REVISED ORDINANCE GOVERNING
REGULATIONS & CURRICULUM FOR BACHELOR OF SCIENCE DEGREE COURSES IN
ALLIED HEALTH SCIENCE FOR FIRST YEAR

B.Sc Medical Laboratory Technology

1. Title of the Courses offered in Allied Health Sciences:

1. Bachelor of Science in Medical Laboratory Technology [B.Sc. (M.L.T)]
2. Bachelor of Science in Operation Theatre Technology [B.Sc. O.T. Technology]
3. Bachelor of Science in Cardiac Care Technology [B.Sc Cardiac Care Technology]
4. Bachelor of Science in Perfusion Technology [B.Sc. Perfusion Technology]
5. Bachelor of Science in Neuro Science Technology [B.Sc. Neuro Science Technology]
6. Bachelor of Science in Renal Dialysis Technology [B.Sc. Renal Dialysis Technology]
7. Bachelor of Science in Respiratory Care Technology [B.Sc. Respiratory Care Technology]
8. Bachelor of Science in Anaesthesia Technology [B.Sc. Anaesthesia Technology]
9. Bachelor of Science in Imaging Technology [B.Sc. Imaging Technology]
10. Bachelor of Science in Radiotherapy Technology [B.Sc. Radiotherapy Technology]

2. Eligibility for admission:
   A candidate seeking admission to the Bachelor of Science Degree Courses in the Allied Health Sciences course from Sl.No. 1 to 10 shall have studied English as one of the principal subject during the tenure of the course and for those seeking admission to the Bachelor of Science Degree Courses in the Allied Health Sciences courses from Sl.No. 1 to 8 mentioned above except for B.Sc. Imaging Technology and B.Sc. Radiotherapy Technology 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 principle 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 principal 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 principal 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 a subject for which the candidate desires to enroll, in the respective Allied Health Sciences course mentioned in Sl. No. 1 to 10 shall have passed plus 12 [10+2] with Physics, Chemistry and Biology, as principal subjects or candidates with 3 years diploma from a recognized Government Board in a subject for which the candidate desires to enroll, in the respective Allied Health Sciences course mentioned in Sl. No. 1 to 10 should have studied Physics, Biology and Chemistry as principal subjects during the tenure of the course.

6. Lateral entry to second year for allied health science courses 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.

7. In case of admission to B.Sc. Imaging Technology or B.Sc. Radiotherapy Technology the candidate should have passed Pre-University or equivalent examination with Physics, Chemistry, Biology and Mathematics, as principal subjects of study.
**Note:**

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

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

3. **Duration of the course:**

   Duration shall be for a period of three and half years including six months of Internship.

4. **Medium of instruction:**

   The medium of instruction and examination shall be in English.

5. **Scheme of examination:**

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

6. **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.

7. **Internal Assessment (IA):**

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

8. 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>Main Subjects</th>
<th>Theory No. of Hours</th>
<th>Practical No. of Hours</th>
<th>Total No. of Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>S L No</td>
<td>Subject</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Human Anatomy</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Physiology</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>3</td>
<td>Biochemistry I</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>Pathology I</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>Microbiology I</td>
<td>70</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>350</td>
<td>100</td>
<td>450</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

- English: 25 Hours
- Kannada: 25 Hours
- Health-Care: 40 Hours

Hospital 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>Main 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>S L No</td>
<td>Subject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Biochemistry II</td>
<td>100</td>
<td>80</td>
<td>170</td>
</tr>
<tr>
<td>2</td>
<td>Microbiology II</td>
<td>100</td>
<td>80</td>
<td>170</td>
</tr>
<tr>
<td>3</td>
<td>Pathology II</td>
<td>100</td>
<td>80</td>
<td>170</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>300</td>
<td>240</td>
<td>510</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>Main 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>S L No</td>
<td>Subject</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Biochemistry III</td>
<td>100</td>
<td>80</td>
<td>170</td>
</tr>
<tr>
<td>---</td>
<td>------------------</td>
<td>-----</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>2</td>
<td>Microbiology III</td>
<td>100</td>
<td>80</td>
<td>170</td>
</tr>
<tr>
<td>3</td>
<td>Pathology III</td>
<td>100</td>
<td>80</td>
<td>170</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>300</td>
<td>240</td>
<td>510</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**
- 03 papers in the 2nd Year
- 03 papers in the 3rd Year.

**Practical examination:**
Three practical examinations, at the end 2nd Year and three practical examinations at the end of the 3rd year.
# TABLE-IV
Distribution of Subjects and marks for First Year University theory Examination

<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</td>
<td>3 hours</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>[Including</td>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Histology]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Physiology</td>
<td>3 hours</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Biochemistry</td>
<td>3 hours</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>Pathology</td>
<td>3 hours</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>Microbiology</td>
<td>3 hours</td>
<td>80</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B</th>
<th>Subsidiary Subject**</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>English</td>
<td>3 hours</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Kannada</td>
<td>3 hours</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Health Care</td>
<td>3 hours</td>
<td>80</td>
<td>100</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>Viva- voca</th>
<th>IA</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>Sociology</td>
<td>100</td>
<td>30</td>
<td>20</td>
<td>150</td>
<td>40</td>
<td>10</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>II</td>
<td>Constitution of India</td>
<td>100</td>
<td>30</td>
<td>20</td>
<td>150</td>
<td>40</td>
<td>10</td>
<td>50</td>
<td>200</td>
</tr>
<tr>
<td>III</td>
<td>Environmental Science &amp; Health</td>
<td>100</td>
<td>30</td>
<td>20</td>
<td>150</td>
<td>40</td>
<td>10</td>
<td>50</td>
<td>200</td>
</tr>
</tbody>
</table>

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

Distribution of Subsidiary Subjects and marks for Second Year 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>

TABLE – VI

Distribution of Subjects and marks for Third Year Examination.

<table>
<thead>
<tr>
<th>Paper</th>
<th>Subjects</th>
<th>Theory</th>
<th>Viva- voca</th>
<th>IA</th>
<th>Paper</th>
<th>Theory</th>
<th>Viva- voca</th>
<th>IA</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Biochemistry III</td>
<td>100</td>
<td>30</td>
<td>20</td>
<td>I</td>
<td>Biochemistry II</td>
<td>100</td>
<td>30</td>
</tr>
<tr>
<td>II</td>
<td>Microbiology III</td>
<td>100</td>
<td>30</td>
<td>20</td>
<td>II</td>
<td>Microbiology II</td>
<td>100</td>
<td>30</td>
</tr>
<tr>
<td>III</td>
<td>Pathology III</td>
<td>100</td>
<td>30</td>
<td>20</td>
<td>III</td>
<td>Pathology III</td>
<td>100</td>
<td>30</td>
</tr>
</tbody>
</table>

Distribution of Subsidiary Subjects and marks for Third Year Examination

** Subsidiary subjects: Examination for subsidiary subjects shall be conducted by respective colleges
<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, internal assessment and Viva-Voce 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; otherwise he/she shall not permitted to proceed to third year.

