUSION TECHNOLOGY - APPLIED

3. Inflammatory response to cardiopulmonary bypass & its clinical effects. Methods to minimise the same. Immune response, neuroendocrine, renal, metabolic splanchnic response, pulmonary response and electrolyte response to cardiopulmonary bypass
4. Blood conservation hemofiltration & dialysis during cardiopulmonary bypass including modified ultra filtration reverse autologous priming and other methods
5. Micro emboli- gaseous and particulate, filters used in cardiopulmonary bypass circuit.
6. Micro pore filtration during cardiopulmonary bypass
7. Counter pulsation techniques and assist devices

Scheme of examination theory

There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for applied dialysis technology paper i shall be as given under.

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3. Short answer- 10 Questions (No choice)  
10x3= 30 marks  
Total= 100

PRACTICAL EXAMINATION

One common practical for all the three papers with equal weightage of marks i.e. 40 marks for each paper
PAPER-III PERFUSION TECHNOLOGY - ADVANCED

1. Perfusion techniques for Paediatric cardiac surgery
2. ECMO- special perfusion techniques for special cardiac surgeries and medical conditions (including thoracic aortic surgeries deep hypothermia and circulatory arrest). Perfusion for non cardiac surgery, invasive cardiology and outside the operation suite.
3. Perfusion as a method of cardiopulmonary bypass
5. Minimally invasive surgery and the perfusionist
6. Recent advances in perfusion techniques
7. Experimental perfusion

Scheme of examination theory

There shall be one theory paper of three hours duration carrying 100 marks. Distribution of type of questions and marks for applied dialysis technology paper i shall be as given under.

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PRACTICAL EXAMINATION

One common practical for all the three papers with equal weightage of marks i.e. 40 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
Behavioural Objectives:
Understands statistical terms.
Possesses knowledge and skill in the use of basic statistical and research methodology.

Unit – I : Introduction
Meaning, definition, characteristics of statistics.
Importance of the study of statistics.
Branches of statistics.
Statistics and health science including nursing.
Parameters and estimates.
Descriptive and inferential statistics. Variables and their types.
Measurement scales

Unit – II : Tabulation of Data
Raw data, the array, frequency distribution.
Basic principles of graphical representation.
Types of diagrams - histograms, frequency polygons, smooth frequency polygon, commulative frequency curve, ogive.
Normal probability curve.

Unit - III : Measure of Central Tendency
Need for measures of central tendency
Definition and calculation of mean - ungrouped and grouped
Meaning, interpretation and calculation of median ungrouped and grouped.
Meaning and calculation of mode.
Comparison of the mean, and mode.
Guidelines for the use of various measures of central tendency.

Unit - IV : Measure of Variability
Need for measure of 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.
Sampling Technique, 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.
Jaypee Broth

**BASICS IN COMPUTER APPLICATIONS**

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

**Introduction to Data processing:**

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

**Hardware Concepts:**


Concept of Software.

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.