

# **SRI BALAJI VIDYAPEETH**

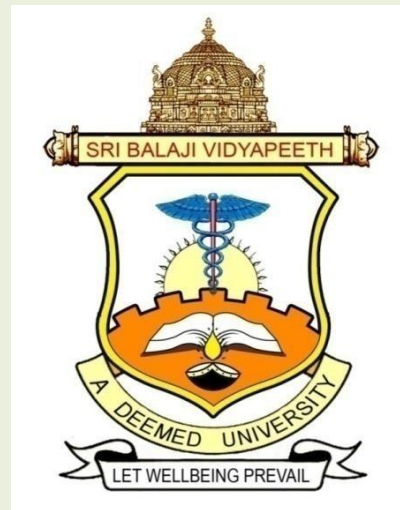
(Deemed to be University Declared u/s 3 of UGC act 1956)

Accredited by NAAC with 'A++' Grade

Pondicherry - 607 402.

[www.sbvu.ac.in](http://www.sbvu.ac.in)

**MAHATMA GANDHI MEDICAL COLLEGE & RESEARCH INSTITUTE,  
PONDICHERRY**



**SCHOOL OF ALLIED HEALTH SCIENCES**

**M.Sc. MLT PATHOLOGY**

**2022 -23 ONWARDS**

**CHOICE BASED CREDIT SYSTEM (CBCS)**

**(As approved in the Academic Council at the meeting held on 18-07-2022)**

<b>SL.NO</b>	<b>SUBJECT</b>	<b>PAGE NO</b>
1.	Preamble	2
2.	Outline of the choice Based Credit System (CBCS) for Post graduate Degree Programme	5
3.	Criteria for University Examinations	6
4.	I Year Scheme of Examination	10
5.	II Year Scheme of Examination	11
6.	Syllabus-I Year	12
7.	Discipline Specific Elective Course	24
8.	Syllabus- II Year	32
9.	Skill based Elective Course	46

# **POLICY ON COURSES OFFERED UNDER FACULTY OF ALLIED HEALTH SCIENCES**

## **PREAMBLE**

Sri Balaji Vidyapeeth, Deemed to be University, established under Section 3 of UGC Act, 1956, Accredited by NAAC with A Grade offers various courses under the Faculty of Medicine, Faculty of Dentistry, Faculty of Nursing Sciences and Faculty of Allied Health Sciences.

"Allied Health Professions are a distinct group of health professionals who apply their expertise to prevent disease transmission, diagnose, treat and rehabilitate people of all ages and all specialties. Together with a range of technical and support staff they may deliver direct patient care, rehabilitation, treatment, diagnostics and health improvement interventions to restore and maintain optimal physical, sensory, psychological, cognitive and social functions." - Organization of International Chief Health Professions Officers (ICHPO).

In March 2011, the Ministry of Health and Family Welfare nominated the Public Health Foundation of India (PHFI) as its technical partner and constituted the National Initiative for Allied Health Sciences (NIAHS) secretariat with a mandate to develop a framework to improve allied health training, education and regulation in the country. (Yet to be notified by Government of India).

Sri Balaji Vidyapeeth has introduced several innovative need based courses under the Faculty of Allied Health Sciences at Undergraduate and Postgraduate levels keeping in mind the initiative of Ministry of Health & Family Welfare, Government of India. In an era marked by expanding global job opportunities, these courses are bound to create an awareness among the students to suit themselves in the Health Care Team. Curricula have been designed in an objective manner and are aimed at cognitive, affective and psychomotor domains of learning. Furthermore all courses are designed in Choice Based Credit System (CBCS) made to suit the convenience of the students. The Undergraduate courses mainly concentrate in creating professionals who form the part of the Health Care Team. The role of these professional is to ably assist the doctor in treatment as well as prognosis and in many a times form the core professional of the team. The proficiency and competence of the Undergraduates is fortified by the promulgation of a unique internship cum research programme.

The Postgraduate courses mainly aim at shaping a graduate into a full professional. Also these postgraduate courses help the graduates as well as the postgraduates to acquire specific skills on various adjunct therapies and techniques

## **POLICY ON ELIGIBILITY, ADMISSION, & COURSE DURATION OF PG COURSES**

At Sri Balaji Vidyapeeth, we empower the departments of all the constituent colleges to contribute to the development of innovative, need, value based and job oriented courses taking into considerations the interests of the stake holders.

**The Post graduate courses (PG)** are presently being offered under the Choice Based Credit System (CBCS) mode as per the Guidelines of UGC. The duration of the course will be two years. 80 percent of attendance is mandatory for appearing at the University Examinations. The students should also complete a short duration project (in their areas of interest) and also maintain and submit a log book. The maximum time limit for completion of the course will be four years. However, the Dean / Principal, AHS has the discretionary powers to extend the course duration on valid grounds (Health, Maternity, Natural Disaster, etc.).

### **Eligibility for Admission**

A candidate seeking admission in the M.Sc. Medical Imaging Technology Programme shall be completing the **B.Sc. (MLT) degree from any University/ Institute recognized by UGC with 50%mark**

### **PAYMENT OF TUITION AND OTHER FEES**

Every student shall pay tuition fee and other fee, as prescribed by the University, within the due date notified. The fees are subject to revision as per rules of the University. All fees, once paid to the University, will not be refunded or adjusted for any other purpose under any circumstance.

### **PROGRAMME OBJECTIVES:**

At the end of the course the candidates must be able to:

- Acquire the knowledge and apply the concepts, theories and principles of laboratory science in their profession.
- To bring about an effective change in the laboratory practice and health care delivery system.
- Establish collaborative relationship with members of other disciplines.
- Demonstrate interest in continued learning and research for personal and professional advancement

### **CAREER PROSPECTS / PLACEMENT OPPORTUNITIES:**

Academics, R & D, Health care set up, corporate organization, Independent practice.

### **SCOPE:**

This post Graduate programme in MLT pathology gives an opportunity for specialized study in the field MLT for training B.Sc. (MLT) students. Candidates who successfully complete M.Sc. (MIT) course may be placed as :

I. The specialization in pathology requires an advanced knowledge of anatomy, histology, histopathology, cytology, haematology, clinical pathology and blood banking inclusive of special pathological techniques and use of sophisticated equipment.

II. Teachers in training institutes of MLT pathology

III. Application Specialist in company

**Other salient feature:**

1. To possess an in-depth understanding of the fundamentals and principles of various sections of Pathology including blood bank
2. To be able to perform routine pathological investigations
3. To be able to do screening tests for all the haematological, histopathological and cytological diseases
4. To establish a modern pathology laboratory and to manage the laboratory with organizational skills
5. To perform the quality control of laboratory tests in Pathology
6. To know a full working knowledge about the functioning and performance of all the automated instruments of Haematology, Histopathology, Cytology and Blood Banking.

## OUTLINE OF THE CHOICE BASED CREDIT SYSTEM (CBCS) FOR POST GRADUATE DIPLOMA PROGRAMME

**Credit System Credit System (CBCS):** The CBCS provides choice for students to select from the prescribed courses (Hard core courses (core course) and Soft core courses (elective courses)). This is to enhance the quality and mobility of the students within and between the Universities in the country and abroad.

### Credit hours

15 Theory classes = 1 credit

30 Practical/Tutorial/Clinical training/Research project = 1 credit

Subjects	Credits
Each core subjects	4 Credits
Skill Enhancement course (SEC)	3 Credits
Generic Elective course ( GEC)	3 Credits
Discipline Specific Electives (DSE)	3 Credits

**Courses:** The courses offered under this Programme of Study are represented as Hard Core courses (core course) and Soft Core courses (elective course).

**a) Hard core course (core course):** A Hard core course may be a Theory, Practical, clinical rotation/field work or Research Project Work which are compulsory component studied by candidate to complete the requirement of their programme.