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. Eligibility for the award of Degree:
A candidate shall have passed in all the subjects of first, second and third year to be eligible for award of degree.
14. Distribution of Type of Questions and Marks for Various Subjects

**THEORY**

<table>
<thead>
<tr>
<th>SUBJECTS HAVING MAXIMUM MARKS = 100</th>
<th>TYPE OF QUESTION</th>
<th>NUMBER OF QUESTIONS</th>
<th>MARKS FOR EACH QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSAY TYPE</td>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>SHORT ESSAY TYPE</td>
<td>12 (10 × 5)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>SHORT ANSWER TYPE</td>
<td>12 (10 × 3)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUBJECTS HAVING MAXIMUM MARKS = 80</th>
<th>TYPE OF QUESTION</th>
<th>NUMBER OF QUESTIONS</th>
<th>MARKS FOR EACH QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSAY TYPE</td>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>SHORT ESSAY TYPE</td>
<td>8 (6 × 5)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>SHORT ANSWER TYPE</td>
<td>12 (10 × 3)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUBJECTS HAVING MAXIMUM MARKS = 60</th>
<th>TYPE OF QUESTION</th>
<th>NUMBER OF QUESTIONS</th>
<th>MARKS FOR EACH QUESTION</th>
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</thead>
<tbody>
<tr>
<td>ESSAY TYPE</td>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>SHORT ESSAY TYPE</td>
<td>7 (5×5)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>SHORT ANSWER TYPE</td>
<td>7 (5×3)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SUBJECTS HAVING MAXIMUM MARKS = 50</th>
<th>TYPE OF QUESTION</th>
<th>NUMBER OF QUESTIONS</th>
<th>MARKS FOR EACH QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESSAY TYPE</td>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>SHORT ESSAY TYPE</td>
<td>5 (3×5)</td>
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<td></td>
</tr>
<tr>
<td>SHORT ANSWER TYPE</td>
<td>7 (5×3)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
B.Sc Medical Laboratory Technology

ANATOMY

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

1. Introduction: human body as a whole
   Theory:
   Definition of anatomy and its divisions
   Terms of location, positions and planes
   Cell and its organelles
   Epithelium: definition, classification, describe with examples, function
   Glands: classification, describe serous & mucous glands with examples
   Basic tissues – classification with examples
   Practical: Histology of types of epithelium
   Histology of serous, mucous & mixed salivary gland

2. Locomotion and support
   Theory:
   Cartilage – types with example & histology
   Bone – Classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, intervertebral disc, fontanelles of fetal skull
   Joints – Classification of joints with examples, synovial joint (in detail for radiology)
   Muscular system: Classification of muscular tissue & histology
   Names of muscles of the body
   Practical: Histology of the 3 types of cartilage
   Demo of all bones showing parts, radiographs of normal bones & joints
   Histology of compact bone (TS & LS)
   Demonstration of all muscles of the body
   Histology of skeletal (TS & LS), smooth & cardiac muscle

3. Cardiovascular system
   Theory:
   Heart-size, location, chambers, exterior & interior
   Blood supply of heart
   Systemic & pulmonary circulation
   Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery
   Peripheral pulse
Inferior venacava, portal vein, portosystemic anastomosis
Great saphenous vein
Dural venous sinuses
Lymphatic system- cisterna chyli & thoracic duct
Histology of lymphatic tissues
Names of regional lymphatics, axillary and inguinal lymph nodes in brief
Practical:
Demonstration of heart and vessels in the body
Histology of large artery, medium sized artery & vein, large vein
Microscopic appearance of large artery, medium sized artery & vein, large vein pericardium
Histology of lymph node, spleen, tonsil & thymus
Normal chest radiograph showing heart shadows
Normal angiograms

4. Gastro-intestinal system
Theory:
Parts of GIT, Oral cavity (lip, tongue (with histology), tonsil, dentition, pharynx, salivary glands, Waldeyer’s ring)
Oesophagus, stomach, small and large intestine, liver, gall bladder, pancreas
Radiographs of abdomen

5. Respiratory system
Parts of RS, nose, nasal cavity, larynx, trachea, lungs, bronchopulmonary segments
Histology of trachea, lung and pleura
Names of paranasal air sinuses
Practical: Demonstration of parts of respiratory system.
Normal radiographs of chest
Histology of lung and trachea

6. Peritoneum
Theory: Description in brief
Practical: Demonstration of reflections

7. Urinary system
Kidney, ureter, urinary bladder, male and female urethra
Histology of kidney, ureter and urinary bladder
Practical: Demonstration of parts of urinary system
Histology of kidney, ureter, urinary bladder
Radiographs of abdomen-IVP, retrograde cystogram

8. Reproductive system
Theory:
Parts of male reproductive system, testis, vas deferens, epididymis, prostate (gross & histology)
Parts of female reproductive system, uterus, fallopian tubes, ovary (gross & histology)
Mammary gland – gross
Practical: demonstration of section of male and female pelves with organs in situ
Histology of testis, vas deferens, epididymis, prostate, uterus, fallopian tubes, ovary
Radiographs of pelvis – hysterosalpingogram
9. Endocrine glands
Theory:
Names of all endocrine glands in detail on pituitary gland, thyroid gland, parathyroid gland, suprarenal gland – (gross & histology)
Practical: Demonstration of the glands
Histology of pituitary, thyroid, parathyroid, suprarenal glands

10. Nervous system
Theory:
Neuron
Classification of NS
Cerebrum, cerebellum, midbrain, pons, medulla oblongata, spinal cord with spinal nerve (gross & histology)
Meninges, Ventricles & cerebrospinal fluid
Names of basal nuclei
Blood supply of brain
Cranial nerves
Sympathetic trunk & names of parasympathetic ganglia
Practical: Histology of peripheral nerve & optic nerve
Demonstration of all plexuses and nerves in the body
Demonstration of all part of brain
Histology of cerebrum, cerebellum, spinal cord

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

Embryology:
Theory:
Spermatogenesis & oogenesis
Ovulation, fertilization
Fetal circulation
Placenta
Internal Assessment
Theory - Average of two exams conducted. 20
Practicals: Record & Lab work* 10
* There shall be no University Practical Examination and internal assessment marks secured in Practicals need not be sent to the University.

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

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**NO PRACTICAL EXAMINATION**

**REFERENCE BOOKS**

**Anatomy**

1. William Davis (P) understanding Human Anatomy and Physiology MC Graw Hill

2. Chaursia –A Text book of Anatomy
   T.S. Ranganathan – A text book of Human Anatomy

3. Fattana, Human anatomy
   (Description and applied)

4. ESTER . M. Grishcimer,
   Physiology & Anatomy with Practical Considerations, J.P. Lippin Cott. Philadelphia
Introduction – composition and function of blood
Red blood cells – Erythropoiesis, stages of differentiation, function, count, physiological variation.
Haemoglobin – structure, functions, concentration, physiological variation.
Methods of Estimation of Hb
White blood cells – Production, function, life span, count, differential count
Platelets – Origin, normal count, morphology, functions.
Plasma Proteins – Production, concentration, types, albumin, globulin, Fibrinogen, Prothrombin functions.
Haemostasis & Blood coagulation
Haemostasis – Definition, normal haemostasis, clotting factors, mechanism of clotting, disorders of clotting factors.
Blood Bank
Blood groups – ABO system, Rh system
Blood grouping & typing
Crossmatching
Rh system – Rh factor, Rh in compatibility.
Blood transfusion – Indication, universal donor and recipient concept.
Selection criteria of a blood donor, transfusion reactions
Anticoagulants – Classification, examples, and uses.
Anaemias: Classification – morphological and etiological effects of anemia on body
Blood indices – Colour index, MCH, MCV, MCHC
Erythrocyte sedimentation Rate (ESR) and Paced cell volume
Normal values, Definition, determination.
Blood Volume – Normal value, determination of blood volume and regulation of blood volume
Body fluid – pH, normal value, regulation and variation
Lymph – lymphoid tissue formation, circulation, composition and function of lymph

Cardiovascular system
Heart – Physiological Anatomy, Nerve supply
Properties of Cardiac muscle,
Cardiac cycle-systole, diastole. Intraventricular pressure curves.
Cardiac Output – only definition
Heart sounds Normal heart sounds Areas of auscultation.
Blood Pressure – Definition, normal value, clinical measurement of blood pressure.
Physiological variations, regulation of heart rate, cardiac shock, hypotension, hypertension.
Pulse – Jugular, radial pulse, Triple response
Heart sounds – Normal heart sounds, cause characteristics and signification. Heart rate
Electrocardiogram (ECG) – significance.
Digestive System - Physiological anatomy of Gastro intestinal tract, Functions of
digestive system
Salivary glands – Structure and functions. Deglutination – stages and regulation
Stomach – structure and functions
Gastric secretion – Composition function regulation of gastric juice secretion
Pancrease – structure, function, composition, regulation of pancreatic juice
Liver – functions of liver
Bile secretion, composition, function regulation of bile secretion. Bilirubin metabolism
types of bilirubin, Vandernberg reaction, Jaundice - types, significance.
Gall bladder – functions
Intestine – small intestine and large intestine
Small intestine – Functions - Digestive, absorption, movements.
Large intestine – Functions, Digestion and absorption of Carbohydrates, Proteins,
Fats, Lipids, Defecation
Respiratory system
Functions of Respiratory system, Physiological Anatomy of Respiratory system,
Respiratory tract, Respiratory Muscles, Respiratory organ-lungs, Alveoli, Respiratory
membrane, stages of respiration.
Mechanism of normal and rigorous respiration. Forces opposing and favouring
expansion of the lungs. Intra pulmonary pleural pressure, surface tension, recoil
tendency of the wall.
Transportation of Respiratory gases:
Transportation of Oxygen: Direction, pressure gradient, Forms of transportation,
Oxygenation of Hb. Quantity of Oxygen transported.
Lung volumes and capacities
Regulation of respiration what? Why? How? Mechanisms of Regulation, nervous and
Applied Physiology and Respiration: Hypoxia, Cyanosis, Asphyxia, Dyspnea,
Dysbarism, Artificial Respiration, Apnoea.
Endocrine System - Definition Classification of Endocrine glands & their Hormones
Properties of Hormones.
Thyroid gland hormone – Physiological, Anatomy, Hormone secreted, Physiological
function, regulation of secretion. Disorders – hypo and hyper secretion of hormone
Adrenal gland, Adrenal cortex physiologic anatomy of adrenal gland,
Adrenal cortex, cortical hormones – functions and regulation
Adrenal medulla – Hormones, regulation and secretion. Functions of Adrenaline and nor
adrenaline
Pituitary hormones – Anterior and posterior pituitary hormones, secretion, function
Pancreas – Hormones of pancreas
Insulin – secretion, regulation, function and action
Diabetes mellitus – Regulation of blood glucose level
Parathyroid gland – function, action, regulation of secretion of parathyroid hormone.
Calcitonin – function and action
Special senses
Vision – structure of eye. Function of different parts.
Structure of retina
Hearing structure and function of can mechanism of hearing
Nervous system
Functions of Nervous system, Neurone structure, classification and properties.
Neuroglia, nerve fiber, classification, conduction of impulses continuous and saltatory.
Velocity of impulse transmission and factors affecting. Synapse – structure, types, properties.
Ascending tracts, Descending tracts –
pyramidal tracts – Extrapyramidal tracts. Functions of Medulla, pons, Hypothalamic disorders. Cerebral cortex lobes and functions. Sensory cortex, Motor cortex, Cerebellum functions of Cerebellum. Basal ganglion functions. EEG.
Cerebro Spinal Fluid (CSF): formation, circulation, properties, composition and functions. lumbar puncture.
Autonomic Nervous System: Sympathetic and parasympathetic distribution and functions and comparison of functions.
Excretory System
Excretory organs
Mechanism of Urine formation: Ultrafiltration criteria for filtration GFR. Plasma fraction, EFP, factors effecting EFR. Determination of GFR selective reabsorption – sites of reabsorption, substance reabsorbed, mechanisms of reabsorption. Glucose, urea, H + Cl aminoacids etc. TMG, Tubular lead, Renal threshold % of reabsorption of different substances, selective secretion.
Properties and composition of normal urine, urine output. Abnormal constituents in urine.
Mechanism of urine concentration.
Counter – Current Mechanisms: Micturition, Innervation of Bladder, Cystourethrogram.
Reproductive system
Muscle nerve physiology
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.

Practicals
Haemoglobinometry
White Blood Cell count
Red Blood Cell count
Determination of Blood Groups
Leishman’s staining and Differential WBC count
Determination of packed cell Volume
Erythrocyte sedimentation rate [ESR]
Calculation of Blood indices
Determination of Clotting Time, Bleeding Time
Blood pressure Recording
Auscultation for Heart Sounds
Artificial Respiration
Determination of vital capacity
Internal Assessment

Theory - Average of two exams conducted. 20
Practicals: Record & Lab work* 10
* There shall be no University Practical Examination and internal assessment marks secured in Practicals need not be sent to the University.