**b) Soft Core or Elective Course:** Soft core Course may be Theory, Practical, field work, clinical rotation or Research Project Work which can be chosen from the list of courses offered by the department/CBCS under SBV/national centre for a particular programme of a study. Soft Course may be supportive to their discipline of study or providing an expanded scope or exposure to multiple disciplines of study to nurture the candidate's proficiency/skill.

**i) Discipline Specific Elective (DSE) Course:** An elective course which is supportive or related to the discipline/subject (i.e. supportive to hard core course) is called a Discipline Specific Elective (DSE) Course.

**ii) Generic Elective (GE) Course:** An elective course which is unrelated to the discipline/subject (i.e. unrelated to hard core course) to expand their knowledge chosen by a candidate is called a Generic Elective.

**iii) Skill Enhancement Courses (SEC):** This course chosen by candidate which provides additional value-based and skill-based knowledge to increase their employability.

# CRITERIA FOR UNIVERSITY EXAMINATIONS ON COURSES OFFERED UNDER FACULTY OF ALLIED HEALTH SCIENCES

## SCHEME OF EXAMINATION

1) **Attendance Requirements:** 80% hours of learning in each Core Subjects / Electives / Practical's /clinical rotation/Postings for appearing for the university exams.

2) **Minimum marks required to be eligible for University Examination:** 50% marks in the internal assessment (Theory / Practical) are required for the candidate to be eligible to appear in the University Examinations.

3) **Passing Minimum:** 50% aggregate both in theory and practical's including internal assessment marks is required for a candidate to pass in the University Examinations.

### 4) Submission of Project and Record Note Books for practical examinations

Candidates appearing for practical examinations should submit bonafide Record Note Books and Project prescribed for practical examinations, otherwise the candidates shall not be permitted to appear for the practical examinations.

## GRADING

Marks obtained by candidate	Equivalent grade letter	Grade descriptor	Grade point
85 % & above	O	Outstanding	10
75-84	A+	Excellent	9
65-74	A	Very good	8
60-64	B+	Good	7
55-59	B	Above average	6
50-54	C	Average pass	5
49 & below	F	Reappear	0
	AB	Absent	0

A student obtaining **Grade F** shall be considered failed and will be required to reappear in the examination.

## **Conversion formula for Percentage to CGPA**

Percentage divided by 9.5 = CGPA

## **Award of Class**

Class division will be based on CGPA grade

≥ 7.8 grade point = Distinction Division

≥ 6.8 and < 7.7 grade point = First class Division

≥ 6.3 and < 6.7 grade point = Second class Division

≥ 5.2 and < 6.2 grade point = Third class Division

< 5.2 and below - Fail

**Cumulative Grade Point Average (CGPA):** It is a measure of overall cumulative performance of a student over all exams. The CGPA is the ratio of total credit points secured by a student in various courses in all exams and the sum of the total credits of all courses in all the University exams. It is expressed up to two decimal places.

**Grade Point:** It is a numerical weight allotted to each letter grade on a 9.5 point scale.

**Transcript:** Based on the credits earned, a transcript shall be issued to all the registered students after the completion of the program indicating the hours of study and structure of the curriculum delivery as prescribed in his/her curriculum and completed by the student. The transcript will display the course details, including course code, title, and number of credits, hours and type of contact hours in a non-semester.

## **INTERNAL ASSESSMENT**

- Continuous Internal Assessment (CIA) for all AHS programs with a minimum of 4 Assessments per year.
- Internal Assessment will be done in each subject according to the scheme of examinations. The IA marks will be on the basis of performance in the assignment, class tests and practical test in the clinical areas.

## **Evaluation of Clinical Rotation**

Clinical rotation/postings - To conduct practical's or viva based on the Heads of the concerned department's decision and the total 100 marks to be sent to COE through proper channel to find a place in the transcript.

## **Question Paper Pattern**

The following question paper patterns shall be followed for CBCS pattern syllabi for the candidates admitted from the academic year 2022-23 onwards.



## CORE SUBJECTS

For **POST GRADUATE DEGREE NON-SEMESTER PROGRAMME** - Each Core Subjects University Exam carries -100 marks of 80(Theory) + 20 (IA marks) which consists of

Theory - 80 marks			
I	Short Essay questions	10 ( *2 choice)	8 x 10=80

The University duration of 80 marks - 3 Hours

## ELECTIVE SUBJECTS

For all UG/PG/DIPLOMA NON SEMESTER **COMPULSORY, GENERIC & DISCIPLINE** Elective University Exam papers carries- 50 marks of 40 (Theory)+10 (IA marks) which consists of

Theory - 40 marks			
I	Short Essay questions	5 ( *1 choice)	4 x 10=40

### \* Number of choices given

For **SKILL BASED ELECTIVES** from 2022-23 batch onwards all UG/PG/DIPLOMA AHS courses will have 40 marks as university Practical cum Viva examination & 10 marks as Internal Assessment = 50 marks.

50 marks of the **COMPULSORY, GENERIC, DISCIPLINE & SKILL BASED ELECTIVES** which will be converted to 100 marks in the transcript.

## CONDONATION FOR SHORTAGE OF ATTENDANCE

Condonation of shortage of attendance in aggregate up to 10% in each Year may be granted by the college Academic Committee and as per regulations of university.

**RESEARCH PROJECT:** Candidates should carry out individual projects only. Research Project shall be allotted at the beginning of the first year. Faculty members of the respective colleges must serve as guides and Co- guides from the other institutions may be allowed. Research Project work in **THREE** copies have to be submitted to university 30 days before the actual schedule of the exam. Research Project report evaluation will be done and Viva-voce will be conducted by both the external and internal examiners during university practical examination for 50 marks

Components	Marks (50)
Research Project	30
Viva	20
Total	50

**Examiners: 2 Internal, 2 external**

External examiner should be a regular teaching faculty of any medical college with either a MD (Pathologist) or MSc., PhD., (MLT) and should be Associate Professor and above.

Theory paper will be evaluated by both external and internal examiners.

**Question paper setters:** should be a regular teaching faculty of any recognized medical college with either a MD degree or M.Sc., PhD., ( Pathologist).

**Practical Duration:** Two days.

**COURSE STRUCTURE AND EXAMINATION SCHEME**

**FIRST YEAR M.SC. MLT PATHOLOGY**

S. No	Course code	Category	Course Title	Hours / Non-Sem	Credit	University Marks	IA marks	Total marks
1	Hard core	Core theory- 1	Basic haematology and blood banking.	60	4	80	20	100
2		Core theory- 2	Basic Histopathology, Laboratory organization in pathology.	60	4	80	20	100
		Core theory- 3	Basic Cytology and clinical pathology	60	4	80	20	100
3		Core Lab-1	Haematology	120	4	80	20	100
		CoreLab-2	Histopathology	120	4	80	20	100
		Core Lab-3	Cytology	120	4	80	20	100
4		Clinical Rotation	Clinical Rotation(Clinical Laboratory)	300	10	-	100	100
5	Soft core/elective course	Discipline specific elective course	DSEC-01- Research Methodology and biostatistics	45	3	40	10	50
6		Generic elective course(to choose anyone)	GEC-01- Environmental Sciences	45	3	40	10	50
			GEC-02-Basics of Hospital Administration					
GEC-03- Lifestyledisorders								
Total				930	40	560	340	800

Total Credit for one year duration= 40 Credits

**COURSE STRUCTURE AND EXAMINATION SCHEME**

**SECOND YEAR M.SC.MLT PATHOLOGY**

S. No	Course code	Category	Course Title	Hrs/ non-Sem	Credit	University Marks	IA marks	Total marks
1	Hard core	Core theory paper -4	Advanced Haematology, Advanced Instrumentation and Automation	60	4	80	20	100
2		Core theory paper- 5	Advanced Histopathology	60	4	80	20	100
		Core theory paper- 6	Advanced Cytology	60	4	80	20	100
		Core Lab - 4	Haematology	120	4	80	20	100
3		CoreLab-5	Histology	120	4	80	20	100
		CoreLab-6	Cytology	120	4	80	20	100
4		Clinical Rotation	Clinical Rotation (Clinical Laboratory)	150	5	-	100	100
5		Research Project		150	5	50(30+20 viva)	-	50
6		Soft core/elective course	Discipline specific elective course	DSEC-02- Biomedical Waste Management	45	3	40	10
7	Skill enhancement elective course (to choose any one)		SEC- 01- Basic life support	45	3	40	10	50
			SEC- 02-English for clinical communication					
		GEC- 03- Basics of yoga and practice						
Total				930	40	610	240	850