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

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NO PRACTICAL EXAMINATION

REFERENCE BOOKS

Physiology

   Latest Ed. Prism publishers
2. Chatterjee(CC) Human Physiology Latest Ed.
   Vol-1, Medical Allied Agency
3. Choudhari (Sujith K) Concise Medical Physiology Latest Ed. New Central Book,
B.Sc. Medical Laboratory Technology

BIOCHEMISTRY

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

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

1. Introduction to Laboratory apparatus
   Pipettes - different types (Graduated, volumetric, Pasteur, Automatic etc.)
   Calibration of glass pipettes
   Burettes, Beakers, Petri dishes, depression plates.
   Flasks - different types (Volumetric, round bottomed, Erlemeyer conical etc.)
   Funnels - different types (Conical, Buchner etc.)
   Bottles - Reagent bottles - graduated and common, Wash bottles - different type
   Specimen bottles etc.,

2. Measuring cylinders, Porcelain dish
   Tubes - Test tubes, centrifuge tubes, test tube draining rack
   Tripod stand, Wire gauze, Bunsen burner.
   Cuvettes, significance of cuvettes in colorimeter, cuvettes for visible and UV range,
   cuvette holders Racks – Bottle, Test tube, Pipette
   Dessicator, Stop watch, rimmers, scissors
   Dispensers – reagent and sample
   Any other apparatus which is important and may have been missed should also be covered

3. Instruments (Theory and demonstration) Diagrams to be drawn
   Water bath: Use, care and maintenance
   Oven & Incubators: Use, care and maintenance.
   Water Distillation plant and water deionisers: Use, care and maintenance
   Refrigerators, cold box, deep freezers – Use, care and maintenance
   Reflux condenser: Use, care and maintenance

4. Centrifuges (Theory and demonstration) Diagrams to be drawn
   Definition, Principle, svedberg unit, centrifugal force, centrifugal field rpm,
   ref. Conversion of G to rpm and vice versa.
   Different types of centrifuges
Use care and maintenance of a centrifuge
Laboratory balances (Theory & Practicals) Diagrams to be drawn
Manual balances: Single pan, double pan, trip balance
Direct read out electrical balances.
Use care and maintenance. Guideline to be followed and precautions to be taken while weighing
Weighing different types of chemicals, liquids. Hygroscopic compounds etc.
Colorimeter and spectrophotometer (Theory and Practicals) Diagrams to be drawn
Principle, Parts Diagram.
Use, care and maintenance.
pH meter (Theory & practicals) Diagrams to be drawn
principle, parts, Types of electrodes, salt bridge solution.
Use, care and maintenance of Ph meter and electrodes
Guidelines to be followed and precautions to be taken while using pH meter
4. Safety of measurements
5. Conventional and SI units
6. Atomic structure
Dalton’s theory, Properties f electrons, protons, neutrons, and nucleus, Rutherford’s model of atomic structure, Bohr’s model of atomic structure, orbit and orbital, Quantum numbers, Heisenberg’s uncertainly principle.
Electronic configuration – Aufbau principle, Pauli’s exclusion principle, etc.,m
Valency and bonds – different types of strong and weak bonds in detail with examples
Theory & Practicals for all the following under this section
Molecular weight, equivalent weight of elements and compounds, normality molarity
Preparation of molar solutions (mole/litre solution) eg: 1 M NaCl, 0.15 M NaCL
1 M NaOH, 0.1 M HCl, 0.1 M H 2S04 etc.,
Preparation of normal solutions. eg., IN Na2CO3, O IN Oxalic acid, 0.1 N HCl, 0.1N
H2504, 0.66 N H2S04 etc.,
Percent solutions. Preparation of different solutions – v/v w/v (solids, liquids and acids)
Conversion of a percent solution into a molar solution

**Dilutions**
Diluting solutions: eg. Preparation of 0.1 N NaCl from 1 N NaCl from 2 NHCl etc.,
Preparing working standard from stock standard, Body fluid dilutions, Reagent dilution techniques, calculating the dilution of a solution, body fluid reagent etc.,
Saturated and supersaturated solutions.
Standard solutions. Technique for preparation of standard solutions eg: Glucose, urea, etc., Significance of volumetric flask in preparing standard solutions. Volumetric flasks of different sizes, Preparation of standard solutions of deliquescent compounds (CaCl2, potassium carbonate, sodium hydroxide etc.,)
Preparation of standards using conventional and SI units
Acids, bases, salts and indicators.
Acids and Bases: Definition, physical and chemical properties with examples. Arreheiuus concept of acids and bases, Lowery – Bronsted theory of acids and bases classification of
acids and bases. Different between bases and alkali, acidity and basicity, monoprotonic and polyprotic acids and bases

Concepts of acid base reaction, hydrogen ion concentration, ionisation of water, buffer, pH value of a solution, preparation of buffer solutions using Ph meter.

Salts: Definition, classification, water of crystallization – definition and different types, deliquescent and hygroscopic salts

Acid-base indicators: (Theory and Practicals)

Theory – Definition, concept, mechanism of dissociation of an idicator, colour change of an indicator in acidic and basic conditions, use if standard buffer solution and indicators for Ph determinations, preparation and its application, list of commonly used indicators and their Ph range, suitable pH indicators used in different titrations, universal indicators

Practicals – Titration of a simple acid and a base (Preparation of standard solution of oxalic acid and using this solution finding out the normality of a sodium hydroxide solution. Acid to be titrated using this base) Calculation of normality of an acid or a base after titration, measurement of hydrogen ion concentration

Quality control:

- Accuracy
- Precision
- Specificity
- Sensitivity
- Limits of error allowable in laboratory
- Percentage error

Normal values and Interpretations

Special Investigations:

- Serum Electrophoresis
- Immunoglobulins
- Drugs: Digitoxin, Theophyllines

Regulation of Acid Base status:

- Henderson Hasselback Equations
- Buffers of the fluid

pH Regulation

Disturbance in acid Base Balance

Anion Gap

Metabolic acidosis

- Metabolic acidosis
- Metabolic alkalosis
- Respiratory acidosis
- Respiratory alkalosis

Basic Principles and estimation of Blood Gases and pH

Basic principles and estimation of Electrolytes

- Water Balance

Sodium regulation

Bicarbonate buffers

Nutrition, Nutritional support with special emphasis on parental nutrition.

- Calorific Value
- Nitrogen Balance
- Respiratory Quotient
Basal metabolic rate
Dietary Fibers
Nutritional importance of lipids, carbohydrates and proteins
Vitamins

PRACTICALS
Analysis of Normal Urine
Composition of urine
Procedure for routine screening
Urinary screening for inborn errors of metabolism
Common renal disease
Urinary calculus

Urine examination for detection of abnormal constituents
Interpretation and Diagnosis through charts
Liver Function tests
Lipid Profile
Renal Function test
Cardiac markers
Blood gas and Electrolytes

4. Estimation of Blood sugar, Blood Urea and electrolytes
5. Demonstration of Strips
Demonstration of Glucometer

Internal Assessment
Theory - Average of two exams conducted. 20
Practicals: Record & Lab work* 10
* There shall be no University Practical Examination and internal assessment marks secured in Practicals need not be sent to the University.

**Scheme of Examination Theory**

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

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NO PRACTICAL EXAMINATION
REFERENCE BOOKS

Biochemistry
1. Varley – Clinical chemistry
2. TEITZ – Clinical chemistry
3. Kaplan – Clinical chemistry
4. Ramakrishna(S) Prasanna(KG), Rajna ® Text book of Medical Biochemistry Latest Ed Orient longman Bombay –1980
5. Vasudevan (DM) Sreekumari(S) Text book of Biochemistry for Medical students ,Latest Ed
B.Sc Medical Laboratory Technology

PATHOLOGY

Histo Pathology, Clinical Pathology, Haematology and Blood Banking

Theory – 70 hours
Practical – 20 hours

- HistoPathology - Theory
  - Introduction to Histo Pathology
  - Receiving of Specimen in the laboratory
  - Grossing Techniques
  - Mounting Techniques – various Mountants
  - Maintenance of records and filing of the slides.
  - Use & care of Microscope
  - Various Fixatives, Mode of action, Preparation and Indication.
  - Bio-Medical waste management
    - Section Cutting
    - Tissue processing for routine paraffin sections
    - Decalcification of Tissues.
    - Staining of tissues - H&E Staining
    - Bio-Medical waste management
      - Clinical Pathology – Theory
        - Introduction to Clinical Pathology
        - Collection, Transport, Preservation, and Processing of various clinical specimens
        - Urine Examination – Collection and Preservation of urine.
          Physical, chemical, Microscopic Examination
        - Examination of body fluids.
        - Examination of cerebro spinal fluid (CSF)
        - Sputum Examination.
        - Examination of feces

Haematology – Theory

- Introduction to Haematology
- Normal constituents of Blood, their structure and function.
- Collection of Blood samples
- Various Anticoagulants used in Haematology
- Various instruments and glassware used in Haematology, Preparation and use of glassware
- Laboratory safety guidelines
- SI units and conventional units in Hospital Laboratory
- Hb, PCV
- ESR
- Normal Haemostasis
Bleeding Time, Clotting Time, Prothrombin Time, Activated Partial Thromboplastin Time.

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

Internal Assessment
Theory - Average of two exams conducted. 20
Practicals: Record & Lab work* 10
* There shall be no University Practical Examination and internal assessment marks secured in Practicals need not be sent to the University.

Scheme of Examination Theory
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NO PRACTICAL EXAMINATION

REFERENCE BOOKS
Pathology –
1. Culling Histopathology techniques
2. Bancroft Histopathology techniques
3. Koss – cytology
4. Winifred greg – Diagnostic cytopathology
5. Orell – Cyto Pathology
6. Todd & Sanford Clinical Diagnosis by laboratory method
7. Dacie & Lewis – Practical Haematology
8. Ramanic Sood, Laboratory Technology (Methods and interpretation)
4th Ed.
   J.P. Bros, New Delhi –1996)
9. Satish Gupta Short text book of Medical Laboratory for technician
   J.P. Bros, New Delhi – 1998
10. Sachdev K.N. Clinical Pathology and Bacteriology 8th Ed, J.P. Bros,

Syllabus for BSc. Allied Science Courses - RGHUS

**B.Sc Medical Laboratory Technology**

**Microbiology**

**Objective**: This course introduces the principles of Microbiology with emphasis on applied aspects of Microbiology of infectious diseases particularly in the following areas:
- Principles & practice of sterilization methods.
- Collection and despatch of specimens for routine microbiological investigations.
- Interpretation of commonly done bacteriological and serological investigations.
- Control of Hospital infections
- Biomedical waste management
- Immunization schedule

**Theory** - 70 hours

1. **Morphology**
   - Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria.
   - 4 hours

2. **Growth and nutrition**
   - Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.
   - 4 hours

3. **Sterilisation and Disinfection**
   - Principles and use of equipments of sterilization namely Hot Air oven, Autoclave and serum inspissrator. Pasteurization, Anti septic and disinfectants.
   - 4 hours

4. **Immunology**
   - Immunity Vaccines, Types of Vaccine and immunization schedule
   - Principles and interpretation of commonly done serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA. Rapid tests for HIV and HbsAg (Technical details to be avoided)
   - 6 hours

5. **Systematic Bacteriology**
   - Morphology, cultivation, diseases caused, laboratory diagnosis including specimen collection of the following bacteria (the classification, antigenic structure and pathogenicity are not to be taught)
   - 20 hours
   - Staphylococci, Streptococci, Pneumococci, Gonococci, Menigococci, C diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella, Esch coli, Klebsiella, Proteus, vibrio cholerae, Pseudomonas & Spirochetes

6. **Parasitology**
   - Morphology, life cycle, laboratory diagnosis of following parasites
   - 10 hours
E. histolytica, Plasmodium, Tape worms, Intestinal nematodes
7. Mycology 4 hours
   Morphology, diseases caused and lab diagnosis of following fungi.
   Candida, Cryptococcus, Dermatophytes, opportunistic fungi.
8. Virology 10 hours
   General properties of viruses, diseases caused, lab diagnosis and prevention of
   following viruses, Herpes, Hepatitis, HIV, Rabies and Poliomyelitis.
9. Hospital infection 4 hours
   Causative agents, transmission methods, investigation,
   prevention and control Hospital infection.
10. Principles and practice 4 hours
    Biomedical waste management

Practical 20 hours

Compound Microscope.
Demonstration and sterilization of equipments – Hot Air oven, Autoclave, Bacterial
filters.
Demonstration of commonly used culture media, Nutrient broth, Nutrient agar, Blood
agar, Chocolate agar, Mac conkey medium, LJ media, Robertson Cooked meat media,
Potassium tellurite media with growth, Mac with LF & NLF, NA with staph
Antibiotic susceptibility test
Demonstration of common serological tests – Widal, VRDL, ELISA.
Grams stain
Acid Fast staining
Stool exam for Helminthic ova
Visit to hospital for demonstration of Biomedical waste management.
Anaerobic culture methods.
Internal Assessment
Theory - Average of two exams conducted.  20
Practicals: Record & Lab work*  10
* There shall be no University Practical Examination and internal assessment marks
secured in Practicals need not be sent to the University.

Scheme of Examination

Theory
There shall be one theory paper of three hours duration carrying 80
marks. Distribution of type of questions and marks for Microbiology shall
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NO PRACTICAL EXAMINATION

REFERENCE BOOKS

Microbiology
1. Anathanarayana & Panikar Medical Microbiology
2. Roberty 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, 1st Ed, J P Bros, New Delhi – 199
7. Basic laboratory procedures in clinical bacteriology, 1st Ed, J P
   Brothers, New Delhi
8. Medical Parasitology – Ajit Damle
B.Sc Medical Laboratory Technology
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. 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
COURSE OUTLINE

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

BEHAVIOURAL OBJECTIVES:
The student at the end of training is able to
1. Read and comprehend english language
2. Speak and write grammatically correct english
3. Appreciates the value of English literature in personal and professional life.

UNIT - I: INTRODUCTION:
Study Techniques
Organisation of effective note taking and logical processes of analysis and synthesis
Use of the dictionary
Enlargement of vocabulary
Effective diction

UNIT - II: APPLIED GRAMMAR:
Correct usage
The structure of sentences
The structure of paragraphs
Enlargements of Vocabulary

UNIT - III: WRITTEN COMPOSITION:
Precise writing and summarising
Writing of bibliography
Enlargement of Vocabulary

UNIT - IV: READING AND COMPREHENSION:
Review of selected materials and express oneself in one's words.
Enlargement of Vocabulary.