**Total Credit for two years duration= 40 Credits**

**SYLLABUS**  
**FIRST YEAR M.Sc. MLT PATHOLOGY**  
**CORE THEORY PAPER I: BASIC HAEMATOLOGY AND BLOOD BANKING**

S.NO	TOPICS	TOTAL HOURS(60)
I	<b>Basic haematology</b> <ul style="list-style-type: none"> <li>• General aspects of blood cell formation - Sites of haemopoiesis. Development of blood cells. Morphology and Regulation of haematopoiesis</li> </ul>	6 hours
II	<b>Anemia</b> <ul style="list-style-type: none"> <li>• Red blood cells - Basic aspects of anaemia, definition, pathophysiology - classification and clinical features - Investigation of a case of anaemia in general.</li> <li>• Normocytic normochronic anaemia: Anaemia in systemic disorders Acute blood loss, Renal failure</li> <li>• Liver disorders etc.</li> <li>• Microcytic hypochromic anaemias: Iron deficiency anemia, Sideroblastic anemia, Anaemia of Disease.</li> <li>• Macrocytic Anaemias: Megaloblastic, Non megaloblastic.</li> <li>• Megaloblastic anaemia - Etiology, clinical features, laboratory investigation. Pernicious anaemia.</li> </ul>	14 hours
III	<b>Haemoglobinopathies And Clinical investigation</b> <ul style="list-style-type: none"> <li>• Disorders of Haemoglobin Structure of Hb and Synthesis : Normal and Abnormal haemoglobins, Haemoglobinopathies and Thalassemias.</li> <li>• Haemolytic anaemia: Definition, pathogenesis, classification, clinical features. Laboratory investigations (screening tests) to establish a case of haemolytic anaemia. Tests done -               <ol style="list-style-type: none"> <li>a. Peripheral smear - specific morphologic abnormalities</li> <li>b. Osmotic fragility test</li> <li>c. Sickling phenomenon</li> <li>d. Kleihauer acid Elution test</li> <li>e. Alkali denaturation test</li> <li>f. Test for G6PD deficiency                   <ul style="list-style-type: none"> <li>• Aplastic anaemia - Clinical features, peripheral blood and marrow findings</li> </ul> </li> </ol> </li> </ul>	14 hours
IV	<b>Leukocyte Disorders</b> <ul style="list-style-type: none"> <li>• Leucocytosis - causes, Leukaemoid reaction - causes,</li> </ul>	10 hours

	<p>laboratory tests, Leukaemias: Definition, classification - FAB &amp;WHO- classification of acute leukaemias, Diagnostic criteria, Cytochemical staining</p> <ul style="list-style-type: none"> <li>• Buffy coat preparation - uses and indications.</li> </ul> <p><b>Automation in haematology:</b></p> <ul style="list-style-type: none"> <li>• Various types of Cell counters - Automated ESR</li> </ul>	
V	<p><b>Blood Banking</b></p> <ul style="list-style-type: none"> <li>• History of Transfusion Medicine</li> <li>• Blood group systems-ABO and Rh system in details; other blood grouping system</li> <li>• Indications for blood transfusion</li> <li>• Blood donation, Donor registration, Donor selection, Blood collection. Adverse donor reaction</li> <li>• Anticoagulants used to store blood, Changes occurring in the stored blood</li> <li>• Blood grouping -Forward and reverse</li> <li>• Coomb's test - Application - DCT, ICT, Rh antibody titre</li> <li>• Compatibility testing - Major and Minor cross match</li> <li>• Blood components - Indications, preparation of blood components</li> <li>• Autologous transfusion</li> <li>• Transfusion transmitted disease</li> <li>• Haemolytic disease of the new born and exchange transfusion</li> <li>• Transfusion reactions and Investigation of transfusion reaction</li> <li>• Haemapheresis - Definition,Types of apheresis,Machines and Techniques.</li> </ul> <p>Biomedical waste management in hematology.</p>	16 hours

## Reference

- Robbins Basic Pathology (Robbins Pathology)- Basic of pathology.
- Pathoma 2021, by Husain A Sattar- Fundamentals of pathology.

**MODEL QUESTION PAPER  
M.SC MLT PATHOLOGY**

**CORE THEORY PAPER: PAPER -1 (BASIC HEMATOLOGY AND BLOOD BANKING)**

**Time: 3 Hours**

**Maximum Marks: 80**

**Illustrate your answers with suitable diagrams where ever necessary. Each question carries 10 marks Total = 80 marks, write any 8 questions.**

1. Discuss in detail the mechanism of erythropoiesis and the factors regulating erythropoiesis. (5+5)
2. Describe different morphologic patterns of anemia and enlist the causes for microcytic hypochromic anemia. Add a note on the laboratory workup of Iron deficiency anemia. (3+3+4)
3. Define hemoglobinopathy. Discuss the genetic defect in Sickle cell anemia and its laboratory workup in detail. (2+3+5)
4. Define hemolytic anemia. Describe in detail the classification and laboratory workup of hemolytic anemia (2+3+5)
5. What is a reticulocyte? What are the stains used for demonstration of reticulocytes? How does it help in anemia work up (2+ 4+4)
6. Discuss in detail about automation in cell counters and in ESR. (7+3)
7. What is Landsteiner's law? Mention the important blood group systems. Add a note on methods of blood group typing(3+3+4)
8. What are the transfusion related diseases. Enlist the laboratory investigations done in Blood bank to prevent transfusion related diseases. (3+7)
9. What all anticoagulants are used in blood bank for storing blood? Discuss the various blood components prepared in a Blood Bank and their uses? (3+7)
10. What is hemapheresis. What are the types of apheresis. Describe the functioning of an apheresis machine highlighting the function of each component. (2+2+6)

**M.SC. MLT PATHOLOGY**  
**CORE THEORY PAPER I: BASIC HEMATOLOGY AND BLOOD BANKING**  
**BLUE PRINT**

<b>Unit No.</b>	<b>Unit</b>	<b>Marks Allotted</b>	<b>No.of questions</b>
<b>1</b>	Basic haematology	<b>10</b>	<b>1</b>
<b>2</b>	Anemia	<b>10</b>	<b>1</b>
<b>3</b>	Haemoglobinopathies And Clinical invstigation	<b>30</b>	<b>3</b>
<b>4</b>	Leukocyte Disorders	<b>10</b>	<b>1</b>
<b>5</b>	Blood Banking	<b>20</b>	<b>2</b>
	<b>TOTAL</b>	<b>80</b>	<b>8</b>



**SYLLABUS**  
**FIRST YEAR M.Sc. MLT PATHOLOGY**  
**CORE THEORY PAPER II: BASIC HISTOPATHOLOGY, LABORATORY**  
**ORGANIZATION IN PATHOLOGY**