UNIT - V: THE STUDY OF THE VARIOUS FORMS OF COMPOSITION:
Paragraph, Essay, Letter, Summary, Practice in writing

UNIT - VI: VERBAL COMMUNICATION:
Discussions and summarization, Debates, Oral reports, use in teaching

Scheme of Examination

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
BIO STATISTICS

Time Allotted: 20 Hours

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

Behavioural Objectives:
Understands statistical terms.
Possesses knowledge and skill in the use of basic statistical and research methodology.

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

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

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

Unit - IV : Measure of Variability
Need for measure of disperrion.
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 ratios of health.

Recommended Books.
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.
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.


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.

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.

Scheme of Examination for MEDICAL ELECTRONICS including COMPUTER APPLICATIONS

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

B.Sc Medical Laboratory Technology
2nd year
BIOCHEMISTRY II

THEORY
1. Blood chemistry (Its constituents)
2. Urine chemistry (Its constituents)
3. Biomolecules:
   a. Carbohydrate: Metabolism & disorder of carbohydrate
   b. Lipids: Metabolism & disorders lipids.
4. Vitamins: sources, functions, deficiency, requirements,
5. Enzymes – Introduction, Activation energy, classification, activity, specificity, kinetics v max, Km, Michaelis Menten equation
7. Photometry, spectrometry, turbidometry, flame photometry and atomic absorption spectroscopy.
8. MPNB - Urea, Uric Acid, Createnine of these importance
9. Nutrition
10. Special investigations
    Demonstration - Serum electrophoresis
    Immunoglobulins
    Drug estimation

PRACTICALS
1. Qualitative analysis of carbohydrates, proteins, amino acids.
2. Estimation blood sugar and Blood Urea
3. Quantitative test for urine glucose and GTT.
4. Qualitative screening test for normal and abnormal urine sample.
5. Estimation of non-protein nitrogenous compounds of blood: Blood urea, Creatinine, Creatinine clearance test (CCT)
6. Protein precipitation, dialysis and separation of proteins, electrophoresis of serum, CSF and urine proteins.

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

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No scheme of examination given for Practicals

B.Sc Medical Laboratory Technology
2nd year
MICROBIOLOGY II

Topics: Parasitology, Mycology and Virology

1. Introduction of Mycology. Terms & Classification.
2. Lab Diagnosis of Fungal Infections 2 Hrs.
3. Mycology 14 Hrs.
   a. Superficial Mycoses
      Malsezzia furfur, T.nigra, T.pidera
   b. Subcutaneous Mycoses
      i. Mycetoma
      ii. Rhinosporidium
      iii. Sporotrichosis
   c. Dermatophytes
   d. Systemic Mycoses
      i. Histoplasmosis
      ii. Blastomycosis
      iii. Coccidiodosis
      iv. Paracoccidiodosis
   e. Opportunistic Fungi
      1. Aspergillosis
      2. Penicilliosis
      3. Zygomyces
      4. Pneumocystis
      5. Mycotoxins

4. Parasitology
   1. Protozoology
      Entamoeba histolytica
      Balantidium coli
      Giardia
      Toxoplasma
      Malaria
      Leishmania
   2. Helminthology
      Cestodes - Taenia, Echinococcus, D. latum, H.nana
      Trematodes - Schistosoma, Fasciola
      Nematodes – Ascaris, hookworm, Strongyloides, Trichuris, Trichinella, Dracunculus,
      Filarial worms

5. Virology - General properties of virus, cultivation of viruses, Pox viruses, Herpes viruses,
   Adenoviruses, Picornaviruses, Orthomyxovirus, Parainfluenza viruses, Rhabdoviruses,
   Hepatitis viruses, Oncogenic viruses, HIV, Parvovirus, Viral haemorrhagic fevers, SARS,
   Rotavirus, Norwalk virus, Astrovirus, Coronavirus

PRACTICALS for II year:

   **Parasitology:**
   1. Stool examination
      a. Saline mount
      b. Iodine mount

   **Mycology:**
   1. Slide culture technique
   2. KOH mount
   3. Identification of fungal cultures
      a. Colony characteristics and Microscopic examination of Candida, Cryptococcus,
         Trichophyton, Microsporum, Aspergillus niger, Asp fumigatus, Rhizopus, Fusarium,
         Penicillium.

   **Virology**
   2. Demonstration of embryonated egg inoculation
   3. Virology exercise:
      a. Spots test, ELISA (HBv, HCV, HIV), HI, PAUL BUNNEL test

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

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**Scheme of Examination Practical**
The scheme of examination for *Microbiology II Practical* shall be as follows:

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<td>Spotters</td>
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<td>Mycology</td>
<td>15</td>
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<tr>
<td>Virology Test</td>
<td>15</td>
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<tr>
<td>Virology Applied Exercise</td>
<td>15</td>
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<tr>
<td>Stool Examination</td>
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**B.Sc Medical Laboratory Technology**

2nd year
PATHOLOGY II

**Theory:**

Histopathology and Hematology

**Histopathology**

Instrumentation : (a) Automated Tissue Processor
(b) Microtomes, Knives, Knife sharpeners
and Ultramicrotome
© Freezing microtome and Cryostat
(d) Automatic slide stainer

Techniques : (a) Routine paraffin section cutting
(b) Frozen section and Cryostat section studies
Staining techniques: Special stains for Carbohydrates, Connective tissue, Nervous tissue, Bone tissue, Collage fibers, Elastic Fibers, Lipids, Organisms, fungi, parasites, pigments and deposits in tissues

Mounting techniques: Various mounts and mounting techniques

Electron Microscope, Scanning electron microscope, Dark ground and Fluorescent microscope

Museum technology

Microphotography and its applications

Maintenance of records and filing of slides

ICDS Classification and coding

Application of computers in Pathology

**Hematology**

Hemopoiesis, Stem cells, formed elements and their functions

Anticoagulants used in various hematological studies

Routine hematological tests and normal values:
(a) Determination of Hemoglobin and Hematocrit
(b) Enumeration of RBC, WBC & Platelets
(c) Absolute Eosinophil count
(d) Reticulocyte count
(e) Calculation of Red cell Indices
(f) Preparation of staining of blood film for morphology of red cells and differential count

Special Hematological tests:

(a) Sickling tests
(b) Osmotic fragility test
(c) Determination HbF and HbA2
(d) Hemoglobin Electrophoresis
(e) Investigation of G6PD deficiency
(f) Plasma haptoglobin and demonstration of hemosiderin in urine
(g) Tests for Autoimmune hemolytic anemia
(h) Measurement of abnormal Hb pigments
Hemostasis and Coagulation

(a) Normal hemostasis, mechanism of blood coagulation and normal fibrinolytic system
(b) Collection of blood and anticoagulants used in coagulation studies
(c) Investigation of hemostatic mechanism-BT, CT, whole blood coagulation time test, PT, PTT
(d) Assay of clotting factors
(e) Tests for fibrinolytic activity- Euglobulin, clot lysis test and FDP
(f) Platelet function tests

Investigation of Megaloblastic anemia and Iron deficiency anemia

(a) B12 and Folate assay and Schilling test
(b) Estimation of serum iron and iron binding capacity

Bone marrow biopsy study

(a) Needle aspiration and surgical biopsy technique
(b) Preparation of smears and staining

Demonstration of LE cells

Cytochemistry

Administration in Hematology and Quality control

Practicals:

1. Paraffin section cutting
2. Staining by Hematoxylin & Eosin and other special stains
3. Determination of Hemoglobin and Hematocrit
4. Red blood cell count
5. Total white blood cell count
6. Platelet count
7. Differential count of white blood cells
8. Absolute Eosinophil count
9. Reticulocyte count
10. Calculation of red cell indices
11. Determination of ESR
12. Determination of BT, CT, Whole blood clotting time
13. Determination of PT and PTT
14. Blood smear preparation and staining
15. Osmotic fragility test
16. Sickling test
17. LE cell preparation

**Scheme of Examination Theory**

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

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**Scheme of Examination Practical**

*B.Sc Medical Laboratory Technology*

3rd year

**BIOCHEMISTRY III**

SYLLUBUS FOR BMLT III YEAR

**THEORY**

1. Liver Function tests. Role of the Liver in metabolism, formation of bilirubin and mode of excretion.
2. Gastric Analysis: Composition of gastric juice, concepts of free and bound acids, gastric acid secretions stimulations.
3. Renal function, Renal function test and renal clearance test.
5. Acid – Base balance and its disturbances.
6. Inorganic ions: Calcium metabolism, phosphate metabolism, sodium-potassium balance and trace element (Fe, CU).
7. Metabolism of proteins and amino acids.
8. Overview & replication, translation, transcription and genetic engineering.
9. Metabolic disorders:
   a. Amino acids
   b. Proteins
   c. Inborn errors of metabolic disorders.
12. Immunoassay: Different methods, principle and applications.

**PRACTICALS:**

Comment: To be provided
1. Specimen Collections: Urine, Blood, Gastric juice,
3. Enzymes: amylase (salivary and Pancreatic), Alkaline Phosphatase, Acid Phosphatase, SGOT, SGPT, LDH and CPK- demonstration on auto analyzer.
4. Liver function tests: estimation of Bilirubin – total and conjugates, Urobilinogen,
5. Gastric analysis: Determination of free and total acid, gastric stimulation.
8. Analysis of calculi
9. Urine – screening for inborn errors of metabolism
10. RFT
11. Cardiac markers
   (Relevant charts on the above topics for interpretation and diagnosis)

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

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**Scheme of Examination Practical**

**B.Sc Medical Laboratory Technology**

3RD year

MICROBIOLOGY III

**IMMUNOLOGY**

01. Infection 2hrs
02. Immunity 4 Hrs.
   A. Innate immunity
   B. Acquired immunity (adaptive immunity)
   C. Active and passive immunity
      1. Natural acquired active immunity
      2. Artificial acquired active immunity
      3. Natural acquired passive immunity - Breast feeding
      4. Artificial acquired passive immunity
03. Immune System
A. 1. Cell development
   2. B lymphocytes (general knowledge of their role)
      a. Bursa of Fabricius
      b. Stem cell differentiation
      c. Gut-associated lymphoid tissue (GALT)
   3. T lymphocytes
      a. Stem cell differentiation (general knowledge of their role)
      b. Cytotoxic T (T_c) cells
      c. Delayed-type hypersensitivity T (T_d) cells
      d. Helper T (T_h) cells
      e. Suppressor T (T_s) cells
   4. Natural killer cells

B. Dual nature of the immune system
   i. Humoral immunity
   ii. Cell-mediated immunity

C. General properties of immune responses
   1. Recognition of self versus nonself
      a. Clonal selection theory B-cells
      b. Tolerance
      c. Clonal deletion
   2. Specificity
      a. Definition
      b. Cross-reactions
   3. Heterogeneity
   4. Memory
      a. Memory cells
      b. Anamnestic response

04. Humoral Immunity
    General characteristics
    1. Antigen types
    2. Antigen sensitization
    3. Plasma cells

05. Antigen & Antibody 04 Hrs.
    1. Antigens
    2. Epitopes (antigenic determinants)
    3. Hapten
    4. Antibodies consequences of antibody binding
    5. Titer

06. Immune Response
    A. Properties of Antibodies (immunoglobulins)*
       1. Light chains *
       2. Heavy chains*
       3. Constant and variable regions*
       4. Antigen binding sites*
       5. Fab and Fc regions *
    B. Classes of immunoglobulins*
       1. IgG*
       2. IgM*
       3. IgA*
          a. J chain
          b. Secretory piece
       4. IgE*
       5. IgD*
       6. Antibody titer
C. Primary and secondary responses *
   1. Primary response*
   2. Secondary response*

D. Kinds of antigen-antibody responses *

E. How humoral responses eliminate foreign antigens *
   1. Basic mechanisms*
      a. Agglutination*
      b. Opsonization*
      c. Activation of complement* Do not worry about the detailed mechanism of complement. Know that it makes a membrane attack complex and what that is.
      d. Neutralization
   2. Summary of humoral immunity

07. Monoclonal Antibodies
   A. Production
      1. Hybridoma formation *
      2. Cloning of cells
   B. Uses*
      1. Research tools*
      2. Diagnostic uses*
      3. Therapy*

08. Cell-Mediated Immunity *
   A. General characteristics*
   B. The cell-mediated immune reactions
      1. Antigen processing
      2. Helper T (T\textsubscript{H}) cells
         a. T\textsubscript{H1} (inflammatory T) cells
         b. T\textsubscript{H2} cells
      3. Suppressor T (T\textsubscript{S}) cells
      5. Cytotoxic (killer) T (T\textsubscript{C}) cells
      6. Natural killer (NK) cells
      7. Memory T cells
      8. Lymphokine release
   C. Superantigens

09. Factors That Modify Immune Responses
   A. Compromised host
   B. Modifying factors
      1. Age
      2. Stress
      3. Diet
      4. Exercise
      5. Injuries
      6. Environmental factors

10. Hypersensitivity reactions
11. Autoimmune disorders
12. Transplantation immunology
    Disk diffusion and Dilution  3 Hrs.
14. Bacteriology of Water, Milk and Air 5 Hrs.