S.NO.	TOPICS	TOTAL HOURS(60)
I	<p><b>Basics of Histology and Instrumentation:</b></p> <ul style="list-style-type: none"> <li>• General introduction to Histological equipment and instruments, their uses, constructions,</li> <li>• maintenance and repair - Organisation of Histology Laboratory.</li> </ul>	10 hours
II	<p><b>Collections of specimen and biopsy:</b></p> <ul style="list-style-type: none"> <li>• Reception and recording of tissue specimen - Biopsy, types of biopsy - Fixation and fixatives - Collection of specimens - Bits taking</li> </ul>	10 hours
III	<p><b>Tissue Processing and Microtome:</b></p> <ul style="list-style-type: none"> <li>• Tissue processing and Microtomy including Frozen along with Trouble shooting in these areas - Tissue processing - automatic and hand processing, details of the instrument, working of automatic- tissue processor - Microtomy - different types, use and care of microtome knives, sharpening, cutting, artifacts in cutting, cutting of different tissues, disposable blades. Decalcification</li> </ul>	16 ours
IV	<ul style="list-style-type: none"> <li>• Staining methods: Staining - theoretical aspects and practical implications Preparation and quality control of all routine and special stains used in Histopathology Haematoxylin and eosin - counter stains. Special stains - stains for nucleic acid, lipid, endogenous pigments, connective tissue, enzymes, amyloid, deposits, fibrin</li> </ul>	16 hours
V	<p><b>Automation in histopathoogy:</b></p> <ul style="list-style-type: none"> <li>• Tissue processing.</li> </ul>	8 hours

	<ul style="list-style-type: none"><li>• Staining.</li><li>• Microtomy and tissue Embedding.</li><li>• Biomedical waste management in histopathology.</li></ul>	
--	--	--

## Reference

- Robbins Basic Pathology (Robbins Pathology)- Basic of pathology.
- Pathoma 2021, by Husain A Sattar- Fundamentals of pathology.

**MODEL QUESTION PAPER  
M.SC MLT PATHOLOGY**

**CORE THEORY PAPER: PAPER -2: BASIC HISTOPATHOLOGY, LABORATORY  
ORGANIZATION IN PATHOLOGY**

**Time: 3 Hours**

**Maximum Marks: 80**

**Illustrate your answers with suitable diagrams where ever necessary.**

**Each question carries 10 marks Total = 80 marks, write any 8 questions.**

1. Define fixation. What are the properties of an ideal fixative and how are fixatives classified. (2+3+5)
2. What is frozen section? Discuss the role of cryostat in frozen section analysis. Add a note on trouble shooting in frozen section. (2+4+4)
3. Enumerate the different microtomes with notes on their specific uses in Histopathology. Discuss in detail the artefacts in microtomy sections. (5+5)
4. Discuss the preparation and storage of Hematoxylin and Eosin stain. Add a note on trouble shooting in H&E stain. (5+5)
5. Discuss the different stains used for demonstrating micro-organisms. (10)
6. Name the special stains for demonstration of mucin. What is the principle of Mucicarmine stain?  
What is importance of pH in mucin stains (3+3+4)
7. What are the various endogenous pigments in humans? Discuss in detail the special stains used for demonstrating these endogenous pigments. (3+7)
8. Discuss in detail the working of an automated tissue processor and add a note on the advantages and disadvantages of automatic tissue processing. (6+2+2)
9. Discuss in detail about laboratory safety at different levels in histopathology. (10)
10. Enumerate and elaborate the various methods available for decalcification? Add a note on checking of end point of decalcification (7+3)

**M.SC.MLT PATHOLOGY**  
**CORE THEORY PAPPER 2 -BASIC HISTOPATHOLOGY, LABORATORY ORGANIZATION IN**  
**PATHOLOGY**  
**BLUEPRINT**

<b>Unit No.</b>	<b>Unit</b>	<b>Marks Allotted</b>	<b>No.of questions</b>
<b>1</b>	Basics of Histology and Instrumentation	<b>10</b>	<b>1</b>
<b>2</b>	Collections of specimen and biopsy	<b>10</b>	<b>1</b>
<b>3</b>	Tissue Processing and Microtome	<b>30</b>	<b>3</b>
<b>4</b>	Staining methods	<b>10</b>	<b>1</b>
<b>5</b>	Automation in histopathoogy	<b>20</b>	<b>2</b>
	<b>TOTAL</b>	<b>80</b>	<b>8</b>

**SYLLABUS**  
**FIRST YEAR M.Sc. MLT PATHOLOGY**  
**CORE THEORY PAPER 3: BASIC CYTOLOGY AND CLINICAL PATHOLOGY**

S.NO	TOPICS	TOTAL HOURS(60)
I	<b>Basic Cytology:</b> <ul style="list-style-type: none"> <li>• Basic Structure of mammalian cell</li> <li>• Cell Physiology, Cell cycle and cell division</li> <li>• Chromosome structure, human chromosome complements and methods of demonstration of sex Chromatin.</li> </ul>	10 hours
II	<b>Benign and malignant cell pathology</b> <ul style="list-style-type: none"> <li>• Benign Pathological processes affecting the cell:</li> <li>• General introduction to tumours and morphological characters of cancer cells</li> <li>• Pathology and Cytology of Female Genital tract</li> <li>• Anatomy, embryology, histology and physiology of Female Genital Tract</li> <li>• Cytology of female genital tract and normal vaginal flora Inflammatory lesions of vagina and cervix.</li> <li>• Hormone cytology in various age groups</li> </ul>	10 hours
III	<b>Fluid cytology and pathology:</b> <ul style="list-style-type: none"> <li>• Effusion cytology including synovial fluid cytology. CSF cytology and cell count.</li> <li>• Introduction to FNAC and guided FNAC. Handling of laboratory reagents and equipment.</li> <li>• Staining techniques in cytology along with relevant special stains.</li> <li>• Use of cytopsin.</li> <li>• Methods of cell block preparation.</li> <li>• Biomedical waste management in cytology</li> </ul>	10 hours
IV	<b>Sample Collection and processing</b> <ul style="list-style-type: none"> <li>• Collection, transport, preservation and processing of various clinical specimens</li> <li>• Urine examination, Physical, chemical and</li> </ul>	15 hours

	<p>microscopic. Manual chemical tests and Urine analysis</p> <ul style="list-style-type: none"> <li>• by Strip method. Automation in urine examination</li> <li>• Test for haemosiderin pigment in urine.</li> <li>• Stool examination Test for Occult blood - Benzidine Test</li> <li>• Sputum examination - Collection of specimen i. Physical examination ii. Microscopic - Gram's stain, ZiehlNeelsen stain for AFB iii. Chemical examination. Concentration methods.</li> </ul>	
V	<p><b>Fluid collection and processing:</b></p> <ul style="list-style-type: none"> <li>• Cerebrospinal fluid analysis Method of obtaining CSF, indications, contra indications.</li> <li>• Examination of CSF :i. Physical examination ii. Biochemical examination iii. Microscopic examination a. Cytological examination b. Bacteriological examination</li> <li>• Body fluids Microscopic examination of Pleural, Pericardial, synovial, ascitic and peritoneal fluid.</li> <li>• Semen analysis</li> <li>• Synovial fluid analysis</li> </ul>	15 hours

## Reference

- Robbins Basic Pathology (Robbins Pathology)- Basic of pathology.
- Pathoma 2021, by Husain A Sattar- Fundamentals of pathology.

**MODEL QUESTION PAPER**  
**M.SC MLT PATHOLOGY**  
**CORE THEORY PAPER -3: BASIC CYTOLOGY AND CLINICAL PATHOLOGY**

**Time: 3 Hours**

**Maximum Marks: 80**

**Illustrate your answers with suitable diagrams where ever necessary.**

**Each question carries 10 marks Total = 80 marks, write any 8 questions.**

1. Draw and discuss in detail the mammalian somatic cell cycle. (10)
2. Draw and label a normal human chromosome. Describe the normal human karyotype. Elaborate on the various methods of demonstrating sex chromatin. (2+3+5)
3. Discuss the fixatives used in Cytology. Add a note on coating fixatives. (5+5)
4. Describe in detail the role of cytospin centrifuge in a cytology laboratory. (10)
5. Discuss the principle, preparation, procedure and utility of PAS stain in cytology practice. (2+3+2+3)
6. Describe the handling of mucoid specimens and bloody fluid samples highlighting the contrast with handling of clear, low protein fluids. (5+5)
7. Discuss the cytological aspects of various infective conditions that can be detected in vaginal smear. (10)
8. Discuss in detail the handling and processing of CSF sample. Add a note on CSF cell counting. (7+3)
9. What are the methods of fine needle aspiration. Discuss troubleshooting in Pap stain. Add a note on Diff Quik stain. (2+6+2)
10. Discuss the handling of glassware in cytology laboratory. Add a note on disposal of various stains used in cytology laboratory. (5+5)

**M.SC.MLT PATHOLOGY**  
**CORE THEORY PAPPER 3 - M.SC.MLT PATHOLOGY**  
**CORE THEORY PAPPER 2 - BASIC CYTOLOGY AND CLINICAL PATHOLOGY**  
**BLUEPRINT**

<b>Unit No.</b>	<b>Unit</b>	<b>Marks Allotted</b>	<b>No.of questions</b>
<b>1</b>	Basic Cytology	<b>10</b>	<b>1</b>
<b>2</b>	Benign and malignant cell pathology	<b>20</b>	<b>2</b>
<b>3</b>	Fluid cytology and pathology	<b>30</b>	<b>3</b>
<b>4</b>	Sample Collection and processing	<b>10</b>	<b>1</b>
<b>5</b>	Fluid collection and processing	<b>10</b>	<b>1</b>
	<b>TOTAL</b>	<b>80</b>	<b>8</b>



# **DISCIPLINE SPECIFIC ELECTIVE**

**SYLLABUS**  
**DISCIPLINE SPECIFIC ELECTIVE COURSE-01**  
**RESEARCH METHODOLOGY AND BIOSTATISTICS**  
**CREDIT 3**

**UNIT I - 10 HOURS**

Research Methodology : Meaning , objectives and types of research, research approaches, significance of research. Research and scientific methods, research process and criteria of good research Definition and identification of a research problem - Selection of research problem, Justification , theory , hypothesis , basic assumptions, limitations and delimitations of the problems.

**UNIT II - 9 HOURS**

Introduction of bio statistics - Meaning and its scope; Population and Sample, Parameter and Statistics; types of statistical data; Diagrammatic representation data; Mean, Median, Mode. Standard deviation. Coefficient of variation. Skewness and Kurtosis. Probability - Definition, Axioms of Probability; addition and Multiplication theorem.

**UNIT III - 9 HOURS**

Concept of correlation - Simple, Partial regression- Simple Methods of Association - Chi square test of association of attributes, Goodness of fit.

**UNIT IV - 10 HOURS**

Concept of Hypothesis - Null, Alternative Hypothesis. Type I and type II errors. Sampling distribution Standarderror t & F distribution; t test based on single samples, two sample mean. Paired samples, F test two sample variances f test for several mean (one way ANOVA only). Z - test for proportion - one sample, two sample, MS -excel support for above expression.

**UNIT V - 10 HOURS**

Framing proposal for acquiring grants: the question to be addressed - rationale and importance of the questionbeing addressed - Empirical and theoretical framework - Presenting pilot study / data or background information - Research proposal and time frame- Specificity of methodology- Organization of different phases of study- Expected outcome of study and its implications - Budgeting - Available infrastructure and resources -Executive summary

**Text books and Reference materials**

1. Bandarkar, P.L and Wilkinson T.S (2000): Methodology and Techniques of social Research , Himalaya Publishing House, Mumbai.
2. Copper, H.M.(2002) Integrating research: A guide for literature review (2nd Edition) California; Sage

# ENVIRONMENTAL SCIENCE

<b>NAME OF THE SUBJECT PAPER</b>	<b>: ENVIRONMENTAL SCIENCE</b>
<b>DURATION OF THEORY CLASSES</b>	<b>: 45 hrs</b>
<b>EXAMINATION</b>	<b>: (40 U + 10 IA)</b>
<b>DURATION OF THEORY EXAMINATION</b>	<b>: 1 ½ hrs</b>

## UNIT-I (Renewable and Non – renewable resources)

The multidisciplinary nature of environmental studies – Definition, scope and importance – Need for public awareness.

1. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
2. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
3. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
4. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
5. Energy resources: Growing energy needs, renewable and non-renewable energy resources, use of alternate energy sources, case studies.
6. Land resources: Land as a resource, land degradation, man induced Landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

## UNIT-II (Ecosystems)

Concept of an ecosystem - Structure and function of an ecosystem Producers, consumers and decomposers – Energy flow in the ecosystem-Ecological succession- Food chains, food webs and ecological pyramids –Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (Ponds, streams, lakes, rivers, ocean estuaries)

## UNIT-III (Biodiversity and its conservation)

Introduction – Definition: genetics, species and ecosystem diversity

- Biogeographically classification of India
- Value of Biodiversity: Consumptive use, productive use, social, ethicalaesthetic and option values
- Biodiversity at global, national and local levels
- India as a mega- diversity nation

- Hot-spots of biodiversity-Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

## **UNIT-IV (Environmental Pollution)**

Definition- causes, effects and control measures of:

- Air pollution
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear pollution
- Solid waste Management: causes, effects and control measures of urban and industrial wastes – role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

## **UNIT-V**

Social Issues and the Environment: From unsustainable to sustainable development – Urban problems and related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies - Environmental ethics: issues and possible solutions climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

- Wasteland reclamation – Consumerism and waste products – Environmental Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act - Issues involved in enforcement environmental legislation – Public awareness
- Human Population and the Environment: Population growth, variation among nations – Population explosion – Family welfare Programmes – Environment and human health- Human Rights - Value Education- HIV/ AIDS - Women and Child Welfare- Role of Information Technology in Environment and Human Health – Case Studies.

## **FIELD WORK**

1. Visit to local area to document environmental assets- river/ forest/ grassland / hill / mountain
2. Visit to a local polluted site - Urban / Rural / Industrial / Agricultural
3. Study of common plants, insects, birds
4. Study of simple ecosystems- pond, river, hill slopes, etc.

## **TEXT BOOKS RECOMMENDED**

1. Agarwal, K.C. Environmental Science, Nidi Publishers.
2. Bharucha Erach, The Biodiversity of India, Mapin Publication.
3. Brunner RC, Hazardous waste incineration, McGraw Hill Publishers.
4. Iaclhav H, Environmental Protection and Laws, Himalaya Publication.
5. Odum EP, fundamentals of Ecology, WB Sannders Publication.

## **TEACHING LEARNING ACTIVITIES**

The course content in Environmental Studies will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Field Visits

## **GENERIC ELECTIVE COURSE 02 BASICS OF HOSPITAL ADMINISTRATION**

**NAME OF THE SUBJECT PAPER** : Basics of Hospital Administration  
**DURATION OF THEORY CLASSES** : 45 Hrs.  
**EXAMINATION** : 50 Marks (40 U + 10 IA)  
**DURATION OF THEORY EXAMINATION** : 1 ½ Hrs.

### **COURSE OBJECTIVES**

- To provide orientation about the hospital functions
- To familiarize students with the basics concepts of hospital management

### **UNIT: I ORGANISATION OF A HOSPITAL AND ITS DEPARTMENTS**

1. Organogram
2. Vision, Mission & Values, Logo
3. Patient Service Points - Clinical & Non-Clinical (OPD's, A&E, MHC, Wards, ICU's, OT's, etc.)
4. Scope of Services (Medical & Supportive Services)

### **UNIT:II HOSPITAL POLICIES & PROCEDURES**

1. Registration Process
2. OP/IP Billing
3. Admission Process
4. Discharge Process
5. Financial counseling
6. Visitors Policy
7. Feedback forms.

### **UNIT: III MEDICAL RECORDS MANAGEMENT/LEGAL ASPECTS**

- 1.Types of Medico legal cases
- 2.SOP's for handling MLC
- 3.Medical Records -Forms, consents, registers used in hospitals.