15. Systematic Bacteriology 75 Hrs.
    Classification, Morphology, Genotypic & Phenotypic characteristics, Pathogenesis, Disease caused,
    Lab Diagnosis & Prophylaxis
    A. Gram Positive Bacteria
i. Staphylococcus
ii. Streptococcus
iii. Pneumococcus
iv. Corynebacteria
v. Clostridia
vi. Bacillus
vii. Listeria
viii. Actinomycetes
ix. Nocardia

B. Gram Negative Bacteria
   i. Neisseria
   ii. Enterobacteriaceae
   iii. Escherichia
   iv. Klebsiella
   v. Enterobacter
   vi. Proteus
   vii. Salmonella
   viii. Shigella
   ix. Yersinia
   x. Pseudomonas
   xi. Haemophilus
   xii. Brucella
   xiii. Pasteurella
   xiv. Legionella
   xv. Bordetella
   xvi. Burkholderia
   xvii. Gardnerella
   xviii. Vibrio
   xix. Campylobacter
   xx. Helicobacter
   xxi. Bacteroides
   xxi. Fusobacterium

C. Spirochetes
   i. Treponema
   ii. Borrelia
   iii. Leptospira

D. Mycobacteria
   i. M. tuberculosis
   ii. M. leprae
   iii. Atypical Mycobacteria

E. Mycoplasma
F. Chlamydiae
G. Rickettsiae
H. Applied microbiology - Diseases.
I. Molecular techniques in diagnostic microbiology - PCR, DNA hybridisation

Desirable to know: (There will be no main questions or short notes from this portion. One paper may have only one question under short answers i.e. 3 marks)
a. Erysipelothrix
b. Propionibacteria
2. Rhodococcus
3. Tropheryma
4. Moraxella
5. Serrata
6. Stenotrophomonas
7. Acinetobacter
8. Streptobacillus
9. Parvobacteria

PRACTICALS FOR 3RD YEAR

BACTERIOLOGY
1. Staining-
   a. Grams staining
   b. ZN staining
   c. Alberts staining
2. Hanging drop preparation
3. Culture methods
4. Introduction to biochemical reactions
5. Identification of bacterial culture
   a. Colony characteristics
   b. Morphological characteristics
   c. Motility study
   d. Interpretation of biochemical reactions
6. Antibiotic sensitivity testing- Kirby Bauer method
1. Applied bacteriology- exercise
8. Immunology: Serological tests:
   a. Specimen collection
   b. Principle
   c. Methods.
   d. Procedure
   e. Normal values/ Significant titer
   f. Interpretations
   g. Limitations : of all the following tests
      i Widal
      ii ASO
      iii CRP
      iv RPR/VDRL/TRUST
      v RA
      vi HBsAg /anti HIV detection
      vii ELISA

Scheme of Examination Theory
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Scheme of Examination *Practical*

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<tr>
<td>ZN Staining</td>
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<tr>
<td>Bacteriology Identification</td>
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<tr>
<td>Organism one</td>
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<tr>
<td>Organism two</td>
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<tr>
<td>Serology</td>
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<tr>
<td>Test one</td>
<td>10</td>
</tr>
<tr>
<td>Test two</td>
<td>10</td>
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<tr>
<td>Spotters</td>
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<td>Record</td>
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B.Sc Medical Laboratory Technology

3\textsuperscript{RD} year

PATHOLOGY III

Cytology, Automation in cytology, Cytogenetics, Cytochemistry
Immunohematology and Blood transfusion

**Cytology**

1. Normal cell structure, functions, cytologic criteria of malignancy
2. Types of specimens, methods of collection & preparation of cell block
3. Different fixatives and methods of fixation
4. Staining: (a) Papanicoloau’s stain- principle, preparation
   and staining techniques
   (c) May Grunwald Giemsa stain
   (d) Shorr’s stain
   (e) Aceto orcin stain

**Female Genital tract**

1. Anatomy, Histology, Physiology & normal cytology
2. Techniques of collection of specimen for cervical cytology study
3. Hormonal cytology and cytological indices
4. Cervical cytology screening for malignant and nonmalignant conditions, Radiation changes & follow up
5. Cytology of Endometrium – normal, nonmalignant and in malignant conditions
6. Cytology in Ovarian cancers

Respiratory tract, Gastrointestinal tract and Urinary tract

1. Anatomy, Histology and Physiology
2. Collection of sample, preparation of smears and staining
3. Cytology of normal, nonmalignant & malignant conditions

C S F and Effusions

1. Cytology of CSF in inflammatory, nonmalignant & malignant Conditions
2. Cytology of effusions in nonmalignant and malignant conditions

Glands – Breast, Thyroid, Salivary glands and Lymph nodes

1. Anatomy, Histology and Physiology
2. Fine needle aspiration cytology of glands and other soft tissue mass
3. Cytologic features in nonmalignant and malignant conditions of different glands and nipple discharges

Automation in Cytology

1. Flow cytometry
2. Image Analysis
3. Principles, Equipments, procedures & Evaluation

**Tissue culture and Immunohistochemistry**

1. Equipments for Tissue culture studies
   (a) Laminar air flow equipment
   (b) Carbon dioxide incubator
   (c) Inverted microscope

2. Derivation of culture from tissue
   (a) Enzymatic digestion of tissue using collaginase, protease
   (b) Plating in tissue culture media
   (c) Observation of cells in Invertoscope
   (d) Subculturing & derivation of cell lines
3. Characterization of cell lines
   (a) Determination of biochemical markers in cells
   (b) Chromosomal & DNA content of cells
   (c) Immunological properties of cells
4. Preservation of Immortalized cell lines
   (a) Storage in Glycerol in Liquid Nitrogen
   (b) Storage in Dimethyl sulfoxide in Liquid Nitrogen

Cytogenetics

1. Introduction to cytogenetics, terminology, classification and nomenclature of human chromosomes
2. Methods of karyotypic analysis
   (a) Culture of bone marrow cells, peripheral blood lymphocytes, solid tumors & skin fibroblasts
   (c) Direct preparation from tumor materials
3. Characterization of human chromosomes by various banding techniques
4. Sex chromatin identification
5. Chromosomes in neoplasia and oncogenes

Immunocytochemistry

1. Basics concepts, monoclonal antibodies & preparation
2. Fluorescence reactions

Immunohematology and Blood transfusion

1. ABO Blood group and Rh system
2. Subgroups of A and B, Other blood groups and Bombay group
3. HLA antigens and their significance
4. Principles of Blood transfusion:
   (a) Blood donor selection
   (b) Methods of bleeding donors
   (c) Blood containers, anticoagulants and storage of blood
   (d) Coomb’s test and its significance
   (e) Screening of blood for infective material
   (f) Blood components, preparation & component therapy
   (g) Autologous transfusion
   (h) Transfusion reactions and work up
   (i) Blood bank organization, standards, procedures, techniques and quality control
Practicals

1. Preparation of various cytology smears and fixation
2. Papanicoloau’s and May Grunwald Geimsa staining
3. Hormonal cytology study
4. Blood grouping and Rh typing
5. Cross matching techniques
6. Screening of Donor’s blood for infective agents
7. Transfusion reaction work up
8. Preparation of blood components

**Scheme of Examination Theory**

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

<table>
<thead>
<tr>
<th>Type of Questions</th>
<th>No. of Questions</th>
<th>Marks</th>
<th>Sub-total</th>
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<tr>
<td>Long Essay (LE)</td>
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<tr>
<td>Short Essay (SE)</td>
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<tr>
<td>Short Answer (SA)</td>
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**Scheme of Examination Practical**

- Comment: Yet to be provided