### **UNIT:IV QUALITY MANAGEMENT**

1. Quality - Brief Introduction
2. Code of Conduct for healthcare professionals
- 3.Patient rights & responsibilities
4. Incident Reporting
5. Quality Indicators
6. List of Licenses to be obtained to run a Hospital College

7. Accreditation - ISO/NABH/JCI

**UNIT: VOCCUPATIONAL SAFETY**

1. Biomedical Waste Management
2. Hospital Spill Management
3. Usage of PPE
4. Emergency Codes
5. Fire Safety Management
6. Hospital Infection Control

**UNIT: VIORGANISATIONAL BEHAVIOUR**

1. Communication with patients/health care professionals
2. Grooming standards
3. Time Management
4. Grievance Handling, Interdisciplinary Committee
5. Leadership

**LEARNING OUTCOMES**

Students will have an overview of hospital functions, processes and patient management.

## GENERIC ELECTIVE 03 LIFESTYLE DISORDERS

NAME OF THE SUBJECT PAPER	: Lifestyle Disorders
DURATION OF THEORY CLASSES	: 45 Hrs.
EXAMINATION	: 50 Marks (40 U + 10 IA)
DURATION OF THEORY EXAMINATION	: 1 ½ Hrs.

### THEORY (45 Hours)

#### UNIT I Modern Life style disorders

Deskbound and sleeping habits, junk food, anxiety. Food poisoning, Acidity.

#### UNIT II Dietary disorders

Food groups and concept of a balanced diet, obesity, metabolic syndrome, hypertension- their causes and prevention through dietary and lifestyle modifications **UNIT III Social health problems** Smoking, alcoholism, drug dependence and Acquired Immuno Deficiency Syndrome (AIDS).

#### UNIT IV Gastrointestinal disorders

Stomach disorders- Gastritis, Ulcer, Amoebiasis, Constipation, piles Common ailment- cold, cough, fevers, diarrhoea, constipation- their causes and dietary treatment

#### Learning outcomes:

To understand the relevance, significance and implications of lifestyle disorders for the betterment of human life quality

#### Text Books

1. Text book of Clinical Biochemistry- Carl. A. Burtis and Edward R. Ashwood
2. Text Book of Medical Biochemistry - Dr. M.N. Chatterjee and Rane Shinde

#### Reference Books

1. P. Singh MD. Textbook of Nutrition and Health; First Ed; 2008; Academic Excellence
2. Biochemistry with Clinical Correlation- Thomas M. Devli



# SECOND YEAR

**SECOND YEAR M.Sc. MLT PATHOLOGY  
CORE THEORY PAPER-IV ADVANCED HAEMATOLOGY, ADANCE  
INSTRUMENTATION AND AUTOMATION  
SYLLABUS**

S.No.	TOPICS	TOTAL HOURS(60)
1.	<b>Introduction of blood disorder:</b> Disorders of Haemoglobin Structure of Hb and Synthesis-Normal and Abnormal haemoglobins, Haemoglobinopathies and Thalassemias	14hours
2.	<b>Haemoglobinopathies And Clinical investigation:</b> Haemolytic anaemia: Definition, pathogenesis, classification, clinical features. Laboratory investigations (screening and diagnostic) to establish a case of haemolytic anaemia. Tests done: a. Peripheral smear - specific morphologic abnormalities b. Osmotic fragility test c. Coomb's test d. Sickling phenomenon e. Kleihauer acid Elution test f. Alkali denaturation test g. Ham's test, Sucrose lysis Test h. Electrophoresis - HbF&Hb A2 estimation i. Test for G6PD deficiency j. Concept of HPLC	10hours
3.	<b>Leukocyte disorder:</b> Bone marrow examination - Aspiration and trephine biopsy Indications, smear making, processing of trephine biopsies. Leucocyte Disorders □ Leucocytosis - causes □ Leukaemoid reaction - causes, laboratory tests □ Leukaemias: Definition, classification - FAB & WHO- classification of acute leukaemias, Diagnostic criteria, Cytochemical staining and Immuno phenotyping □ Chronic Leukaemias: classification, Diagnostic criteria	14hours
4.	<b>Myeloid splastic syndromes and Bleeding disorder:</b> Myeloid splastic syndromes- Introduction, disease entities, laboratory work up Myeloproliferative disorders - classification ,Clinical features, laboratory investigations. Chronic myeloid	12hours

	<p>leukaemia in detail. Plasma cell disorders - classification. Plasma cell myeloma - definition. Clinical features, laboratory investigations.</p> <p>Bleeding disorders :</p> <ul style="list-style-type: none"> <li>▫ Platelet disorders - Qualitative and Quantitative, Causes and laboratory investigations</li> <li>▫ Coagulation disorders - Inherited and acquired, Laboratory work up.</li> </ul> <p>Thrombotic disorders - Inherited and acquired and laboratory work up.</p> <p>Automation in hematology including coagulation</p>	
5.	<p><b>Flow cytometry</b></p> <p>Organization and quality assurance in hematology - Internal Quality control and external quality assessment programmes .</p> <p>Biomedical waste management pertaining to hematology.</p>	10hours

## Reference

- Robbins Basic Pathology (Robbins Pathology)- Basic of pathology.
- Pathoma 2021, by Husain A Sattar- Fundamentals of pathology.

**MODEL QUESTIONPAPER**  
**SECOND YEAR M.Sc. MLT (Pathology) -**  
**CORE THEORY PAPER- IV (ADVANCED HEMATOLOGY**  
**AND AUTOMATION)**

**Time:3hrs**

**Max Marks:80**

**Short Essay questions: (any eight)**

**Each question carries 10 marks Total = 80 marks**

1. Enumerate the indications of Bone marrow examination. What are the various needles used to obtain bone marrow samples. Add a note on processing of bone marrow biopsy. (4+3+3)
2. Define Acute Leukemia. Discuss the utility of various cytochemical stains in the workup of Acute Leukemias. (2+8)
3. Discuss the presentation, peripheral smear picture and cytogenetic anomaly in Chronic Myeloid Leukemia (CML). Add a note on the utility of LAP score in the diagnosis of CML. (6+4)
4. Enumerate the various laboratory tests used in the diagnosis of Multiple Myeloma. Write in detail on the role of serum Electrophoresis in such patients. (4+6)
5. Discuss the coagulation pathways involved in clotting of blood. Add a note on the base line coagulation tests (5+5)
6. Discuss the importance of preanalytical variables in coagulation testing. Add a note on platelet rich and platelet poor plasma (7+3)
7. What is the principle of Flow cytometry. Discuss sample preparation with emphasis on the various fluorophores used in Leukemia diagnosis in flow cytometry. (3+7)
8. What is the principle of Platelet aggregometry. Explain in detail the collection and processing of patient sample and preparation of reagents used in Aggregometer. (2+8)
9. What is Quality control. Enumerate few common pre-analytical and post-analytical variables in processing samples received for routine workup. Discuss the utility of Levey Jennings plot in hematology laboratory. (2+6+2)
10. Give an overview on the steps to be undertaken for Biomedical waste management in hematology section. Add a note on the safety measures to be undertaken in dealing with known Retropositive patients. (8+2)
11. Mention the methods of estimation of ESR and discuss about automation in ESR. (3+7)
12. Discuss the automation in urine analysis with its advantages and disadvantages (6+4)

**M.Sc. MLT PATHOLOGY- SECOND YEAR**  
**CORE THEORY PAPER-IV ADVANCED HAEMATOLOGY, ADVANCED**  
**INSTRUMENTAION AND AUTOMATION**  
**BLUEPRINT**

Unit No.	Title	Marks allotted	No.of questions
1	Introduction of blood disorder	10	1
2	Haemoglobinopathies And Clinical invstigation	20	3
3	Leukocyte disorder	20	2
4	Myelodysplastic syndromes and Bleeding disorder	20	2
5	Flow cytometry	10	1
	Total	80	8

\*Choice question can be taken from any unit

## SECOND YEAR M.Sc. MLT PATHOLOGY

### CORE THEORY PAPER- V ADVANCED HISTOPATHOLOGY

#### SYLLABUS

S.No	TOPICS	TOTAL HOURS(60)
1.	<b>Microscopic identification and tissue processing:</b> <ul style="list-style-type: none"> <li>• Microscopy - different types of microscopes used in pathology.</li> <li>• Electron microscopy - Principle and technical aspects</li> <li>• Tissue processing and Microtomy including Frozen along with Trouble shooting in these areas .</li> <li>• Tissue processing - automatic and hand processing, details of the instrument, working of automatic tissue processor</li> </ul>	10hours
2.	<b>Microtomy and quality control of histopathology</b> <ul style="list-style-type: none"> <li>• Microtomy - different types, use and care of microtome knives, sharpening, cutting, artifacts in cutting, cutting of different tissues, disposable blades.</li> <li>• Preparation and quality control of all routine and special stains used in Histopathology.</li> </ul>	14hours
3.	<b>Organization and quality assurance in histopathology</b> <ul style="list-style-type: none"> <li>• Special stains - stains for nucleic acid, lipid, endogenous pigments, connective tissue, enzymes, amyloid, deposits, fibrin</li> <li>• Decalcification.</li> <li>• Organization and quality assurance in histopathology - Internal Quality control and external quality assessment programmes</li> </ul>	12hours
4.	<b>Tissue of special interest</b> <ul style="list-style-type: none"> <li>• Tissue of special interest - hard tissue, nervous system, skin kidney</li> <li>• Plastic embedding media and techniques</li> <li>• Immunofluorescence</li> <li>• Immunoenzyme techniques (IHC)</li> <li>• Enzyme histochemistry and its applications</li> </ul>	14hours
5.	<b>Automation in Histopathology</b> <ul style="list-style-type: none"> <li>• New generation microtomes, tissue processing, paraffin, Embedding, Station ,stainers and cover</li> </ul>	10hours

	<p>slippers.</p> <ul style="list-style-type: none"><li>• Tissue -tek systems, Manual tissue microarray</li><li>• Image analysis</li><li>• Use of microwave oven in processing</li><li>• Automation and recent advances in different disciplines of pathology</li></ul>	
--	--	--

## Reference

- Robbins Basic Pathology (Robbins Pathology)- Basic of pathology.
- Pathoma 2021, by Husain A Sattar- Fundamentals of pathology.

**SECOND YEAR M.Sc. MLT PATHOLOGY**  
**MODELQUESTIONPAPER**  
**CORE THEORY PAPER- V ADVANCED HISTOPATHOLOGY**

**Time:3hrs**

**Max Marks:80**

**Short Essay questions: (any eight)**

**Each question carries 10 marks Total = 80 marks**

1. What are the various microscopes used in Pathology practice. Write a short note on Electron microscopy (EM) with special mention on sample processing for EM. (3+4+3)
2. Discuss plastic embedding media and their application in histopathology (10)
3. Discuss the principle of Fluorescence microscopy. Discuss the pre-analytical variables affecting processing on renal biopsies for Immuno fluorescence. (4+6)
4. Discuss the various techniques and enzyme systems available for performing Immuno histochemistry. (10)
5. Elaborate on the methods of extraction of cellular antigens for IHC. (10)
6. Elaborate, in detail, the processing of a Lung cancer specimen to be mounted for display in Pathology museum. What are the advantages of Perspex in museum science. (8+2)
7. What is Tissue Microarray. Describe the steps of preparation of a Tissue microarray highlighting the differences with conventional tissue processing. Add a note on the utility of Tissue Microarray. (2+6+2)
8. Discuss in detail Microwave processing highlighting the advantages over conventional Tissue processing. (10)
9. Write short notes on (5+5)
  - a. Stains for amyloid
  - b. Metachromatic dyes
10. Discuss the relevance of External quality assessment programme in Histopathology practice. Add a note on disposal of hazardous chemicals in Histopathology laboratory. (6+4)



**M.Sc. MLT PATHOLOGY- SECOND YEAR**  
**CORE THEORY PAPER- V ADVANCED HISTOPATHOLOGY**  
**BLUEPRINT**

Unit No.	Title	Marks allotted	No.of questions
1	<b>Microscopic identification and tissue processing</b>	10	1
2	<b>Microtomy and quality control of histopathology</b>	20	3
3	<b>Organization and quality assurance in histopathology</b>	20	2
4	<b>Tissue of special interest</b>	20	2
5	<b>Automation in Histopathology</b>	10	1
	<b>Total</b>	<b>80</b>	<b>8</b>

\*Choice question can be taken from any unit

**SECOND YEAR M.Sc. MLT PATHOLOGY**  
**CORE THEORY PAPER- VI Advanced Cytology**

**SYLLABUS**

S.NO	TOPICS	TOTAL HOURS(60)
1.	<b>Basics of pathology:</b> General Pathology and Cytology of Tumors Role of cytologic techniques in diagnosis of cancer.	10hours
2.	<b>Pathology and Cytology of Female Genital tract</b> □Cytology of benign disorders of epithelia of uterine cervix and vagina □Precancerous and cancerous lesions of cervix □Effect of therapeutic procedure such as radiotherapy and drugs on epithelia of female genital tract □Significance of cervical cancer screening	12 hours
3.	<b>Pathology and Cytology</b> Pathology and Cytology of Respiratory tract, urinary tract with a knowledge of distinguishing between normal and abnormal smears. Identifying malignancies - Aspiration biopsy cytology- General principles of technique and cytodiagnosis. Methods of cell block preparation Immuno cytochemistry on cytology smears.	14hours
4.	<b>Automation in cytology laboratory-</b> Liquid based cytology, Flow cytometry - methods of processing and technical aspects Cytogenetics: Karyotyping and banding techniques Laboratory organization and safety in cytology Setting up of the FNAC laboratory service.	12hours
5.	<b>Quality assurance in Cytology-</b> Internal Quality control and external quality assessment programmes - Biomedical waste management pertaining to Cytology section.	12hours

**Reference**

- Robbins Basic Pathology (Robbins Pathology)- Basic of pathology.
- Pathoma 2021, by Husain A Sattar- Fundamentals of pathology.

**SECOND YEAR M.Sc. MLT PATHOLOGY**  
**MODEL QUESTION PAPER**  
**CORE THEORY PAPER- VI ADVANCED HISTOPATHOLOGY**

**Time:3hrs**

**Max Marks:80**

**Short Essay questions: (any eight)**

**Each question carries 10 marks Total = 80 marks**

1. Discuss the cytomorphology of normal and reactive squamous cells in contrast to Squamous cell carcinoma. (10)
2. Elaborate on banding techniques in cytogenetic analysis. (10)
3. Explain the various methods used to prepare cell block from cytology samples. Enumerate the advantages of cell block preparation over aspirate smears. (6+4)
4. Elaborate on the processing of urine samples. Discuss automation in urine cytology. (5+5)
5. Discuss hormonal cytology across age groups stressing on calculation of hormonal indices. (7+3)
6. Discuss the various steps in performing immune cytochemistry and highlight the differences with immune histochemistry. Add a note on Multiplex immune histochemistry. (8+2)
7. Compare and contrast Sure Path and Thin Prep. Enumerate the advantages of Liquid based cytology over conventional Pap smear processing. (6+4)
8. What are the requirements in setting up a FNAC laboratory. Discuss the measures to be undertaken to ensure safe laboratory practice. (6+4)
9. Enumerate, with brief explanation, the various ancillary cytological techniques used in cytology samples emphasizing the ideal fixatives and specimen handling in each technique. (10)
10. What is Quality Assurance? Elaborate on the various quality control measures being practiced in our cytology laboratory. (2+8)

**M.Sc. MLT PATHOLOGY- SECOND YEAR**  
**CORE THEORY PAPER- VI ADVANCED CYTOLOGY**  
**BLUEPRINT**

<b>Unit No.</b>	<b>Title</b>	<b>Marks allotted</b>	<b>No.of questions</b>
<b>1</b>	<b>Basics of pathology</b>	<b>10</b>	<b>1</b>
<b>2</b>	<b>Pathology and Cytology of Female Genital tract</b>	<b>20</b>	<b>3</b>
<b>3</b>	<b>Pathology and Cytology</b>	<b>20</b>	<b>2</b>
<b>4</b>	<b>Automation in cytology laboratory</b>	<b>20</b>	<b>2</b>
<b>5</b>	<b>Quality assurance in Cytology</b>	<b>10</b>	<b>1</b>
	<b>Total</b>	<b>80</b>	<b>8</b>

**SYLLABUS**  
**DISCIPLINE SPECIFIC ELECTIVE COURSE-02**  
**BIOMEDICAL WASTE MANAGEMENT**

**UNIT I: Introduction to hospital waste**

- Definition classification of hospital wastes.
- Types and composition : Types of solids, liquids, sharps, blood and blood tissue, radioactive material, biological and chemical material.
- Hospital effluents: Nature and composition, Levels of generation in a small clinic nursing home, small and large hospital, storage of hospital waste; Types of bags and containers used for usage.

**UNIT II: Biomedical Waste Management Guideline**

- Requirement
- Documentation of Biomedical waste types and guidelines
- Biomedical wastes (Management & Handling) Rules , 1998; and amendments.

**UNIT III: Principles of Biomedical Waste Management**

- Segregation of biomedical waste.
- Handling and transport of hospital waste; Authorization and accidental spilling
- Methods/ treatments required for disposal of pathogens
- Waste disposal methods
- Techniques of waste management
- Protocols of HW management

**UNIT IV: Waste prevention**

- Waste reduction activities
- Waste recycling,

**UNIT V: Biomedical Waste Treatment facility**

- Introduction, location, land requirements,
- Coverage area, types of equipment
- Infrastructure requirements,
- Record keeping,
- Waste collection, transport and storage facilities, precautions required.

**Text Books:**

1. Sustainable Biomedical Waste Management, P.K.Behera, 2<sup>nd</sup> Edition .2008.
2. Biomedical Waste Management, R.RadhaKrishnan, 1<sup>st</sup> edition,2005
3. The environmental Protection Act, 1986.

# **SKILL ENHANCEMENT ELECTIVE COURSE**

## SKILL BASED ELECTIVE COURSES - II YEAR

### SEC-03 Basics of Yoga and Practice

<b>NAME OF THE SUBJECT PAPER</b>	: Basics of Yoga and Practice
<b>DURATION OF THEORY CLASSES</b>	: 45Hrs.
<b>EXAMINATION</b>	: 50 Marks (40 U + 10 IA)
<b>DURATION OF THEORY EXAMINATION</b>	: 1 ½ Hrs.

Unit	TIME(HRS)	CONTENT
1	1	Introduction to Yoga philosophy, psychology and lifestyle
2	1	A brief outline of the history of Yoga.
3	1	Cultivation of correct psychological attitudes
4	1	Asanas : Definition, Types, scope and limitations of Asanas
5	1	Pranayamas and their significance in Yogic curriculum, Types & phases of Pranayama.
6	1	Dharna and Dhyana as the keys to unlocking human potential.
7	1	Study of various aspects of Yoga: Kriyas, Bandhas, Mudras
8	1	Yoga defined as –Integration   and –Harmony
9	1	Meaning of the term –Positive Health
10	1	Yoga, a tool to restore homeostasis
11	1	Integration of Yoga into Health Professions Education
12	1	Order of teaching the Yogic practices; Do's and Dont's of specific Yoga techniques.
13	2	Applied aspects of Yoga in various human activities like therapeutics, education and sports
14	2	Introduction to yogic concept of health and disease



## **Unit 15: Introduction to Yogic techniques: Methods and practices (32 hours)Asanas (26 hrs):**

- Aruna Surya Namaskar
- Ardha -Padmasana/Padmasana
- ArdhakatiChakrasana
- Pada Hasta
- PavanaMuktasana
- Trikona
- Navasana
- Ardha - Shalabhasana
- Shalabhasana
- Makarasana
- Bhujangasana
- Dhanurasana
- Vakrasana
- Vrikshasana
- Ushtrasana
- Gomukasana
- Yoga Mudra.
- Natarajasana
- Chakrasana
- Sarvangasana
- Matsyasana
- Halasana
- Shavasana

## **Pranayama (6 hrs)**

- Vibhaga Pranayama
- Pranava Pranayama
- Savitri Pranayama
- Chandra and Surya Nadi Pranayama
- Nadi - Shuddhi
- Sheetali and Sitkari

## **PRESCRIBED TEXT BOOKS**

- Dayanidy G and Bhavanani AB. CYTER Practical Book. Pondicherry, India:Dhivyananda Creations; 2016.
- A primer of Yoga Theory - Dr Ananda BalayogiBhavanani, DhivyanandaCreations, Pondicherry-13
- Fundamentals of Yoga History- Compilation by MeenaRamanathan
- Basic Hatha Yoga lessons (Tamil) - Dr Ananda Balayogi and MeenaRamanathan,Puducherry

## **BOOKS RECOMMENDED FOR STUDIES AND REFERENCE**

1. A yogic approach to stress-Dr Ananda BalayogiBhavanani, Ananda Ashram,Pondicherry
2. Asana, Pranayama, Mudra and Bandha. Swami Satyananda, Bihar School ofYoga, Monger
3. ASANAS : WHY? AND HOW? - by Shri. O.P. Tiwari. Kaivalyadhama, Lonavla.
4. Ramanathan Meena. Applied Yoga: Applications of Yoga in Different Fields ofHuman Activities. 3<sup>rd</sup> Ed; Pondicherry, India: Sri Balaji Vidyapeeth; 2018
5. PRANAYAMA - by Swami Kuvalayananda. Kaivalyadhama, Lonavla.
6. Yoga and sports- Swami Gitananda and Meenakshi Devi, Ananda Ashram,Pondicherry

**SEC 02 : ENGLISH**  
**NAME OF THE SUBJECT PAPER : ENGLISH**

<b>DURATION OF THEORY CLASSES</b>	<b>: 16 hrs</b>
<b>DURATION OF PRACTICAL SESSIONS</b>	<b>: 34 hrs</b>
<b>EXAMINATION</b>	<b>: 100 marks (80 U + 20 IA)NO</b>
<b>UNIVERSITY PRACTICAL EXAMINATION</b>	
<b>DURATION OF THEORY EXAMINATION</b>	<b>: 1 ½ hrs</b>
<b>SUBJECT PAPER IS TAUGHT</b>	<b>: 1 YEAR</b>

**SYLLABUS**

**(THEORY& PRACTICALS = 16 +34 Hours)**

**COURSE DESCRIPTION:** This course is designed to build spoken and written English competency of the students needed to function effectively in academic setup.

**OBJECTIVES:** On completion of this subject, the student will be able to:

1. Speak and write grammatically correct sentences in English.
2. Develop effective writing skills.
3. Build fluency in English

**UNIT : I GRAMMAR**

1. Remedial Grammar : Parts of speech; Types of sentences, question tags
2. Modal verbs;
3. Tenses
4. Concordance

**UNIT : II VOCABULARY**

1. Word formation - prefixes and suffixes
2. Medical terminology
3. Words often misused or confused
4. Idioms and phrases

**UNIT : III WRITING SKILLS**

1. Letter writing - permission, leave and other official letters
2. Note making methods
3. Jumbled sentences - cohesion
4. Paragraph Writing

**UNIT : IV SPOKEN COMMUNICATION**

1. Pronunciation of commonly mispronounced words
2. Day to day conversation
3. Telephonic conversations

4. Group Discussions

## **UNIT : V LISTENING AND READING SKILLS**

1. General Listening and reading comprehension

### **Textbook Recommended**

1. Effective English Communication by Krishna Mohan and Meenakshi Raman, TataMcGraw - Hill Publishing Company Limited, New Delhi.

2. English for Colleges and Competitive Exams by Dr. R. Dyvadatham, EmeraldPublisher